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CONTENT

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TCP BANDWIDTH MEASUREMENT OF WI-FI NETWORK IN DIFFERENT VERSIONS OF ANDROID SMARTPHONES

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ABSTRACT- Today android smart phones are becoming more and more popular due to functionality with various useful applications. It is the platform of communications. The smart phones are equipped with Wi-Fi technology. The Wi-Fi on smart phones used to fast and possibly free Internet access, direct communication between nearby devices. The increasing number of 802.11acess point (AP), the wireless devices which causes unsatisfactory wireless performance. The major evaluation parameter and matrices are considered on the network. In this paper, performance analysis, bandwidth measurement and response time of Wi-Fi network are taken into the account. Here the IPERF ,a software tool is used effectively and that diagnoses root causes of bandwidth performance and response of Wi-Fi network in different version of android mobile phones. The obtained results concludes that higher versions of androids phones utilises less channel bandwidth as compare to the lower versions of android phones. This leads to the better performance of android smart phones in internet speed and android based functionality.

Keywords- Wi-Fi, Smartphone, Android, TCP Bandwidth

INTRODUCTION:

Wired technology for communication have been available for the several years but these technology have been drawbacks of using cable, it is very difficult to use for long distance communication. Even also reliability does not occur. Therefore these drawbacks can be overcome by using wireless communication. The wireless communication has been allowed for transferring data over long distance[1, 11, 3]. The primary advantage of using wireless communication is Reliability of data, greater mobility and possibilities to move devices and connect it freely without utilization of cables.Wireless communication communicates via satellite. The data can transfer with the help of wireless sensor network such Wi-Fi[4,11].

Wi-Fi is the wireless fidelity which allows an electronic device to communicate over wireless signal. Fidelity gives compatibility between wireless equipment from different manufacturer. Wi-Fi works on physical and data linklayer [12]. It allows local area network to operate without cables and wiring. It is very much popular for the home and business network [6]. It can be used to provide wireless broad band internet access for many devices such as laptops, smartphones, tablets and computers with authentication. It uses radio frequency to transmit and receive data at higher speed frequency with the electromagnetic spectrum associated with radio wave propagation. When an RF current is passing through and antenna an electromagnetic field is created that is able to propagate through space [4,11].

2. Standards of Wi-Fi:

There are multiple standards for wireless n/w available today with varying levels of standardization and interoperability. The IEEE finalized the initial standards for wireless n/w under the title of IECE 802.11. It defines the format and structure of short range signals that provide the Wi-Fi service.[4,14] The original 802.11 standard was released in 1997. It covers several types of wireless media and specifies a 2.4 GHz operating frequency with the data rate of 1 and 2 Mbps. It uses either frequency hopping or direct sequence because of relatively low data rate as compared to Ethernet. In 1999, IEEE published two additional 802.11 standards : 802.11a and 802.11b. The 802.11 operates the physical layer in the 5 MHz radio spectrum with data rate up to 54Mb/s. It covers 50.20 meter range and higher range physical layer as compared to 802.11b. It has less radio frequency interference with other type of devices. However 802.11 are not compatible with 802.11b and 802.11g as with the initial standards 802.11b operates in the 2.4Ghz radio spectrum but it includes 5.5 and 11Mb/s data rates with the range 30m, but it produces more frequency interference. The 802.11 extends the data rate in 2.4 GHz radio frequency band to 50Mbp/s using orthogonal frequency division Multiplexing. It is the combination of 802.11a and IEE 802.11b. It is appeared offering greater performance on the basis of speed and range. Another improved standard called 802.11n has yet to be finalized. It has an additional features of MIMO (Multiple inputs and Multiple outputs)[4,14]. It specifies an operation in the 2.4Ghz radio spectrum with an data rate 54Mbps to 600Mbps.Following table gives overall idea about Wi-Fi standards[3,6].

Parameters	802.11 Standards of Wi-Fi			
	802.11a	802.11b	802.11g	802.11n
Year	1999	2001	2003	2009
Freq. Range	5Ghz	2.4Ghz	2.4Ghz	5Ghz
Data Rate	54Mbp/s	11Mb/s	54 Mb/s	600Mbp/s
Modulation	OFDM	DSSS	OFDM	OFDM

Table 1: Summary of IEEE 802.11 standard

I. Elements of Wi-Fi network:

1)Access point : Wireless trans receiver/base station to connect one or many wireless device simultaneously to the Internet .[7]

2) Wi-Fi cards : They accept the wireless signal and relay information internal or external such as PCMCIA Card, PCI card).[7]

3)Safeguards : Firewalls and anti-virus software to keep information secure.[7]

II. Topology used in wireless LAN

1) Ad-hoc wireless LAN: Many wireless nodes connect together to establish a peer to peer communication. Clients devices communicate to each other directly, only the clients within the transmission range can communicate to each other. If a client wishes to communicate outside the transmission range, the clients must operate as gateway and perform routing. No access requiressharing their resources. It works without an access point.[4]

2) Infrastructure wireless LAN :
Wireless nodes communicate through access points the access point allow the wireless nodes to share the available n/w resources efficiently. [4]

4. Performance metrics of Wi-Fi network:

There are five key performance metrics to consider when evaluating a wireless solution:
Coverage: The primary driver of coverage is link budget. Link budget measures the ability of a wireless system to overcome obstacles to close a link. Three primary factors that contribute to link budget: transmit power, antenna gain, and receiver sensitivity. The range of a wireless link to reliably connect devices. [4,13,5]
Capacity : Coverage and capacity must work in parallel to achieve a highly functioning network, and work in conjunction to drive the ratio of gateways to device endpoints. Providing coverage for many devices without proper capacity is pointless; conversely, excess capacity without coverage to reach devices is equally futile. It is the optimal mix of the two that delivers cost effective performance for a wireless network. The amount of data from device endpoints an AP can simultaneously serve. [4,8]
Coexistence: At the PHY-layer, techniques such as direct sequence spread spectrum (DSSS) that can operate at negative Signal to Noise Ratio (SNR) are particularly strong because they are designed to withstand far more co-channel interference. At the MAC, it is imperative that an acknowledged point-to-point data transfer between the endpoint and the gateway is implemented. A properly implemented protocol makes the underlying wireless medium, with all its interference and channel variation, seem like a wire to the higher protocol layers. The ability of a wireless technology to coexist with other devices that can cause significant and dynamic interference. [4]
Power Consumption: A strong device networking technology should be configurable to provide a low latency, highly responsive connection for continuously powered devices and an extremely power-efficient connection for battery-powered devices. The ability to support a long battery life. [4,8,5].

5. Experimental Work:

There are many tools available for Wi-Fi performance measurement such as iperf,wifi analyser [8,13,10,14]. In this paper ,iperf tool is used for TCP and UDP performance measurements. The experiment has been carried out on two smartphones with latest version of Android OS. Following is the configuration of the smartphones.The tool 'iperf' has been used to perform the study.The iperf tool is command line tool and all results are obtained by different commands. Following are the different commands used for the experiment of TCP bandwidth measurements:

a) To send data of different size in one direction:
   perf –c 192.168.43.144 –n 10
b) To send more no. of requests in one direction:
    perf –c 192.168.43.144 –p 10
c) To send data from both directions sequentially:
   perf –c 192.168.43.144 –r –n 10
d) To send data from both directions parallel:
   perf –c 192.168.43.144 –d –n 10
e) To send no. of requests from both directions sequentially:
   perf –c 192.168.43.144 –r –p 10
f) To send no. of requests from both directions parallel:
   perf –c 192.168.43.144 –d –p 10

6. Results obtained for TCP Bandwidth Measurement:

A)Unidirectional
In this case the data or request is sent from client device to server. The server is receiving the data. Hence the bandwidth is measured for both the devices that means client and server but the client side bandwidth is sent data per second and for server side, it is data received per second. The two cases are considered, by changing the size of data to be sent and by sending the no. of request.
Case 1: Changing the size of data to be sent:

Size (in KB)	Android version-5.0		Android version-6.0	
	Client (G bits/s)	Server (M bits/s)	Client (G bits/s)	Server (M bits/sec)
10	1.13	31.45	0.387	35.05
100	1.82	50	1.03	104
1000	1.81	46.2	1.19	121.5
10000	1.60	29.2	0.782	58.2

Table 2: Bandwidth obtained for unidirectional w.r.t. size of data

Comparison of Client's Bandwidth in two versions of Android
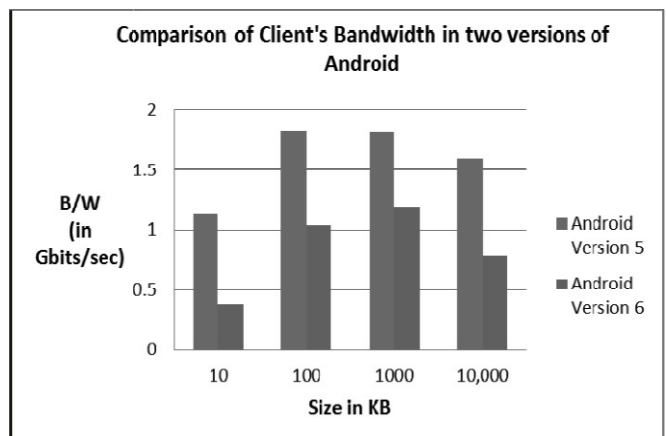
Fig.1: Comparison of client's bandwidth in two versions of Androidfor unidirectional w.r.t. size of data

By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone. In both version bandwidth utilization is increased with increase in size of the data sent.

Fig.2: Comparison of server's bandwidth in two versions of Androidfor unidirectional w.r.t. size of data

By analysing the graph we can say that the Android version 5 smartphone is requiring less bandwidth than Android 6 smartphone. In both version bandwidth utilization is increased with increase in size of the data sent until the data size of 1000 KB but at 10000 KB it is suddenly reduced.

Case 2: Changing the no. of requests to be sent:

No. of Requests	Android version-5.0		Android version-6	
	Client (M bits/s)	Server (M bits/s)	Client (M Bits/s)	Server (M bits/sec)
2	20	19.8	32.5	31.3
20	11.3	18.75	40.5	32.5
40	13.7	11.2	51.0	33.5
80	17.7	10.4	52.5	34.0
100	19.6	10.8	52.9	35.9
120	15.0	9.8	61.5	35.9

Table 3: Bandwidth obtained for unidirectional w.r.t. no. of requests
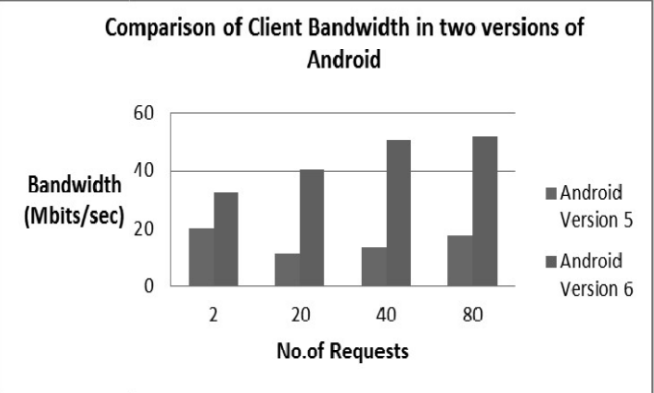
Fig.3: Comparison of client's bandwidth in two versions of Android for unidirectional w.r.t. no. of requests

By analysing the graph we can say that the Android version 5 smartphone is requiring less bandwidth than Android 6 smartphone.In Android version 5 bandwidth utilization is slightly decreased but in version 6 it is slightly increased.
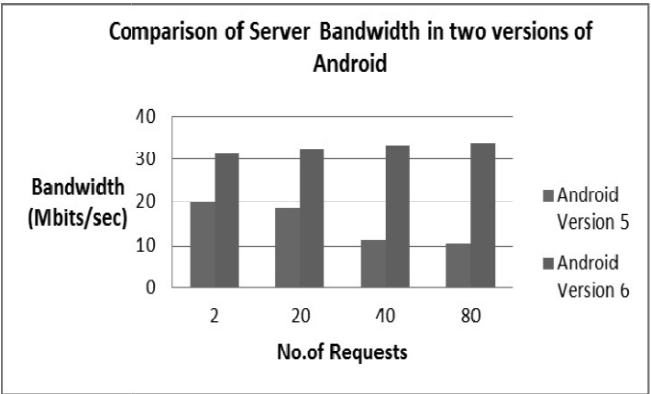
Fig.4: Comparison of server's bandwidth in two versions of Androidfor unidirectional w.r.t. no. of requests

By analysing the graph we can say that the Android version 5 smartphone is requiring less bandwidth than Android 6 smartphone. In Android version 5 bandwidth utilization is decreased but in version 6 it is almost same

B) Bidirectional Sequentially

In this case the data or request is sent from client device to server as well as from server device to client. The server is receiving the data as well as sending data. Both devices are acting as client as well as server. Hence the bandwidth is measured for both the devices that means client and server as data sent per second and data received per second. The two cases are considered, by changing the size of data to be sent and by sending the no. of request.

Case 1: Changing the size of data to be sent:

Size (in KB)	Android version-5.0		Android version-6	
	Sender (G bits/s)	Receiver (M bits/s)	Sender (G bits/s)	Receiver (M bits/sec)
10	1.85	36.05	1.61	9.65
100	1.975	46.05	1.61	11.695
1000	1.69	28.9	1.19	20.2
10,000	2.08	26.8	0.38	17.85

Table 4: Bandwidth obtained for bidirectional (sequential) w.r.t. size of data
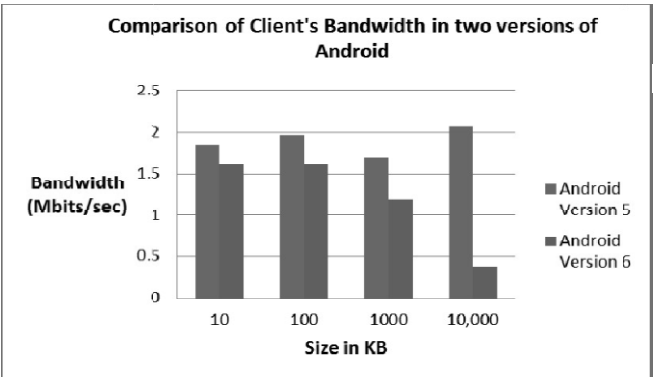
Fig.5: Comparison of client's bandwidth in two versions of Androidfor bidirectional (sequential) w.r.t. size of data
By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6.In Android version 5 bandwidth utilization is almost same but in version 6 it is reduced.
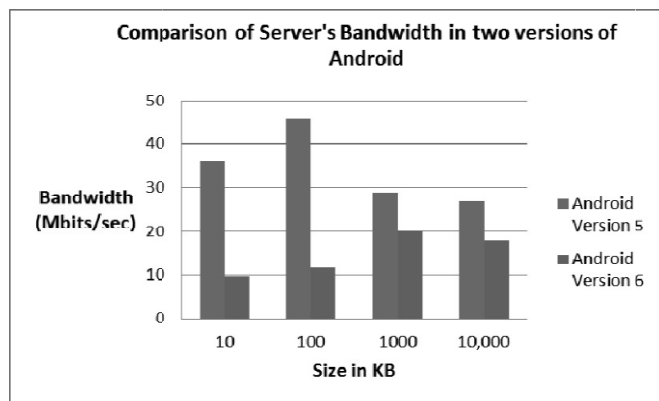
Fig.6: Comparison of server's bandwidth in two versions of Androidfor bidirectional (sequential) w.r.t. size of data
By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone. In Android version 5 bandwidth utilization is decreased but in version 6 it is increased.

Case 2: Changing the no. of requests to be sent:

No. of Requests	Android version-5.0		Android version-6	
	Client (M bits/s)	Receiver (M bits/s)	Sender (M bits/s)	Receiver (M bits/sec)
2	18.6	19.8	29.6	28.8
20	27.3	19.7	38.3	29.7
40	35.6	20.4	46.6	30.4
80	40.6	24.8	51.6	34.8

Table 5: Bandwidth obtained for bidirectional (sequential) w.r.t. no. of requests
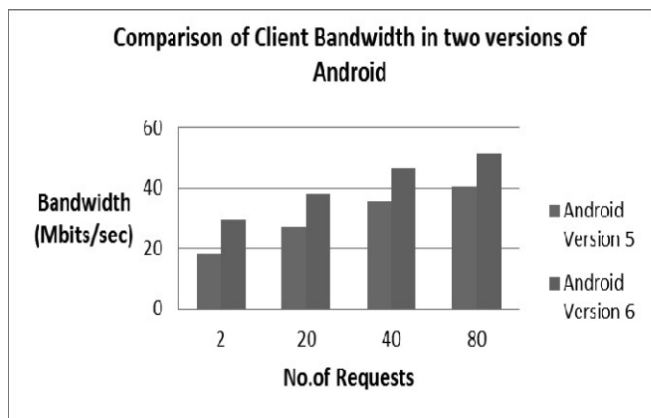
Fig.7: Comparison of client's bandwidth in two versions of Androidfor bidirectional (sequential) w.r.t. no. of request

By analysing the graph we can say that the Android version 5 smartphone is requiring less bandwidth than Android 6 smartphone.In both version of android the bandwidth utilization is increased with increase in in no. of requests
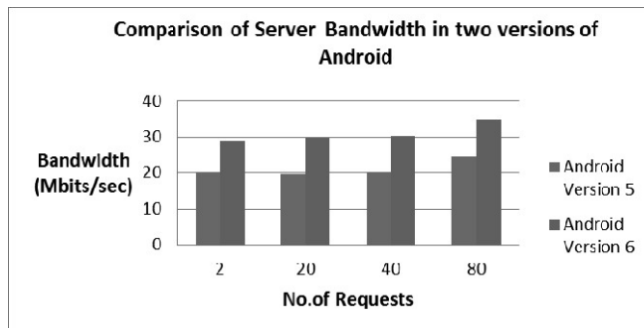
Fig.8: Comparison of server's bandwidth in two versions of Androidfor bidirectional (sequential) w.r.t. no. of requests

By analysing the graph we can say that the Android version 5 smartphone is requiring less bandwidth than Android 6 smartphone.In both version of android the bandwidth utilization is increased with increase in no. of requests.

B) Bidirectional - Parallel
Case 1) Changing the size of data to be sent:

Size	Android version-5.0		Android version-6	
	Sender (G bits/s)	Receiver (M bits/s)	Sender (G bits/s)	Receiver (M bits/sec)
100	2.11	45.8	1.40	18.2
100	2.01	42.8	1.29	16.2
1000	1.43	39.5	1.54	16.3
10,000	2.12	31.2	0.95	17.85

Table 6: Bandwidth obtained for bidirectional (parallel) w.r.t. size of data
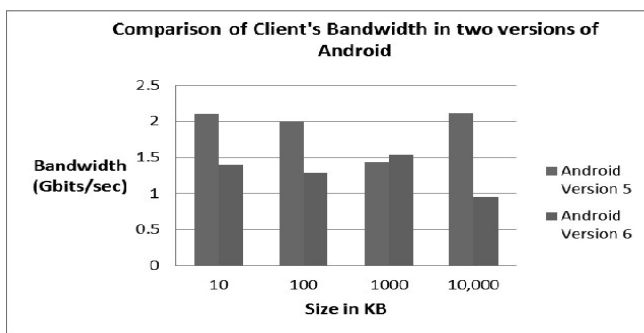
Fig.9: Comparison of client's bandwidth in two versions of Androidfor bidirectional (parallel) w.r.t. size of data
By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone.In Android version 5, Bandwidth utilization is decreased till size of data to be sent is 1000 KB and it is increased at data size 10000 KB.In Android version 6, Bandwidth utilization is almost same till the size of data to be sent is 1000 KB and it is decreased at data size 10000 KB.
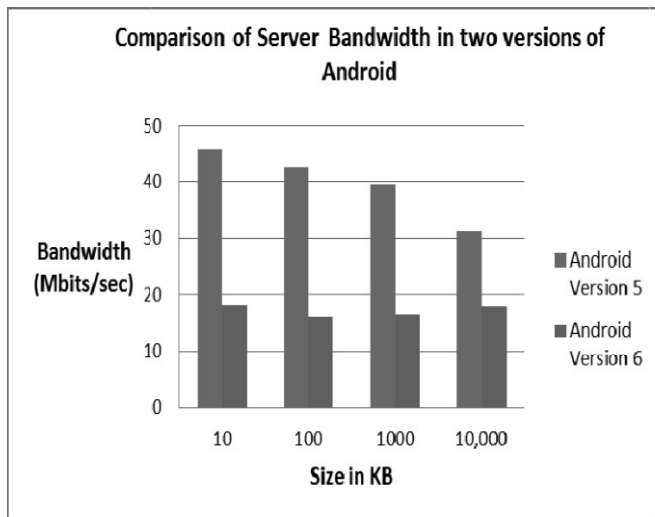
Fig.10: Comparison of server's bandwidth in two versions of Androidfor bidirectional (parallel) w.r.t. size of data

By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone.In Android version 5, Bandwidth utilization is decreased and in Android version 6, Bandwidth utilization is almost same with increase in data size.

Case 2: Changing the no. of requests to be sent:

Size (in KB)	Android version-5.0		Android version-6	
	Client (M bits/s)	Receiver (M bits/s)	Sender (M bits/s)	Receiver (M bits/sec)
2	30.8	29.9	20.8	19.9
20	47.0	30.8	37.0	20.8
40	51.8	31.1	41.7	21.1
80	54.5	31.7	44.5	21.7
100	53.8	34.2	43.7	24.2
120	66.7	39.9	56.7	29.9

Table 7: Bandwidth obtained for bidirectional(parallel) w.r.t. no. of requests
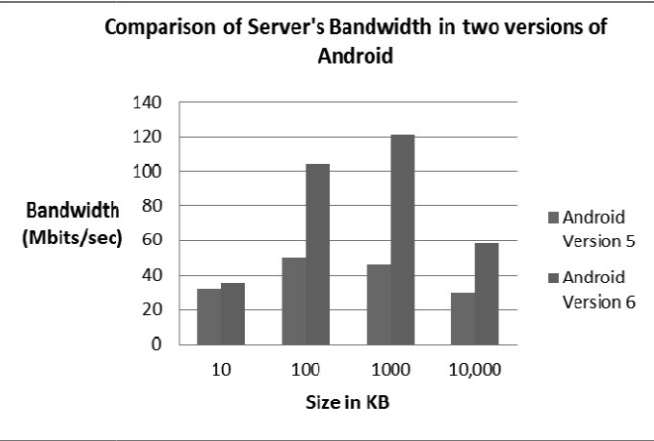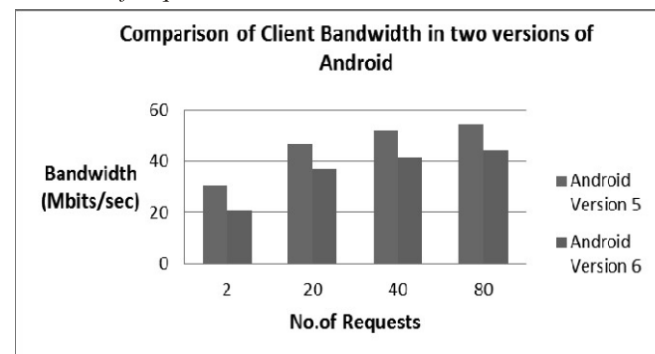

Fig.11: Comparison of client's bandwidth in two versions of Androidfor bidirectional (parallel) w.r.t. no. of requests

By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone.In both Android versions, Bandwidth utilization is increased with increase in no. of requests.
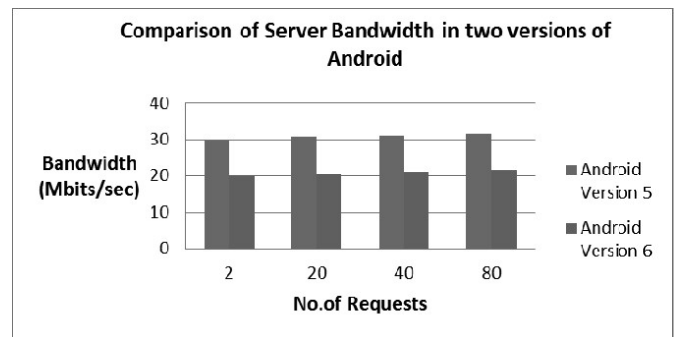
Fig.12: Comparison of server's bandwidth in two versions of Android for bidirectional (parallel) w.r.t. no. of requests

By analysing the graph we can say that the Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone.In both Android versions, Bandwidth utilization is almost same with increase in no.of requests.

CONCLUSION:

From the experimental results, it is concluded that Android version 5 smartphone is requiring more bandwidth than Android 6 smartphone when only client device is sending data to server and data is transferred from client to server & server to client sequentially as well as parallel with respect to data size.By the observation it can be concluded Android version 5 smartphone is requiring less bandwidth than Android 6 smartphone when only client device is sending data to server and data is transferred from client to server & server to client sequentially with respect to no. of requests, but when data is transferred from client to server and back to client parallel it requires more bandwidth. The reason behind this can be the smartphone's internal configuration that means RAM, processor speed etc., the total no. of devices connected to same Wi-Fi access point distance between access point and client devices.

Finally it can be concluded that Android 5 is better when least no. of devices are transferring large scale data but when maximum no. of devices are transferring data in small chunks Android version 6 is better. This can be further tested with further experiments.

5. Future Work:

The experiment can be further extended by obtaining the response time and data transfer rate for TCP and UDP. The UDP measurements can be obtained for jitter, datagram loss and latency measurements. Like iperf, other tools can be used to obtain detailed analysis in different direction. The nest direction in research in context with TCP bandwidth in smartphones is to study is to find why the bandwidth is utilization is varying in different versions of Android in Wi-Fi network.

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OVERVIEW OF APPLICATION BASED MOBILITY MODEL

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ABSTRACT: A Mobile Ad-hoc Network (MANET) is a collection of wireless mobile nodes forming a network without using any infrastructure. All mobile nodes function as mobile routers that discover and maintain routes to other mobile nodes of the network and therefore, can be connected dynamically in an arbitrary manner. The mobility attribute of MANETs is a very significant one. Routing protocols are used to find route in mobile ad-hoc network. The mobile nodes may follow different mobility patterns that may affect connectivity, and in turn protocol mechanisms and performance. Thus, study of existing mobility model used for simulation is important. Overview of different mobility models used in simulation of MANET is given with their real life application in this paper.

Keywords: Mobile ad-hoc networks, entity mobility models, group mobility models,mobility model,temporary dependency,spatial dependency,geographical dependency

INTRODUCTION:

Wireless technology come in existence since the 1970 and it is has reached new heights till date. Wireless ad-hoc networks do not require any per-existing infrastructure for communication, does not rely on existing wired network and all the communication happens through air. A MANET is Ad-hoc network formed on fly without central control and nodes are allowed to move freely. Here mobile nodes are responsible routing as well as communication. Thus primary challenge in MANET is to maintain route between this mobile nodes for smooth communication among nodes as there is breakage and formation of links due to mobility of nodes. Mobility models describe the movement of nodes with their direction, location, speed, pause time. Mobility models have different mobility characteristics depending upon respective application such as Cafeteria Area, ShoppingMall, Conference Room,Avalanche rescue,Military Area,Disaster Area and Campus Area. For example movement behavior of mobile nodes in cafeteria area is altogether different from disaster area movement pattern. Therefore, it is important to understand, study and analysis mobility model for different application.

Currently there are two types of mobility models used in the simulation of networks: traces and synthetic models [8].A Traces are obtained by means of measurements of deployed systems and usually consist of logs of connectivity or location information, whereas synthetic models are mathematical models, such as sets of equations, which try to capture the movement of the devices. However, new network environments (e.g. ad hoc networks) are not easily modeled if traces have not yet been created. In such situation it is necessary to use synthetic models. So current research has focused on the so-called synthetic mobility models [12] that are not trace-driven. Synthetic models attempt to realistically represent the behaviors of mobile nodes without the use of traces. In this paper, we present several synthetic mobility models that have been proposed for (or used in) the performance evaluation of MANET protocols.

2. Problem Statement

Various wireless propagation models (two way propagation, shadowing), traffic models (constant bit rate,exponential etc.)and their impact on performance of network simulations [3,7,13] has been deeply studied,recently researchers have considered the influence of mobility model on network performance[4,14].Results shows that , indeed, the mobility model plays vital role in determining the performance of the network. This is true for all wireless networks, but is in ad-hoc network is especially cardinal as communication between source and destination depends on connectivity of intermediate nodes. Thus, in deep study of mobility model is consequential.

3.Overview of Mobility Models

To model and analyze the mobility models in MANET, we are more interested in the movement of individual nodes at the microscopic-level, including node location and velocity relative to other nodes, because these factors directly determine when the links are formed and broken since communication is peer-to-peer.

The classification for various mobility models into several classes based on their specific mobility behavior is shown in Figure-1.
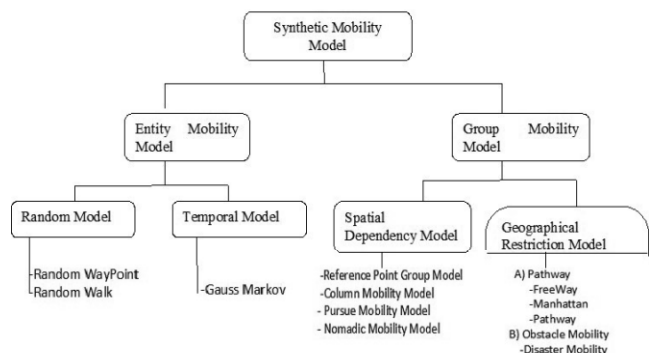
Figure-1: The Classification of Mobility Modelsbased on mobility behavior.

Synthetic mobility model **They**realistically represent the behaviors of mobile nodes without the use of traces which are discussed below.

I) **Entity Mobility Models:**
This is Mobility Model where movements are independent of each other's movement.
1) Random Model- Here nodes move randomly. E.g. - Random Waypoint, Random Walk Mobility Model etc.
2) **Mobility model with temporal dependency-**
Here, the movement of a mobile node is likely to be affected by its movement history. E.g. - Gauss Mobility model etc.
II) **Group Mobility Models-**
Heremobility of nodes in depends on mobility of group of nodes, the group in which it is included.
1) **Mobility models with spatial dependency-**
In this mobility model, the mobile nodes tend to travel in a correlated manner. Examples of this model are Reference Point Group Model, Column Mobility Model, Pursue Mobility Model, Nomadic Mobility Model etc.
2) **Mobility models with geographical dependency-**
This is other class of the mobility model with geographic restriction, where the movement of nodes is bounded by streets, freeways or obstacles.**It is further classified as Pathway mobility model and Obstacle Mobility Model .Examples of Pathway Models are Freeway Mobility Model, Pathway Mobility Model and Manhattan Mobility Model. Examples of Obstacle Mobility Model are Disaster Mobility Model**

I) Entity Mobility Models:
This is Mobility Model where movements are independent of each other's movement.

1.Random Walk Mobility Model:
The Random Walk Mobility Model was first described mathematically by Einstein in 1926 [9]. Since many entities in nature move in extremely unpredictable ways, the Random Walk Mobility Model was developed to mimic this erratic movement [15]. In this mobility model, a mobile node moves from its current location to a new location by randomly choosing a direction and speed in which to travel.

It is simple mobility model based on random directions and speeds with zero pause time. Here every node chooses random direction and random speed uniformly distributed in $[0, 2\pi]$ and speed [speed min, speed max] respectively, it then moves for specific time and repeats the same. The Random Walk Mobility Model is a widely used mobility model [5, 6], which is sometimes referred to as Brownian motion. In its use the model is sometimes simplified. For example, [4] simplified the Random Walk Mobility Model by assigning the same speed to every mobile node in the simulation.

In an equivalent view of this model, the world is divided into cells (e.g., squares) and at each step a node can jump into any of the neighboring cells (up to several steps away).When the nodes reach the edges of the bounding rectangle, they can "bounce" (or "reflect") from the edges or "wrap-around", by assuming that the world is a torus. The movement can also take place on a sphere. Random mobility of a node is shown in figure-2.
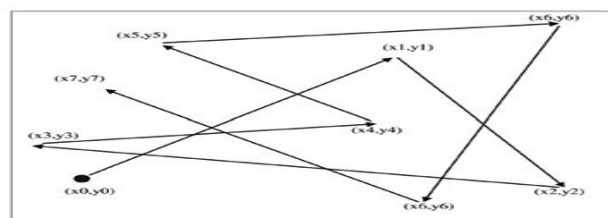
Figure-2: Random Walk Mobility Model

2. Random Waypoint Mobility Model(RWP):
The Random Waypoint Model was first proposed by Johnson and Maltz [11].This model has fixed number of nodes in fixed size rectangle where nodes are uniformly distributed. Each node chooses a random destination and chooses a random speed distributed uniformly in the interval [v min, v max]. Once it arrives at the destination, it pauses for a random time uniformly distributed in [P min, P max], then it chooses a new speed and destination and repeats the process.

3.Gauss-Markov Mobility Model:
The Gauss-Markov Mobility Model was first introduced by Liang andHaas[15] and widely utilized[14,16].Mobility of a node may be constrained by the physical laws of acceleration, velocity and rate of change of direction. Hence, the current velocity of a mobile node may depend on its previous velocity. Thus the velocities of single node at different time slots are 'correlated'. We call this mobility characteristic as temporal dependency of velocity. However, the memory less nature of Random Walk model, Random Waypoint model and other variants render them inadequate to capture this temporal dependency behavior. As a result, various mobility models considering *temporal dependency* are proposed.In this model, velocity of mobile nodes depends on previous velocity.

B)Group Mobility Models-
Heremobility of nodes in depends on mobility of group ofnodes, the group in which it is included.
I) Mobility model with Spatial Dependency
As nodes movement depends on spatial movement of other node,they are also categorized as Model withSpatial Dependency.

1.Reference Point Group Mobility Model (RPG):
In this model, mobile nodes tend to coordinate their movement with respect to group leader or center of group. This model represents the random motion of a group of mobile nodes as well as the random motion of each individual node within the group. Movement of group is based on path traveled by logical center for group (Group Motion, GM).The motion of group center depends on movements of its corresponding group of mobile nodes, including their direction and speed. As the individual Reference Points (RP) move from time t to t + 1, their locations are updated according to the group's logical center. Once the updated reference points, RP (t + 1), to represent the random motion of each MN are calculated, they are combined with a random motion vector, RM,about its individual reference point.
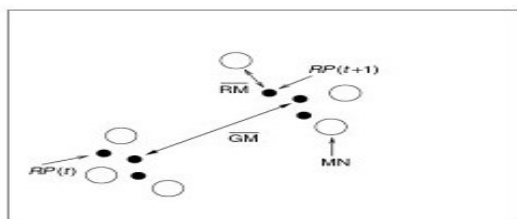
Figure-5: Reference Point Group Mobility Model

Figure 5gives a shows three mobile node moving with the RPGM model, at time t,three black dots exist to represent the reference points, RP(t), for the three mobile nodes. As shown, the RPGM model uses to calculate each node new reference point, RP(t + 1), at time t + 1; group motion vector, GM, be randomly chosen or predefined. The new position for each MN is then calculated by summing a random motion with the new reference point. The length of RM is uniformly distributed within a specified radius centered vector, RM, at RP(t + 1) and its direction is uniformly distributed between 0 and 2π.

The RPGM model was designed to depict scenarios such as an avalanche rescue, where the responding team consisting of human and canine members work cooperatively. The human guides tend to set a general path for the dogs to follow, since they usually know the approximate location of victims.

2. Column Mobility Model:

A group mobility model where the set of Mobile Nodes form a line and are uniformly moving forward in a particular direction. This model is useful for scanning or searching purposes. Here a set of Mobile Nodes that move around a given line (or column), which is moving in a forward direction (e.g., a row of soldiers marching together towards their enemy). A slight modification of the Column Mobility Model allows the individual Mobile Nodes to follow one another (e.g., a group of young children walking in a single-line to their classroom orrobots that move in a certain fixed direction. This mobility model can beused in searching and scanning activity, such as destroying mines by militaryrobots.).
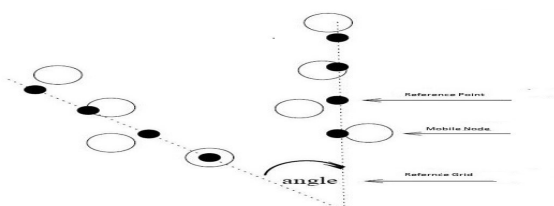
Figure-7: Column Mobility Model

For this model, an initial reference grid as shown in figure above. Each mobile nodes is then placed in relation to its reference point in the reference grid; the MN is then allowed to move randomly around its reference point via an entity mobility model (i.e. Random Walk Mobility Model, as the entity mobility model.) The new reference point for a given Mobile Nodes is defined as:
new reference point = old reference point + advance vector

Where old reference point is the Mobile Nodes previous reference point and advance vector is a predefined offset that moves the reference grid. The predefined offset that moves the reference grid is calculated via a random distance and a random angle (between 0 and π since movement is in a forward direction only). Since the same predefined offset is used for all mobile nodes, the reference grid is a 1-D line.

3. **Nomadic Community Mobility Model**: A group mobility model where a set of Mobile Nodes move together from one location to another. Best example of this model is ancient nomadic societies moved from location to location , the Nomadic Community Mobility Model represents groups of mobile nodes that collectively move from one point to another. Within each community or group of mobile nodes maintains their own space, where they move randomly. For example, consider a class of students touring an art museum and this model could be applied in mobile communication in a conference or military application.

In the Nomadic Community Mobility Model, each mobile node uses an entity mobility model (e.g., the Random Walk Mobility Model) to roam around a given reference point. When the reference point changes, all Mobile Nodes in the group travel to the new area defined by the reference point and then begin roaming around the new reference point. The parameters for the entity mobility model define how far a mobile node may roam from the reference point. Compared to the Column Mobility Model, the Mobile Nodes in the Nomadic Community Mobility Model share a common reference point versus an individual reference point in a column. Thus, we would expect the mobile nodes to be less constrained in their movement around the defined reference point.

For example, in the Column Mobility Model, the Mobile nodes may only travel for two seconds before changing direction and speed; in the Nomadic Community Mobility Model, the mobile nodes may be allowed to travel for 60 seconds before changing direction and speed. **Figure 8** gives an illustration of seven Mobile Nodes moving with the Nomadic Community Mobility Model. The reference point (represented by a small black dot) moves from one location to another; as shown, the mobile nodes follow the movement of the reference point.
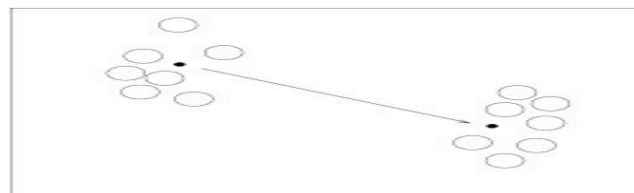
Figure-8: Nomadic Mobility Model

4. **Pursue Mobility Model:**A group mobility model where a set of mobile nodes follow a given target.
As the name implies, the Pursue Mobility Model attempts to represent mobile nodes tracking a particular target. For example, this model could represent police officers attempting to catch an escaped criminal or target tracking and law enforcement. The Pursue Mobility Model consists of a single

update equation for the new position of each node:
new position = previous position + acceleration(target −previous position) + random vector

Whereacceleration (target- previous position) is information on the movement of the mobile node being pursued and random vector is a random offset for each node. The random vector value is obtained via an entity mobility model (e.g., the Random Walk Mobility Model); the amount of randomness for each mobile node is limited in order to maintain effective tracking of the mobile node being pursued. The current position of an mobile node, a random vector, and an acceleration function are combined to calculate the next position of the MN. **Figure 9** gives an illustration of six nodes moving with the Pursue Mobility Model. The white node represents the node being pursued and the solid black nodes represent the pursuing nodes.
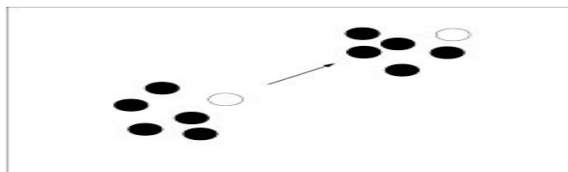
Figure-9:Pursue Mobility model

II) Mobility Models with Geographic Restriction:
1) Pathway:

Unlike the Random Waypoint model where the nodes can move freely,the mobile nodes in this model are only allowed to travel on the pathways. However, since the destination of each motion phase is randomly chosen, acertain level of randomness still exists for this model. This graph basedmobility model, the nodes are traveling in a pseudo-random fashion on thepathways.

2) Manhattan Grid Mobility Model:

These mobility models guide the driver of the vehicle in taking the right path, also provides safety and comfort. One such mobility model is the Manhattan mobility model. The Manhattan mobility model uses a grid road topology. This mobility model was mainly proposed for the movement in urban area, where the streets are in an organized manner.

In this mobility model, the mobile nodes move in horizontal or vertical direction on an urban map. The Manhattan model employs a probabilistic approach in the selection of nodes movements, since, at each intersection, a vehicle chooses to keep moving in the same direction. The probability of going straight is 0.5 and taking a left or right is 0.25 each.

From the above discussion, it is very clear that this model is not suitable for highway systems. Although this model provides flexibility for the nodes to change the direction, it imposes geographic restrictions on node mobility.

3)Obstacle Mobility Model:

Another geographic constraint playing an important role in mobilitymodeling includes the obstacles in the simulation field. To avoid the obstacles on the way, the mobile node is required to change its trajectory. Therefore, obstacles do affect the movement behavior of mobile nodes. Moreover, the obstacles also impact the way radio propagates. For example, for the indoor environment, typically, the radio system could not propagate the signal through obstacles without severe attenuation. For the outdoorenvironment, the radio is also subject to the radio shadowing effect. When integrating obstacles into mobility model, both its effect on node mobility and on radio propagation should be considered**.**

Johansson, Larsson and Hedman et al. [11] develop three 'realistic' mobilityscenarios to depict the movement of mobile users in real life, including -
1. Conference scenario, people attending conference move with low mobility.
2. Event Coverage scenario, where a group of highly mobile people orvehicles are modeled.
3. Disaster Relief scenarios where some nodes move very fast and othersmove very slowly.

4.Conclusion and discussion

A systematic survey of mobility model available for simulation is conducted for real life application scenarios.
Random walk has speed between some max and min speed and direction between [0,180] with pause time is zero.

Random Way Point hasspeed between some max and min speed and direction [0,180] with Pause time between some minimum and maximum pause time and is mostly applicable to People moving randomly in Cafeteria Area, Shopping Mall, and Conference Room.

Gauss-Markov mobility model has speed and direction depends on previous direction with correlated moment

RPGM has speed and direction depends of mobility of leader nodes in group with movement depends on leader node/spatial dependency which is applicable to avalanche rescue.

Column Mobility Model has speed and direction depends on other nodes with pre -defined movement along path with application in a row of solider marching towards their enemy, robot moving in predefined manner.

Nomadic Mobility Model has movement around reference point and groups of nodes move in co-ordination with group leader. Its real life application are class of students touring art museum, conference, military application.

Pursue Mobility Model has speed and direction which depends on other nodes random nodes moves with respect to target. Its applications are police office attempting to catch escaped criminal, target tracking and law enforcement.

Mobility model should be picked in such a way that it closely matches the excepted real-world scenario. Further research on mobility models for ad hoc network protocol evaluation is needed. One approach of future work is to devote further effort in examining the movements of entities in the real world to produce accurate mobility models (trace based mobility model)

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PERFORMANCE EVALUATION OF FAT-TREE DATA CENTER NETWORK ARCHITECTURE

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ABSTRACT: Computing paradigm has changed and today cost effective solution is cloud data centers. Data centers are scalable that supports heterogeneous kind of applications like social networking, data intensive, computation intensive and web services. There are different types of data centers distinguished on architectural modal. A Fat-tree is one of the popular network architecture, widely used for designing data centers. It offers high path diversity and low latency. Fat-tree architecture is used for scalable high performance computing data center network for cost effective solution. In this paper the performance of fat-tree data center network architecture is measured by taking fixed number of servers and varying loads in terms of number of users accessing HTTP service. The experimental study is performed using OPNET simulator and simulation results are analyzed to understand load behavior.

Keywords : Fat-tree, Data center, OPNET, Throughput, Delay.

INTRODUCTION:

The computing paradigm has changed understanding the era from mainframe,personal computing to client-server and web technology, and today it is cloud technology as computing. Cloud computing is a computing paradigm,where a large pool of systems are connected in private or public network to provide dynamically scalable infrastructure for application data and storage. It is a practical approach to experience direct cost benefits and it has the potential to transform a data center from capital intensive setup to a variable priced environment. This is internet based computing environment where one can pay only for the resources that they use.A data center consists of enormous computational units, storage capacity and network resources [10].Data center hosts Internet-based applications like search engines, video data hosting, social networking, large-scale computations [6][14]. Data centers are treated as important component for internet communication [5]. The servers of data centers are growing exponentially because of tremendous growth in data intensive computing and high performance computing[2].The performance of data centers mainly measured using three metrics: throughput, latency and reliability. Hence data centers are designed to achieve high throughput, low delay and maintained reliability[11].The oversubscription ratio is also considered asperformance measure of data center networks.An oversubscription ratio of 1:1 indicates that all hosts communicate at the full bandwidth of their network capacity. An oversubscription value of 4:1 indicates that only 25% of the network bandwidth is used by network hosts [7].

Increased number of servers and interconnection complexity within data center network candemand highaggregate bandwidth. Day by daydata center network sizesand network complexities are increasing exponentially, hence there is big challenge to design high performance data center networkswith minimum infrastructure cost and minimum internetwork complexity[2][1].

Different types of application requirements are supported by different data center network architectures. These different data center networkarchitecturescan be compared based onthroughput, scalability, path diversity, latency,cost and power consumptionmetrics [2]. These data center network architectures are classified into three classes' namely switch-based architecture, server-based architecture and hybrid architecture.

I Switch-based architectures: Packet forwarding is implemented using switches. Multi-tiered, fat-tree, flattened butterfly are the examples of switch-based architectures.

ii) Server-based architectures: Servers are used for packet forwarding. Servers have two responsibilities, first to process applications and second to forward packets. Camcube is Server-based architecture.

iii) Hybrid architectures: Both switches and Servers are used for packet forwarding. DCell and BCube are examples of hybrid architecture[4].

Selection of proper network architecture helps designing the data center that become scalable, balance the load, provide high aggregate bandwidth among end-hosts, compatible with existing infrastructure, provides agility and fault tolerance, incurs minimum power consumption and infrastructure costs [6].

Fat-tree is the most promising and widely used switch-based network architecture. It offersvery high path diversity, high throughput, high scalability and low latency [9]. It is used to build large scale high performance data center networks. This paper is an attempt to measure the performance offat-tree data center network architectureusing OPNET simulator.The performance is measured by varying the user load, accessing HTTP service provided by fat-tree data center network containing fixed number of servers.

Section two is the description about fat-tree architecture. Section three contains simulation parameters and setup. Result analysisis given insection four. Last section contains conclusion.

II - FAT-TREE NETWORK ARCHITECTURE

Fat-tree architecture solves the over subscription, network bottleneck and single node failure problems of traditional network architecture[3]. Fat-tree replaces expensive, more advanced switches and deploys low-cost commodity switches. Therefore cost of fat-tree network is less than traditional network[5].

Fat-tree architecture is composed of Npods, where each pod contains $(N/2)^2$ servers, N/2 access layer switches and N/2 aggregate layer switches in the topology. The core layer contains $(N/2)^2$ core switches where each of the core switches is connected to one aggregate layer switch in each of the pods. The maximum number of servers and switches in fat-tree of N pods is $N^3/4$ and $5N^2/4$ respectively [12].Figure-1 shows sample topology of Fat-tree network architecture with N=4.
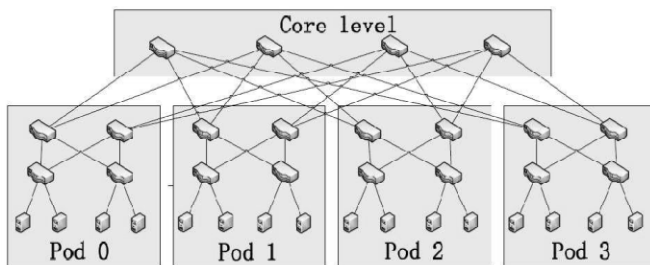
Figure-1: Fat-tree network architecture

The number of switch-ports per switch determines scalability of fat-tree network [3].The agility and limited functionalities of commodity switches are the major drawbacks of fat-tree data center network architecture [5][8].

III SIMULATION PARAMETERS AND SETUP

OPNET modeler 14.5 is used for simulation. Fat-tree data center network having 16 servers as traffic sources connected with ethernet switches. It is providingHTTP application services to varying number of clients (100, 200, 400 and 800). Duplex ethernet link 10BaseT with 10Mbps transmission rate is used for interconnection and data transfer. Data center and client subnets are connected to internetthrough PPP_DS1 link of 1.544 Mbps bandwidth. All routers, firewalls and internet support OSPF routing protocol. The HTTP application traffic has been considered as services at servers. Table-1 shows the HTTP application traffic generation details.

Table-1: HTTP Application traffic generation parameters

SNo	Attribute	Value
1	Page Inter-arrival Time	20(seconds)
2	Object size	$5000 - 10000$ (bytes)
3	Number of objects per page	10-20
4	Pages per server	10

Figure-2 to figure-5 shows network topologies consisting of data center and different number of subnets, each subnet contains 50 clients.Figure-6 is the internal structure of fat-tree data center network containing 16 HTTP servers, 20 ethernet switches, 2 routers and a firewall. Figure-7 shows the internal structure of one of the client subnet which has 50 ethernet workstations, a router,switch and firewall.
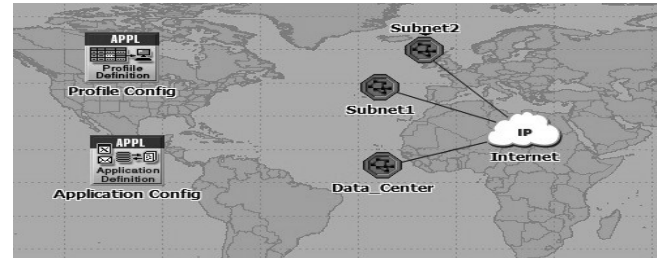
Figure-2: Network topology containing fat-tree data center networkand2 subnets
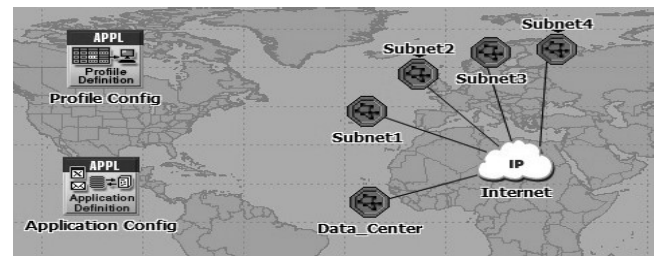
Figure-3: Network topology containing fat-tree data center network and 4 subnets
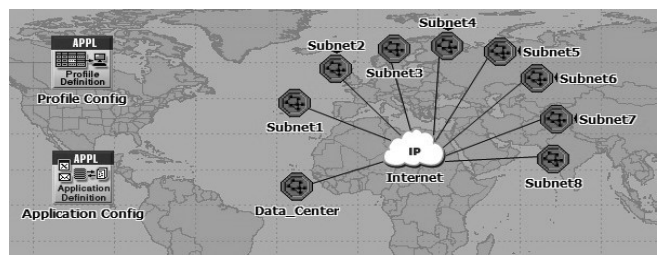
Figure-4: Network topology containing fat-tree data center networkand 8 subnets
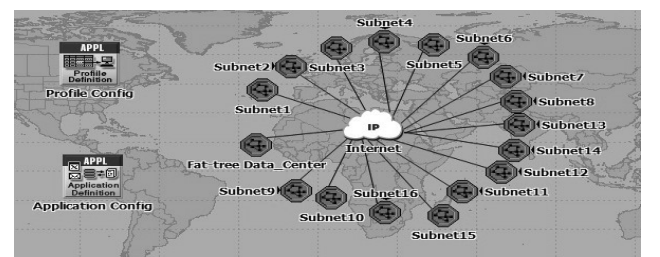
Figure-5: Network topology containing fat-tree data center networkand 16 subnets
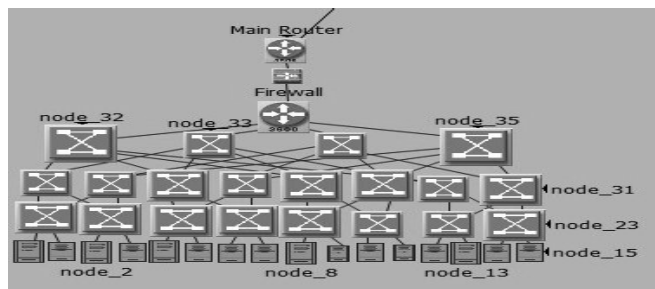
Figure-6: Fat-tree data center network
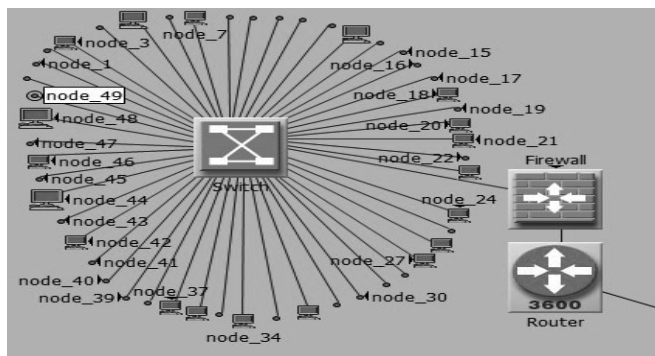
Figure-7: Client subnet

IV RESULTS ANALYSIS

In this section, we evaluated the performance of fat-tree data center network architecture by varying number of clients accessing HTTP service. Figure-8 and figure-9 shows effect on network throughput (number of bytes received per seconds) and network delay for varying user load respectively.
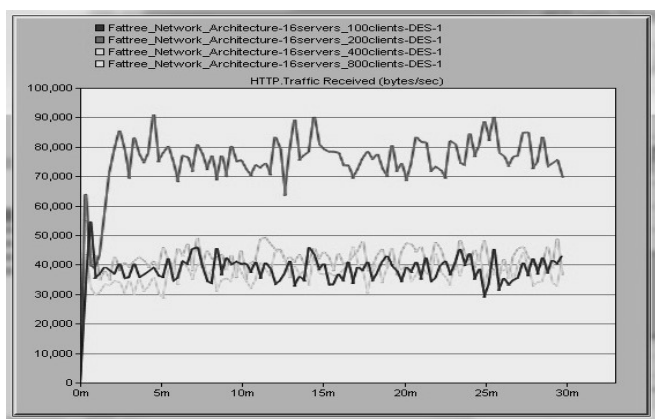
Figure-8: Throughput of the network for varying user load
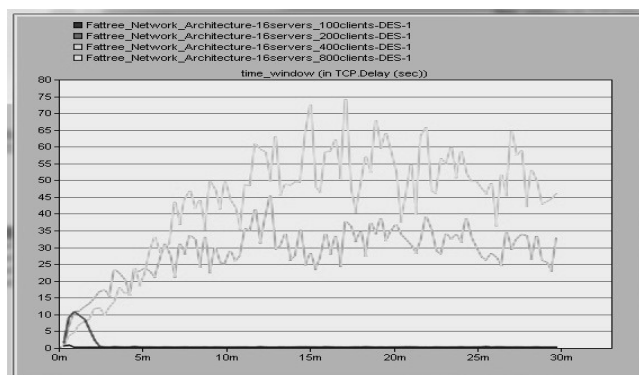
Figure-9: Network delay for varying user load

The average HTTP traffic sent and average HTTP traffic received (bytes/sec)for varying number of clients is shown in figure-10.
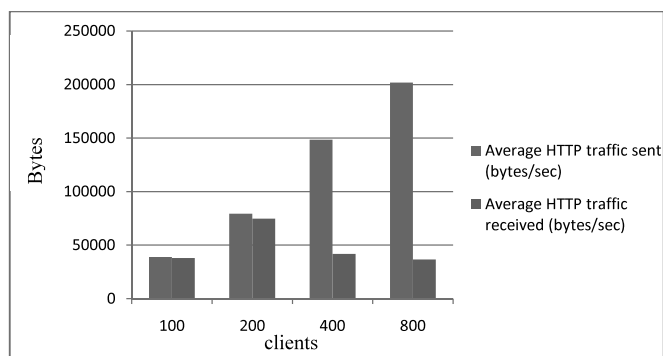
Figure-10: Average HTTP traffic sent and average HTTP traffic received (bytes/sec) for varying user load

The statistical data of average HTTP traffic sent, average HTTP traffic received and average network delay for varying number of clients are tabulated in table-2.

Table-2: performance of fat-tree architecture forvarying users load.

SNo	Number of clients	Average HTTP traffic sent (bytes/sec)	Average HTTP traffic received (bytes/sec)	Average Network delay (seconds)
1	100	38928	37966	0.21457
2	200	79364	74657	0.729
3	400	148458	41805	27.919
4	800	201908	36594	43.291

CONCLUSION :

The performance of fat-tree data center network having 16 servers has been analysed with the help of OPNET modeler. The simulation result shows that throughput of network decreases as the number of users accessing HTTP services of fat-tree data center increases. Also network delay increases as the user load on the network increases.

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EXTRACTION OF TUMOR WITH REGION GROWING TECHNIQUE IN AUTOMATED BRAIN TUMOR DETECTION

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ABSTRACT : Brain tumor is a fatal disease which should be diagnosed in early stages, accurately. In this paper we provide an image segmentation method using region growing which will help in locating and extracting tumor. We included artefact removal algorithm as part of pre-processing for removal of artefacts such as skull and patient information form MRI images. Once the artefact removal is done, we apply region growing method for image segmentation and from the connected components we extract brain tumor. Our focus is limited to extraction of brain tumor accurately from the input MRI Image with the help of region growing method, maintaining its shape and size.

Keywords : Region growing, Image Processing and MRI

INTRODUCTION:

Brain tumor is one of those diseases that can be life threatening if not diagnosed in early stages. Actual cause of brain tumor is not known but brain tumors are created due to abnormal growth of cells in brain. Normally calls have a life span in our body. New cells are created (replaced) and destroyed after a particular age. In cancer and other kind of diseases these cells grow faster than normal even though body does not need them. If this continuously happen then more and more abnormal cells grow and get added to the mass and thus size of tumor increases [5].

Brain tumors can be categorized into two types' primary and secondary. Primary tumors may be either benign or malignant. Benign tumors are non-harmful tumors whereas malignant tumors are harmful ones. Primary tumors are cancerous and benign are non-cancerous. A primary tumor originates within brain only. Secondary tumors also known as metastatic tumors originate elsewhere inside our body and get spread throughout. Brain tumors are classified in increasing order of abnormality as grade I, grade II, grade III and grade IV [6].

Medical Imaging is the technique of creating visual representation of the interior structure of our body for medical analysis. It is the branch of medical science which deals with generation of images of internal organs of human body. It helps doctors in visually identifying the anomalies. Radiography, Magnetic Resonance Imaging (MRI), Nuclear Medicine, Ultrasound are among several imaging modalities [7]. Magnetic Resonance Imaging is the most common imaging modality used today. It uses magnets powerful enough to excite hydrogen atoms of water molecules present in human tissue. It then produces a signal that can be detected and encoded spatially, thus resulting in detailed images of body. MRI scanner produces Radio Frequency pulse at a frequency resonant to the hydrogen atoms in water molecule. When RF pulse is absorbed by the protons, they move in the direction with respect to magnetic field [25]. MRI creates a two dimensional image of cross section of body called as "slice" of the body [3]. There are no long term known effects of MRI scanning on human body so, there is no limit to number of scans that a person can undergo in his lifetime [25].

1. LITERATURE SURVEY

Researchers have been working constantly in the direction of implementing and improvising automated brain tumor detection. Along with image processing techniques, probabilistic neural networks, and fuzzy logic are also used for detection of brain tumor [3, 21]. Pre-processing of image is done to remove noise and make image more suitable for tumor detection. Histogram equalization is used for distributing pixel more evenly throughout [29]. Smoothening is done with the help of Gaussian and average filter before segmentation (edge detection) [3]. Low pass filtering is used as a pre-processing technique [5]. Median Filter is used for noise reduction for image enhancement [7].

For finding our region of interest i.e. the portion with brain tumor, color based segmentation using k-means is proposed which enhanced accuracy [1]. Fuzzy-c algorithm followed by watershed algorithm saved oversaturation that watershed algorithm alone produced [2]. Several applications of watershed algorithm were used for detection of brain tumor [2, 4, 6, 8]. Sucharitha, Brain and Anand proposed use of adaptive mean shift along with FCM produces much better results than mean shift alone can [21]. Some researchers tried to get 3D representation of detected tumor by using the set of MRI slices and OpenGL [18].

Brain is the most important part of our body, that's why it is kept under heavy protection of skull. Due to such protecting cover, it was difficult to study, access and work on it. Traditional medical imaging techniques helped us to overcome few hurdles and now we are able to look into those places which we were not able to do before. Now MRI is able to create 2-D images of internal of the body and is a common technique for detection of tumors [9]. These images give enough information to get an idea of the internal scenario. Further confirmation is done with the help of biopsy. In biopsy, pathologist does a microscopic study of brain tissue for presence of any abnormality [10]. For surgical procedure doctors must be sure of the extent, location and size of the tumor. For this MRI is helpful.

Traditionally the obtained MRI Images are segmented manually. Obviously how well the physician

perceives the image will make the difference the final result. No one can deny the possibility of human error. Expertise of technician is very important for proper segmentation. Superior segmentation knowledge can be obtained by considerable amount of training and testing on data which is complicated and time consuming.

2. METHODOLOGY
2.1 Getting MRI Image as Input
To study about any kind of abnormality inside the body one needs to analyze current condition from inside. MRI helps doctors to analyze and diagnose any kind of abnormality inside the body. MRI scanning is still a costly procedure because the scanner itself is very costly [11]. Several manufacturers such as GE, Fujifilm, Siemens Philips etc. are continuously working on creating and improvising these state of the art machines [12]. Nowadays MRI machines that can produce 1.5 Tesla or more, are used, which can create better quality scans. One of the latest MRI scanners can scan the patient with their skull open and when the operation is still ongoing [13].

MRI scanner will produce digital images that are printed on films for further assistance. Those digital images will be the input images for our system. The images are of form RGB and contain vital information such as patient information, age etc. printed over it. We have collaborated with Fidelity Diagnostics Center Aundh Pune for live MRI Images. Test data contains more than 10 images containing brain tumor. Our focus will be on extracting tumor maintaining its shape and size. Some are shown in output.

3.2. Pre-Processing
First task is pre-processing the image. In pre-processing we first convert the RGB MR Image into gray scale Image. Pre-processing may include noise removal in the image using filters. Then the pre-processed image is given for artefact removal. Artefacts may include patient name, age, MR details and skull.

Artefact removal is the process of removing unwanted features of the image such as patient name etc.
Artefact Removal Algorithm:
1. The image is binarized using global thresholding function.
2. The connected components of the image are found and labelled.
3. Of all the components, the one with largest size is found. It happens to be the portion inside the skull.
4. Every portion except the largest component is then removed.
5. The resulting image contains only brain portion as white portion (binary 1 pixel).
6. It is then multiplied with the original grey image pixel wise and thus we get brain as segmented part from original image. The image will not contain any borders or skull.

2.2 Region Growing
Region growing is the method in which a region is grown out of a single point or set of points. The point or set of points is called as seed point(s). The seed point depicts the starting point of the region to be chalked. The seed pixel is compared to the neighbouring pixel. If the neighbouring pixel is found to be similar to the seed point, the pixel is added to the region or left otherwise. Doing so a region is formed. In the brain MRI Image the region formed may be either the tumor region or non-tumor region. Either way, we can extract the tumor region.

2.3 Post-Processing & Tumor Detection
The image that went through region growing will be the binary image (thresholded) image with tumor and other portions, which do not constitute the tumor. Tumor detection will need some post-processing that will lead to removal of non-tumor portions by identifying them and making them zero. For this we are using connected components. All the connected components of the image are labelled. Maximum sized component is kept and the rest are removed. The portion left in the image will be brain tumor only.

4. SIMULATION RESULTS

Grayscaled Input Image binarised image biggest cluster kept without artefact

region growing output tumour with noise extracted tumor

Grayscaled Input Image   binarized image   biggest cluster kept   without artefact

region growing output   tumour with noise   extracted tumor
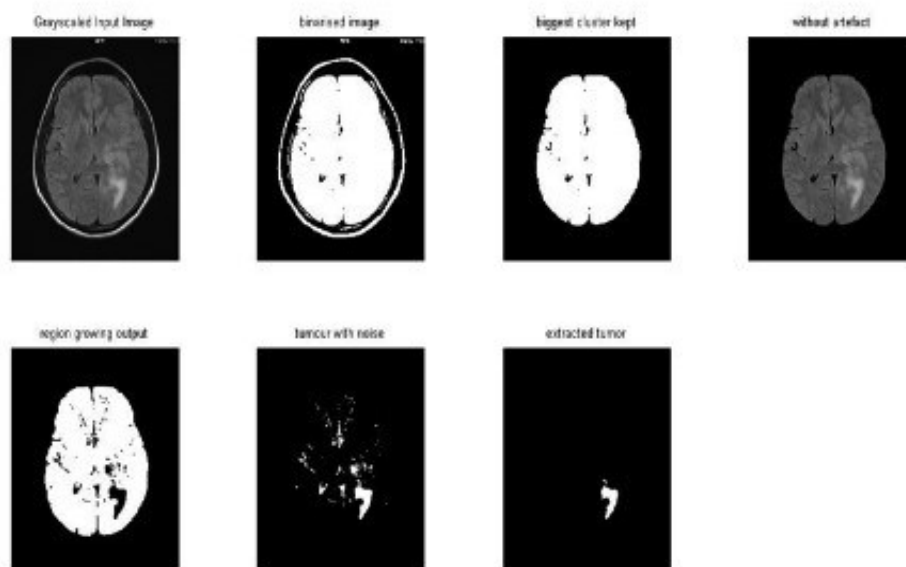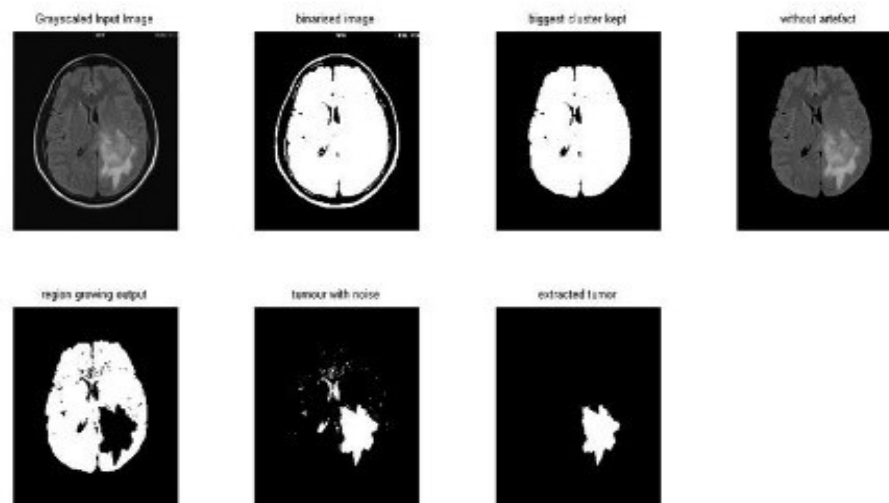
CONCLUSION :

In this paper the method used for brain tumor segmentation is region growing followed by tumor extraction using connected component. This is a small step toward fully automated brain tumor systems. As one can see region growing is doing convincing job in maintaining shape and size of brain tumor. We will try to make tumor detection hybrid by including machine learning and neural networks along with image processing for greater accuracy under future enhancements for better and accurate results.

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PARAMETRIC OPTIMIZATION OF COLD BACKWARD EXTRUSION PROCESS USING SIMULATED ANNEALING ALGORITHM

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ABSTRACT : Cold backward extrusion process is a widely accepted metal forming process due to high production rate and capability to produce complex part with good surface quality. The present work highlights the development of mathematical models using response surface modeling (RSM) for correlating the inter-relationships of various parameters of cold backward extrusion process such as extrusion force, stroke length, slug diameter, and back pressure along with determination of optimal setting of these process parameters so as to minimize extrusion power required and to achieve high dimensional stability of product. A well-known metaheuristics known as simulated annealing (SA) is then applied to a practical case study of extruded tube to find the optimal combination of process parameters with objectives of minimizing extrusion power as well as dimensional instability subjected to the constraints on diaphragm thickness and nozzle thickness of the tube.

INTRODUCTION:

Extrusion is a relatively young but still one of the most important metalworking processes. Some of the latest developments within the manufacturing industry have revealed the use of emerging extrusion technologies to reduce production lead time and to manufacture mass range of products. The main benefits of cold backward extrusion process as compared to other manufacturing processes are the optimal usage of material, high production rate with short piece-production time, good surface quality, good static and dynamic properties of the components due to the favorable fiber structure and work hardening (Plancak et al. 1992). With these merits, cold backward extrusion processes is capable to produce complex part design for special purpose use and serve for many industries like pharmaceutical, aerospace, automobile, consumer goods, etc. Having such enormous advantages, a big hindrance in the full scale application of cold backward extrusion technology is the requirement of huge amount of power to form the product in cold state which substantially increases the manufacturing cost of the product. The distribution of the comparative strain for cold backward extrusion is clearly non-homogeneous, which means cold backward extrusion process deals with a non-stationary process behavior resulting into dimensional instability.

Many researchers (Elkholy,1996; Kuzman et al., 1996; Danckert, 2004; Onuh et al., 2003; Bakhshi-Jooybari et al., 2006; Bhanu**Prasad et al., 2001;** Arif et al., 2001; Brezocnik and Gusel, 2004; Tiernan et al., 2005; Abrinia and Gharibi, 2008; Qamar, 2010; Jung et al., 2014; Bingol, 2015) contributed to predict effects of various process parameters in extrusion process on performance measures such as extrusion pressure, extrusion time and quality. The literature survey reveals that few attempts also have been made for optimization of extrusion process including Gierzynska-dolna and Krajewska-binczyk (1992), Hao et al (2011), Cheng-liang et al (2012), Fereshteh-Saniee et al. (2013) , Wang et al. (2015), Venkatesh and Venkatesan (2015) etc.

The traditional methods of optimization such as sequential quadratic programming, method of feasible direction etc. can be used for parametric optimization of the cold extrusion process. However, these methods do not fare well over a broad spectrum of problem domains, are not efficient when practical search space is too large, and also tend to obtain a local optimum solution. To overcome these drawbacks one of the well-known metaheuristics simulated annealing is applied in this work. The next section provides the experimental details of the case study considered in this work.

2.   Experimental details of case study

The product considered in this case study is cold backward extrusion of aluminum collapsible tube used to store the medicinal cream(Pawar and Patil, 2013). The details of this tube are shown in Fig. 1.
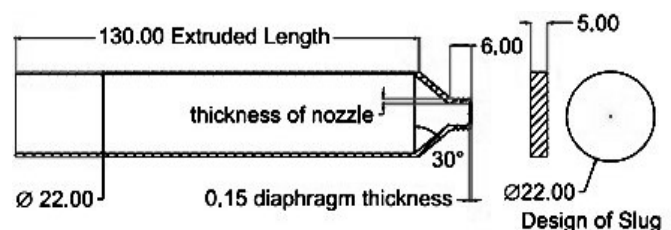
Fig. 1   Specification of test component

The tube is to be extruded from a slug having diameter 22 mm. The critical aspects of this tube manufacturing using cold backward extrusion process are to maintain the thickness of the diaphragm within the range of 0.10 to 0.15 mm, to maintain the thickness of the nozzle within the range of 1.15 mm to 1.525 mm, to ensure that the deviation of extruded length from its specified value (130 mm) should be minimum and extrusion power required to be minimum. A horizontal type cold backward extrusion press of 100 ton is utilized to manufacture this tube. Keeping in view the above mentioned aspects of product manufacturing, the two objectives considered are (i) minimization of the deviation of tube length from its specified value of 130 mm and (ii) Minimization of the extrusion power required subjected to the constraints on (i) thickness of diaphragm to be maintained within 0.10 mm- 0.15 mm and (ii) thickness of nozzle to be maintained within 1.15 mm- 1.525 mm. The important process variables identified affecting the above mentioned responses are extrusion force (F_e), stroke length (S_l) , slug diameter (d_s), and back pressure (P_b). Experimental details are available in the work by Pawar and Patil (2013).

To study the effect of process parameters i.e. F_e, S_l, d_s, and P_b, on performance measures i.e. power (P_w), deviation in extruded length (L_e), thickness of diaphragm (T_d), and nozzle thickness (T_n) a second-order polynomial response is fitted into the following Eq. (1).

$$y = b_0 + \sum_{i=1}^{k} b_i x_i + \sum_{i=1}^{k} b_{ii} x_i^2 + \sum_{j>1}^{k} b_{ij} x_i x_j \qquad [1]$$

Where 'y'is the response and $x_i(1, 2 \ldots k)$ are coded levels of k quantitative variables. The coefficient $b_0$is the free term, the coefficients $b_i$are the linear terms, the coefficients $b_{ii}$are the quadratic terms, and the coefficients $b_{ij}$are the interaction terms. Eqs. (2) - (5) are then derived by determining the values of the coefficients using the least square technique for the observations collectedfor power (P_w), extruded length (L_e), thickness of diaphragm (T_d), and nozzle thickness (T_n) respectively.x_1 to x_4 represents the coded values of four variables F_e, S_l, d_s, and $P_b$respectively.

$$P_w = 5166.443 + 279.723\, x_1 + 212.949\, x_2 + 175.132\, x_3 +$$
$$254.782\, x_4 - 56.597\, x_1^2 - 64.815\, x_2^2 - 28.354\, x_3^2 +$$
$$44.014\, x_4^2 - 11.029\, x_1 x_2 - 31.295\, x_1 x_3 + 16.021\, x_1 x_4 +$$
$$13.097\, x_2 x_3 + 12.230\, x_2 x_4 + 36.667\, x_3 x_4 \qquad [2]$$

$$L_e = 151.375 + 3.648\, x_1 + 4.126\, x_2 - 2.2958\, x_3 - 2.6083\, x_4 +$$
$$0.4927\, x_1^2 + 0.5302\, x_2^2 - 0.4985\, x_3^2 - 1.2797\, x_4^2 - 0.3175\, x_1 x_2 +$$
$$0.0025\, x_1 x_3 - 0.805\, x_1 x_4 - 1.2475\, x_2 x_3 - 1.135\, x_2 x_4 + 0.3325\, x_3 x_4 \qquad [3]$$

$$T_d = 0.13605 - 0.013737\, x_1 - 0.009462\, x_2 + 0.0035958\, x_3 -$$
$$0.020004\, x_4 - 0.006703\, x_1^2 - 0.008028\, x_2^2 - 0.0072406\, x_3^2 -$$
$$0.0079031\, x_4^2 - 0.0018937\, x_1 x_2 - 0.000943\, x_1 x_3 - 0.00263125\, x_1 x_4 +$$
$$0.0000687\, x_2 x_3 - 0.0006437\, x_2 x_4 - 0.00094375\, x_3 x_4 \qquad [4]$$

$$T_n = 1.28395 - 0.0637666\, x_1 - 0.0216\, x_2 + 0.000775\, x_3 -$$
$$0.0742333\, x_4 + 0.0074541\, x_1^2 - 0.0069958\, x_2^2 + 0.00041666\, x_3^2 -$$
$$0.01538333\, x_4^2 + 0.016825\, x_1 x_2 - 0.015\, x_1 x_3 - 0.0483375\, x_1 x_4 +$$
$$0.004875\, x_2 x_3 + 0.0088625\, x_2 x_4 - 0.0249625\, x_3 x_4 \qquad [5]$$

To test whether the data are well fitted in model or not, the calculated S value of the regression analysis for power, extruded length, thickness of diaphragm, and nozzle thickness are obtained as 118.30, 2.411, 0.011, and 0.054 respectively, which are smaller and R value for these responses are 0.94, 0.88, 0.83, and 0.78 respectively. The R value is moderately high for all responses. Hence, the models developed in this work fit the data well.

The next section describes the working of simulated annealing algorithm used in this work for optimization of cold backward extrusion process.

3 Simulated annealing algorithm

The simulated annealing algorithm developed by Kirkpatrick et al. (1983) resembles the cooling process of molten metals through annealing. At high temperatures, the atoms in the molten metal can move freely with respect to each another, but as the temperature is reduced, the movement of the atoms gets restricted. The atoms start to get ordered and finally form crystals having the minimum possible energy. However the formation of crystal mostly depends on the cooling rates. If the temperature is reduced at very fast rates, the crystalline state may not be achieved at all; instead, the system may end up in polycrystalline states, which may have a

higher energy state than the crystalline state. Therefore, in order to achieve the absolute minimum energy state, the temperature needs to be reduced at a slower rate.

The simulated annealing algorithm simulates this process of slow cooling of molten metal to achieve the minimum function value in the minimization problem. The cooling phenomenon is simulated by controlling a temperature like parameter introduced with the concept of Boltzman probability distribution. According to Boltzman probability distribution, a system in a thermal equilibrium at a temperature 'T' has its energy distributed probabilistically according to the following expression:

$$P(E) = \exp(-E / KT) \qquad [6]$$

where 'K' is Boltzman constant. This expression suggests that a system at high a temperature has almost uniform probability of being at any energy state. Therefore by controlling the temperature 'T' and assuming that the search process follows Boltzman probability distribution, the convergence of an algorithm can be controlled. At any current point X (t), the new value of the variables for the successive iterations is calculated using the formula,

$$X_{t+1} = X_t + \sigma \left[\sum_{i=1}^{n} R_i - \frac{N}{2} \right] \quad [7]$$

Where, $= (X_{max} \quad X_{min}) / 6$, R = Random number and N = Number of random numbers used.

In this work six random numbers are used. While starting the process, the initial values for the variables are taken as the average of the respective variable limits and the same is followed in the present work also.

Using the Metropolis algorithm (Metropolis et al.1953), we can say that the probability of the next point being accepted at $X_{(t+1)}$ depends on the difference in the function value at these two points or on $E = E (t+1)$ $E (t)$ and is calculated using the Boltzman probability distribution:

$$P (E (t+1)) = \min (1, \exp (-\Delta E / KT)) \qquad [8]$$

If $\Delta E \leq 0$, this probability is one and the point $X_{(t+1)}$ is always accepted. In the function minimization context, this makes sense because if the functional value at $X_{(t+1)}$ is better than $X_{(t)}$, the point $X_{(t+1)}$ must be accepted. The interesting situation happens when E is bigger than zero, which implies that the function value at $X_{(t+1)}$ is worst than at $X_{(t)}$. According to many traditional algorithms, the point should not be chosen. According to the Metropolis algorithm, there is some finite probability of selecting the point $X_{(t+1)}$ even though it is worst than point $X_{(t)}$. However the probability is not same in all situations. This probability depends on the magnitude of T and T values.

If the parameter T is large, this probability is more or less high for points with largely disparate functional values. Thus, any point is almost acceptable for a large value of T, on the other hand, if the parameter T is small, then the probability of accepting an arbitrary point is small. Thus, for small values of T, the points with only small deviation in the function values are accepted.

Simulated annealing is a point-by-point method. The algorithm begins with an initial point and a high temperature T. A second point is created at random in the vicinity of .the initial point and the difference in the function values [E] at these two points is calculated. If the second point has a smaller function value, the point is accepted, otherwise the point is accepted with the probability of exp [-E/T]. This completes an iteration of this simulated annealing procedure. In the next generation, another point is created at random in the neighborhood of the current point and the Metropolis algorithm is used to accept or reject the point .in order to simulate the thermal equilibrium at every temperature the number of points 'n' is usually tested at a particular temperature, before reducing the temperature. The algorithm is terminated when a sufficiently small temperature is obtained or a small enough change in function value is found. An estimate of the initial temperature can be obtained by calculating the average of the function values at a number of random points in the search space. A suitable value of 'n' can be chosen (usually between 2-100) depending on the available computational resource and the solution time. Decrement factor is left to the choice of the user.

The next section provides the application example for optimization of cold backward extrusion process.

4 Multi-objective optimization using Simulated annealing

Now, to demonstrate and validate the simulated annealing algorithm for parameter optimization of cold backward extrusion process following multi-objective optimization model is formulated:

Objectives:

Objective 1: The objective is to minimize the extrusion power (P_w) as given by the Eq. (2).

Objective 2: Minimization of deviation of extrusion length (d_L) from its specified value i.e.

Where, L is length of tube as given by Eq. (3)

The combined objective function is then formulated as:

$$Min\ Z = w_1 \times \frac{P_w}{P_{w_{min}}} + w_2 \times \frac{d_L}{d_{L_{min}}} \qquad [9]$$

Where, w_1 and w_1 are the weights assigned to the two objectives. is the minimum value of extrusion power obtained when single objective optimization problem considering only extrusion power as an objective was solved for the given constraints. is the minimum value of deviation of extrusion length obtained when single objective optimization problem considering only deviation of extrusion length as an objective, was solved for the given constraints.

Constraints: The constraints considered in this work are mainly to ensure the dimensional accuracy of the product. The constraint on surface roughness is not considered as the test component considered in work is subjected to post extrusion processes like hardening and painting. Hence, following two constraints are considered.

a)   Thickness of diaphragm: For proper functioning of the extruded tube for the intended purpose, the thickness of diaphragm (T_d)should be between 0.10-0.15 mm. This constraint can be expressed as:

$$T_d - 0.10 \geq 0 \qquad [10]$$

$$0.15 - T_d \geq 0 \qquad [11]$$

Where, T_d is as given by Eq. (4).

a) Thickness of nozzle: For proper functioning of the extruded tube for the intended purpose, thickness of nozzle (T_n)should be between 1.15 to 1.525 mm. This constraint can be expressed as:

$$T_n - 1.15 \geq 0 \qquad [12]$$

$$1.525 - T_n \geq 0 \qquad [13]$$

Where, T_n is as given by Eq. (5).

The variable bounds for the four variables considered in this work are:

$$380 \leq F_e \leq 770 \text{ (kN)} \qquad [14]$$

$$341 \leq S_l \leq 344 \text{ (mm)} \qquad [15]$$

$$19 \geq d_s \leq 22 \text{ (mm)} \qquad [16]$$

$$50 \leq P_b \leq 125 \text{ (N/mm}^2) \qquad [17]$$

Now the algorithm is applied to solve this optimization problem. The results of optimization using SA considering various weights for two objectives are presented in Table 1.

Table 1   **Results of optimization of cold backward extrusion process using SA**

F_e	S_l	d_s	P_b	P_w	L_e	T_d	T_n	Z
380	341	19.66	56.80	3239.44	132.9	0.1	1.421	1.015

For equal weights ($w_1 = w_2 = 0.5$),the best value of solution, mean value of solutions, and standard deviation of solution using 150 trial runs of SA algorithm are presented in Table 2. The standard deviation of 0.0013 indicates the robustness of the algorithm.

Table 2   **Mean and standard deviation of the optimum solutions obtained by using SA**

Method	Mean value	Best value	Standard deviation
SA	1.0164	1.0154	0.0013

CONCLUSIONS :

Extrusion is one of the important metal forming processes used to manufacture complex parts in several engineering applications. This paper deals with the optimization aspects of cold backward extrusion process. The objectives considered are minimization of extrusion power and improving the dimensional stability thereby minimizing the deviation in the extruded length. The effect of important extrusion process variables such as extrusion force, stroke length, diameter of slug, and back pressure on the extrusion power and extrusion length is obtained by response surface modeling approach. The optimization is then carried out using the recently developed optimization algorithm known as simulated annealing (SA) algorithm.

It is observed that all process variables considered in this work has significant effect on the performance measures. The extrusion power increases with increase in extrusion force, stroke length, slug diameter, and back pressure. However, it is observed that, the extrusion length initially increases and then decreases with increase in stroke length, slug diameter, and back pressure. The extrusion length increases with increase in extrusion force. The performance of the SA algorithm is studied in terms of convergence rate and accuracy of the solution. It is observed that Simulated annealing can deal with highly nonlinear models, noisy data and bounded constraints. It is a robust and general technique. Its main advantages over other local search methods are its flexibility and its ability to approach global optimality. The algorithm is quite versatile since it does not rely on any restrictive properties of the model. Simulated annealing algorithm has relatively less number of algorithm specific parameters such as initial temperature, cooling schedule etc., this algorithm can be easily tuned to enhance its performance for application example under consideration. The algorithm can also be easily modified to suit optimization of process parameters of other metal forming processes such as forging, rolling, die-casting, etc. Also the presented algorithm can efficiently handle the multi-objective optimization models.

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SENSING FOR SMART PLACES

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ABSTRACT : This paper explores the smart city concept and proposes an innovative way of sensing urban life using sensors and human sensors (VGI, Geosocialnetworks) data. The paper also discusses the need of an enabling geosocial information platform to facilitate data discovery and access in order to support smart citiesoperations. Data Infrastructure plays an important role and acts as an enabling platform linking government with voluntary information initiatives. This paper discusses how Geosocial platform will help for smart city project for PUNE CITY in INDIA.

Keywords : Smart city, Sensors, Place, Life, Pune city, Geosocial Information,Geosocial Network, Volunteer Geographic Information, DI, Cloud Information

INTRODUCTION:

Our living world becomes more and more complex every day and faces growing challenges. Urban areas are especially under pressure, as their population will exponentially grow in the coming decades. Various economical, environmental, social, demographical, etc. issues and stakes will lie ahead in the near future. These issues are even stronger while the age of real-time and location-aware information accelerates social and spatial changes. Building "smarter" (intelligent) urban environments and communities is one of the potential solutions that is currently proposed and explored to tackle these challenges. Smart City is one the smartest answer that was firstly proposed. A smart city is described as a platform or a system of systems, essentially based on three components: Sensors, Networks and Engagement (actuators). But is this 'Smart Cities' approach makes cities smart enough to meet the current and future challenges? The answer is certainly NO [1]. Making a city smarter is neither only a technological infrastructure issue, nor a managerial one. It is also and essentially providing citizens a better and safer way of living in urban areas, in the places where they live, work, have fun. Therefore, sensing life in those places is a major stake to understand new city dynamics and then to design better living urban environments. With the many challenges facing society today at multiple scales, location has emerged as a key facilitator in decision-making. Location data is now commonly regarded as the fourth driver in the decision-making process. The location provides more intelligent data analysis due to improved analytical and visualization capabilities. Location-based services and information are the basic components needed to dynamically describe and represent places' life [2].

We live in the Global Location Age. "'Where am I?' is being replaced by, 'Where am I in relation to everyone else as well as everything else?'"[3]. This kind of information, voluntarily produced and used by people, mainly refers to the places they live/use. Indeed, people whom live in a place are often the "experts" of this place [4]. The active engagement of citizens is then a major requirement for smarter operations of a city, and this needs for citizens to be digitally enable [1]. Capturing the sense of places is then a major stake for urban communities that look for a smarter way ofdevelopment.

Smart city infrastructure has to be based on an Enabled platform for aggregating formal data sensed by sensors and sensible knowledge sensed by citizen sensors. In smart cities, a network of sensors, cameras, wireless devices, IoT, data centers form the key infrastructure, which allows civic authorities to provide essential services in a faster and more efficient manner. Smart cities are also far more environmentally friendly as they use sustainable materials for building facilities and reduce energy consumption. This stake also poses fundamental research problems: How to efficiently and dynamically sense urban life? What kind of mechanisms should be developed to actively engage citizens as active sensors? What should be included in a Volunteer Geographic Service VGS to make this service useful for engaging citizens in smarter city operations?

This paper precisely providing recommendations for sensing Pune City life by using aggregation of sensors devices and human sensors (VGI, geosocial networks) location-based data.

Strengths of the Pune City

Pune has been able to create one of the strongest human capital and economic growth engines among Indian cities. With 811 colleges, it is often called the "Oxford of the East". This has resulted in more than 30% graduate workforce, which has triggered the IT revolution in the city. Almost all of the top IT companies in the country have their presence here, making it the 2nd biggest software hub in the country. The city also has a strong manufacturing base across auto and engineering. Thus, Pune is among the top five foreign direct investment (FDI) destinations in India. It is also one of the successful start-up destinations in India with more than 400 local start-ups.Pune's educated citizens have also been instrumental in driving participative governance, which is again one of the best across Indian cities. Pune City Connect is a forum to bring corporates and eminent citizens together to work on corporate social responsibility (CSR) activities on city-level issues.Pune has sufficient water at aggregate level (1,250 mld). Citizens get average water of 220 lpd, which is much higher than the 150 lpd benchmark (as compared to other cities like Delhi, Chennai and Hyderabad). Pune also has a comfortable climate with temperatures ranging from 12 to 38 degrees Celsius. The city is also called the cultural capital of Maharashtra, with a thriving arts and culture centre. It was the seat of power of Deccan India during the Peshwas in the 17th and 18th

centuries and has promoted arts and literature ever since. Encouraged by this, Pune Municipal Corporation (PMC) has also been at the forefront to deliver core urban services well. The city today has 94 percent households with tap water (71 percent for urban India), 57 percent MSW segregation (highest in India), 97 percent population covered by sewage systems (63 percent for urban India), 220 lpd water (highest in India among top 10 cities), and 98 percent electricity coverage with no load-shedding. PMC spent INR 9,461 per citizen in 201314 (3rd highest in India after Delhi and Mumbai). It has been the leading city under the Swachh Bharat Abhiyan.

2. HOW TO MAKE CITY SMARTER?

2.1 City weaknesses

While Pune has been able to deliver on most core urban services, top most area which needs significant improvement is mobility. A significant rise in the number of private vehicles and the lack of public transportation options have led to massive congestions across the city, with an average speed of 18 kmph. Pune is the only city among the top eight in the country without a mass rapid transit system (MRTS). The average number of buses per lakh population is only 37, compared to the benchmark of 55. This has resulted in 18 percent share of public transportation vs the 50 percent benchmark. The city has also grown radially, with most new job opportunities in IT and manufacturing being created on its outskirts. This has increased the average trip length to 10 km with 30 percent of bypass traffic going through the heart of the city. A lack of ring roads makes matters worse. While 50 percent of the commute is less than 5 km, limited non-motorised transport (NMT) options for pedestrians and cyclists has discouraged usage.

Also, while there is abundant water at an aggregate level, inequality of water distribution among citizens is a challenge. Around 85 percent of citizens get more than 150 litres per capita, per day (lpcd) benchmark whereas 14 percent of citizens get less than the stipulated amount on daily basis. This is driven by the lack of infrastructure (e.g., reservoirs, pipelines) in certain regions, about 30 to 35 percent non-revenue water (NRW) due to internal leakages and lack of water metering leading to excess consumption [8].

The housing challenge also needs to be addressed. Twenty-eight percent of the city's households live in slums (compared to 17 percent for national average).Finally, while Pune was earlier known for its dense tree cover and good environment, urbanization has taken a toll on the livability and sustainability parameters. Air quality (PM10 levels) in Pune stands at 91 compared to the ideal state of 60. Upto 355 mld untreated sewage is discharged into the Mula-Mutha river, which has biochemical oxygen demand (BOD) levels of 50 to 80. Sound pollution, driven by congestion, is one of the highest among top Indian cities. With its unplanned growth, Pune lacks the benchmark levels of open spaces (7 percent vs 15 percent) [8].

Challenges

Mobility

Addressing Pune's mobility challenge is critical since it came as most critical issue in both citizen engagement and desk profile. Increase in public transportation usage from 15% to 30% by adding options of public transport (like metro, BRT) and enhancing current options (e.g. 3000 buses). Increase in trip share of NMT to at least 30% with bicycles and walking as preferred mode of transport. Both public transportation and NMT usage will help Punekars in improving mobility by increasing average speed from 18 kmph to 30 kmph.
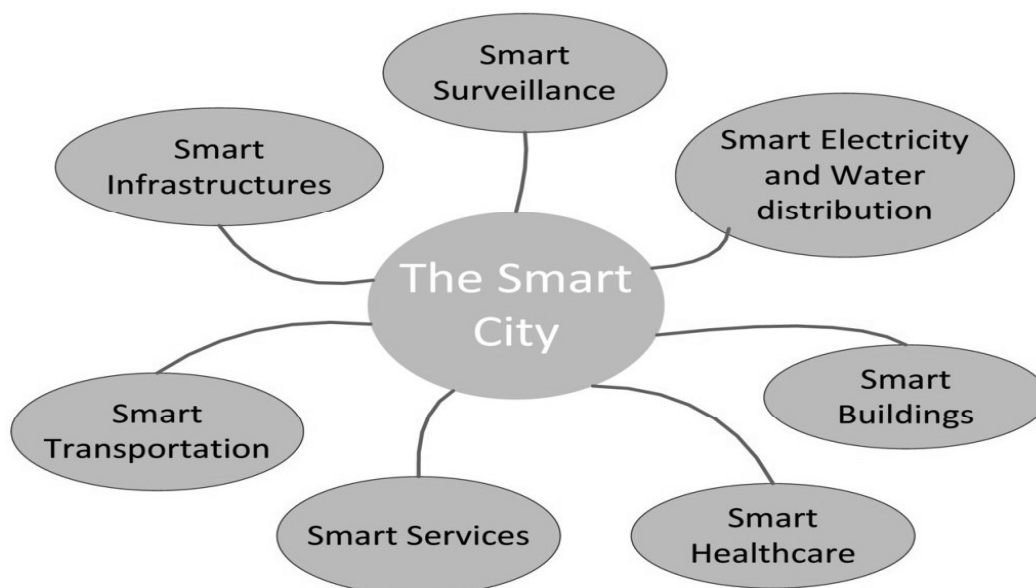
Pune Public Transport System can use systems like Vehicle health monitoring system (VMS), Real-time tracking of 100% buses (VTS), CCTV surveillance, Public information system (PIS) to improve availability, reliability and passenger comfort. ' Pune Traffic Management System' can be reduce congestion by using Adaptive traffic signals, Smart parking, Traffic mobile apps and online portal with live and forecasted traffic [9].

Environmental Sustainability

A smart city has at least 10% of electricity generated by renewables. With this guidance, Pune has planned to achieve this target by aiming at 15-20% of electricity generated by Rooftop Solar. This initiative provides a platform for demand and supply side of rooftop PV to interact with each other and continue to find lower prices for citizens at acceptable quality levels of power generated [10].

Intelligent Lighting for City Roads

Does street lighting really need to burn at full power the whole night now that energy is becoming more and more expensive? We say: No, it doesn't. That is because intelligent street lighting management already provides a wide range of options for cutting energy consumption without compromising on safety and the quality of life [12]. Both the duration and intensity of lighting can be regulated with the aid of modern sensors and control systems [11].

2.2. Smart city requirements

Then "smart city" refers to the capability of a city (or a community) to understand events or phenomena that characterized its internal and external dynamics (crisis, transport issues, road traffic, socio-economical transformations, demographical changes, etc.). The Latin etymology of intelligent ("intelligere") refers to the ability to learn about/from someone or something, understand, interact with one's environment and, act relevantly. This ability particularly consists of adaptability to changes in the environment and, capacity for knowledge from this environment.

A smart city must also be able to identify the main components of an event (where, when, who, what, how), to analyze it, to provide location-aware sense to it and, to react (actuate) properly (and in real-time at least compliant with the nature of this event). In order to achieve these goals, urban infrastructures liketransport, communication, water supply or energy,etc.have of course to be redesigned and upgraded by new active and communicant sensors and actuators. This refers to the Internet of Thingsand the Web of communicating objects.

3. PLACE AND LIFE

3.1 concept of Place

Here sensing urban place and lifeespecially, are central as a way to understand cities and then to smartening its urban management and design. But what the concept of Place does really mean in the smart city context and to what extent place and life does matter to make city smarter?

3.2 Does Place/life still matter for smart city?

As it was highlighted before, people increasingly live in highdensity urban, often high rise and multi-functional buildings. These increasingly urbanized populations will predominantly live in multi-level, multi-purpose, highly engineered, high-rise developments. Cities require significant infrastructure above and below the ground. Rapidly expanding vertical cities and their populations will experience a range of new environmental, social and economic challenges. With this in mind, then the question would be, does place still matter in a spatially enabled society? we believe the answer is undoubtedly yes

3.3 DI Platform

Data Infrastructure (DI) is an integrated, multi-leveledhierarchy of interconnected DI based on partnerships at corporate, local, state, national, multinationaland global levels. This enables users to save resources, time and effort when trying to acquire new data by avoiding duplication of expenses associated with the generation and maintenance of data and their integration with other data [13].

3.4 Citizens as sensors

User generated Geosociographic information. It ismajor characteristic of spatially designed smart city. Citizens increasingly use technology, particularly mobile technology, to voluntarily contribute and provide local information and share place-based knowledge on their networks. Users become both producers and consumers of this information. Citizens, as sensors, are able to provide their social network with real-time information about their experiences: recording and sharing personal memories, reporting on inefficiencies and problem areas within the city, or rating the services provided in different locations.

In this type of user-contribution-based service, community is shaped and in return, these services rely on community, considered as a source of information. This concept of "citizens as sensors" [5] is also an important issue for Data Infrastructures (DIs). Spatially enabled citizens could be considered as a dynamic source of information to feed the DI data flows [7], as well as the monitoring system of smart cities.

3.5 CC TV cameras sensors

Distributed CC TV cameras across cities which are used for many applications such as traffic management or public safety can also be useful for other potential applications. These cameras can be considered as sensors network for further data collection and analysis for live city application of related movement and planning..This camera sensor network can be used to create an immersive and coherent 3D visualization of streets and their real-time dynamics and events. The camera sensor networkwill include live cameras around the city, traffic control sensors and VGI. High-level image processing, including feature extraction from live video streaming, will allow for accurate and detailed information to be readily available in real-time. A dynamic live city has applications as diverse as urban planning, disaster management, asset management and intelligent transportation systems.

4.AGGREGATIONS

In order to aggregate place-based information system ensure traceability capability, it proposeplatform based on aCloud network. The cloud network applies wiki management and integration strategies to geo-data geometry (shape and location)graphic attributesdescriptive attributes. More precisely, a Cloud Network is a information system (IS), created online (on the Internet) throughcollective interventions (in this case, data coming from camerasensorstogether with data coming from citizens), which involves interactions between participants, followed by the combination and traceability of their contributions into coherent geosocial representations that are open to improvements [6].

CONCLUSION :

This paper proposes a City (Pune) based urban platform that aims to facilitate data access, discovery and linkages in a smart city context. This platform is fed both by smart sensors information and citizen-sensors through their location-based network. By sensing urbanlife, this platform contributes to the smart operations of cities.

The work related in this paper is a work in progress. The platform is currently under development and an experimental protocol should be designed. This paper provides illustrations of how to proceed to move urban infrastructures and city components towards smarter operational modes. Geosocial technologies, information and methods are powerful means to smartening the world by providing multi-sensing capabilities, building models, improving analyses and capacities to understand and react by feeding actuating technologies or engaged people. But more important for a smart city is its capability to capture the sense of places. A city is not a robot or machineratherit has heart, feelings. This could not be captured and represented without active citizens sensors connected to location based-social (Geosocial) networks. Capturing the sense of places, in a dynamic way, is then a major stake for urban communities that look for a smarter way of development. Smart city infrastructure has to be based on an Enabled platform for aggregating formal data sensed by device sensors and sensible knowledge sensed by citizen sensors.

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EXPERIMENTAL STUDY OF PERMISSION REMOVAL FROM ANDROID APK USING REVERSE ENGINEERING PROCESS

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ABSTRACT : Therecent boom in Android mobile device usage has caused a shift in the information technology and has affected the way how information and data are stored , shared among the mobile users. The advent of social networking applications also demands the availability of resources that can be shared among the authentic users. This paper is experimental study of permission removal from android apk using reverse engineering process .Recompiled app runs on a device as the way original app . The experimental study included ten apps from different category. Experimental study result shows difficulty of permission removal due to permission type and dependency of permission within app functionality.

Keywords: Android Mobile App Security, User Privacy, Permission check, re-compilation.

INTRODUCTION:

Android Smartphone OS has captured more than 80 % of the total marketshare, leaving its competitors iOS, Windows mobile OS and Blackberry far behind [1]. Gartner Smartphone sale report 2014 reports 53.2% in Android devices compared to the previous year [1]. The overall market share increased to 80% from 66% compared to the past two years ,a substantial rise of 14% among the users.Ubiquitous Internet connectivity and availability of personal information such as contacts, messages, social network access, browsing history , online shopping and banking credentials have attracted the attention of malware developers towards the mobile device in general and Android in particular.

Mobile environment threats may affect different assets like 1)Personal data 2) Corporate Intellectual property 3) Classified information 4) Financial assets 5)Device and service availability and functionality 6)Personal and political reputation.

Threatsin mobile environment are reported such as Data leakage resulting from device loss or theft , an Unintentional disclosure of data , -attacks on decommissioned devices: phishing, spyware, network spoofing, surveillance, dialerware, financial malware , network congestion .

Methodologies to perform attacks against smartphones are categorized using classes - Wireless, break-in, infrastructure based, worm based, bot-net, userbased. Attackers use possible methodologies to perform an attack in a mobile environment to reach different goals like privacy , sniffing, denial of service, overbilling. Paper consists of related work, is Comparative study of existing techniques and solutions for Mobile Apps, Methodology section is about android app structure, permission types, tools available for reverse engineering , method used for experimental study, conclusion section is result analysis.

RELATED WORK

Shabtai [2] et al. proposed Adnromaly a framework for anomaly detection on Android smartphones. The framework continuously monitored the information obtained from the Smartphone. Then, it applied machine learning to classify the collected data as benign or malicious. Yet they could not find real malware to test their proposal.

Enck et al [8] used de-compilation and static analysis techniques to study 1100 free applications from the official Android Market to understand a broad range of security-related metrics associated with these applications. They discovered that sensitive information is widely leaked in applications. For instance, more than half of the applications include at least one advertisement libraries that collect and send private information, e.g. the location of the phone.

Pridgen& Wallach [7] examined a sample of114,000 apps and found that the number ofpermissions required by apps is increasing, andconsequently, posing a privacy risk to Android users .

Felt et al. [3] and Kelley et al. [5]suggested that many users have a low comprehensionof the Android permissions system that is thepermissions system may be insufficient in providingadequate user privacy in the hands of a novice user.

Kern &Sametinger [6]took a different approach and recommended the useof fine-grained individual permissions control on aper app basis. This means that each Android appwould have each of their permissions explicitly listedand the user would either deny or allow thepermission request.

Zhou et al. [9]designed a system that could control an app's accessto sensitive permissionsBerthome et al. [4] proposed a set of two apps,comprising (1) the Security Monitor, a third party appinstalled onto the device, and (2) the SecurityReporter, which would be injected into a decompiledtarget app. The injected app is able to monitor thetargeted app and can then report to the SecurityMonitor with details such as resource requests.

METHODOLOGY

Android applications have a basic structure .The following is a short list of important items that are included in any Android source project. **AndroidManifest.xml** This is an essential XML configuration file for your application that defines properties such as the package name, the minimum required Android OS version this application will run under, icon, and label definitions. One of the most widely known properties of an Android application is defined in this configuration file: the required application permissions.[10]

/src The location of your source (.java) files.

/res A resources folder that contains files related to user

presentation. Graphics and layout XML documents are typically found here.

/res/layout/main.xml This configuration file contains definitions that control the layout of the main application. The file name 'main.xml' is a default value.

/res/values/strings.xml As one can imagine, the strings.xml configuration file contains strings. These are static string definitions that are referenced in other places by your application. One important string object name is "app_name", which contains the name of your Android application. The file name 'strings.xml' is a default value.

The table below lists some additional common values. [11]

ACCESS_COARSE_LOCATION   -

Allows coarse location access (Cell / WiFi)

ACCESS_FINE_LOCATION   -

Allows fine location access (GPS)

ACCESS_WIFI_STATE   -

Allows access to WiFi network information

GET_ACCOUNTS   -

Allows access to account lists on the device

INTERNET   -

Allows network / Internet access

READ_CONTACTS   -

Allows access to contact data

Allows access to contact data   -

VIBRATE   -

Allows access to vibration control / state

WRITE_EXTERNAL_STORAGE   -

Allows writing to external storage (i.e. SD)

The eight free android apps are downloaded from Google play and two self-built android apps are considered for this study. Categories of app are general apps (e.g. Flashlight), educational apps (e.g. Smart Bridge), Games (e.g. Cooking Fever) ,Social Networking App (e.g. What Sapp), Self Built App (e.g. Pune Rider).

The tools likeapktool , jad, dex2jar can be used to extract information from Android apk files.
The experimental study uses apktool for extracting AndroidManifest file and for repackaging the android app's apk. For signing repackaged apk ,SignApk tool is used. Following are the experimental study steps and diagrammatic representation of the same :
1.   Get apk from Play Store
2.   Decompile to extract .XML (apktool)
3.   Manually Edit file to remove permission
4.   Recompile apk folder (apktool)
5.   Get new apk file from Dist folder
6.   Create Certificate file (SignApk tool)
7.   Install Modified app on device
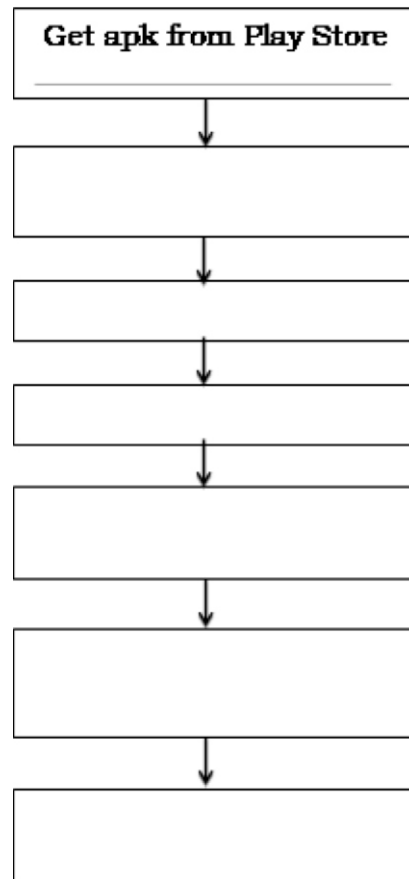
Few screens which depicts the experimental study steps during the de compilation, recompilation, signed apk process carried out .

1. Decompile command to extract .XML (apktool)
apktool d mobilesutra.college.apk
2. Decompile to extract .XML (apktool)a
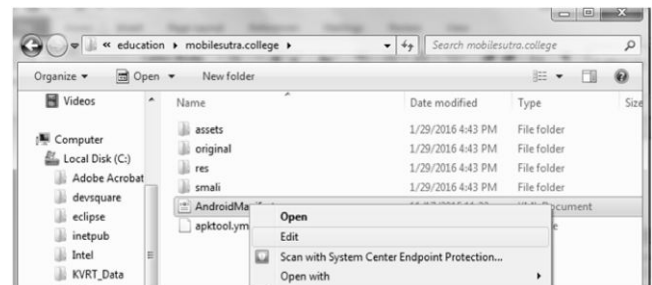
2.Manually Edit file to remove permission

4.Recompile apk folder (apktool)

```
C:\Windows\apktool>apktool b mobilesutra.college
I: Using Apktool 2.0.0
I: Checking whether sources has changed...
I: Smaling smali folder into classes.dex...
I: Checking whether resources has changed...
I: Building resources...
I: Building apk file...
```

5.Get new apk file from Dist folder
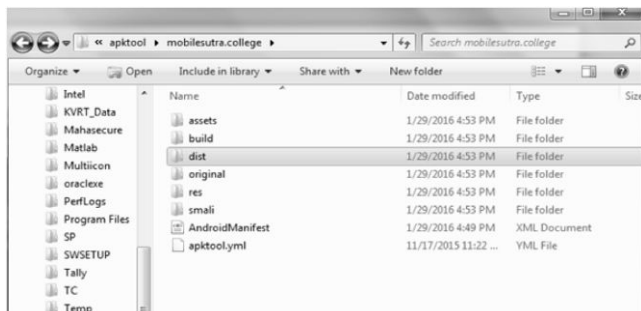
6.Create Certificate file (SignApk tool)

```
C:\Windows\SignApk (1))java -jar signapk.jar certificate.pen key.pk8 mobilesutra
.college.apk mobilesutra.collegesigned.apk
```

7.Modified app installed on device and is functioning stable
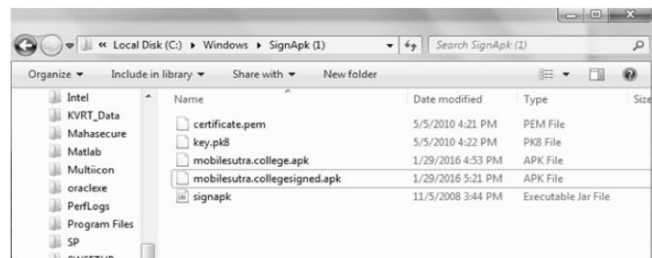
CONCLUSION :

The experimental study shows that ACCESS_FINE_LOCATION could be removed from apps without direct change in source code . The process is to actually remove the permission request from the AndroidManifest.xml file and recompile the app. The new apkin dist folder with the permissions removed, is functionally stable after the permission is removed. Thus the security of android app can be improved by removal of extra or unwanted permission.

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A REFERENCE STRING INDEPENDENT HYBRID PAGING ALGORITHM TO IMPROVE SYSTEM PERFORMANCE

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ABSTRACT : Page replacement algorithms are very important when virtual memory comes into picture.
These algorithms are evaluated on the sequences of memory reference. The number of page faults can be a one parameter to measure system performance. If number of page faults is less, system performance is better . But, the number page faults for a perticular algorithm is sometimes depend on the reference String. So,in this paper two page replacement algorithms are taken into consideration named LRU(Least Recently Used) and SCA(Second Chance Algorithm).And a new hybrid algorithm is proposed , which gives consistently optimized performance for any kind of reference string for frame size three.

Keywords : LRU(Least Recently Used), SCA(Second Chance Algorithm),page fault, reference string, reference bit

INTRODUCTION:

Virtual memory is an imaginary space of memory which allows a system to overcome a problem of shortages of physical memory. Virtual memory allows the process to be executed which needs more memory space than available. The programs having larger size than available memory can be executed using virtual memory. [3]

1.1 Demand Paging :
A process is divided into pages and memory is divided into frames, and here the concept of demand paging comes in role. The basic idea behind demand paging is that the page is swapped in the main memory only when it is required. Because of demand paging , several processes can be accommodated in the main memory at the same time.[7]

1.2 Page Replacement :
Let us consider a scenario, when a process requests some more pages and no empty space is available there in memory to bring the pages in . In this case, the pages which are not required currently should be moved out and the pages which are needed should be moved in. That means one of the page out of already available pages should be replaced by a new requested page. This mechanism is handled by page replacement concept. [4]

1.3 Page fault and Reference String :
Page fault is one more important concept in page replacement. Page fault occurs when the requested page is not present in the memory.There are several page replacement algorithms which are evaluated on a string of memory references, called as reference string.[6]

1.4 The page replacements algorithms :
 Paging happens when page fault occurs. And when page fault occurs,one of the page out of available pages should be swapped out. This decision of replacement of a page is taken by Page Replacement Algorithms.[6]
The Page replacement algorithms are as follows:
1. First In First Out (FIFO)
2. Least Recently Used (LRU)
3. Most Recently Used (MRU)
4. Least Frequently Used (LFU)
5. Most Frequently Used (MFU)
6. Second Chance Algorithm (SCA)
7. Optimal Page Replacement

1.5 Least Recently Used Algorithm (LRU) :
In LRU algorithm, the page which not has been referred for the longest time is selected for replacement.
For the implementation of LRU,a linked list is to be maintained for all the pages in the memory.
In this linked list, the most recently used paged are stored at front end and least recently used pages are
stored at the rear end.[7]
LRU can be implemented using hardware assistance also.

1.6 Second Chance Algorithm :
Second chance algorithm is FIFO variant, only the difference in FIFO and SCA is an additional reference bit is added in SCA. The working of SCA is same as FIFO , like the pages stored at the front of the queue are selected for replacement. But, here one more thing is checked. The reference bit of that page is checked.[2]
The page is swapped in secondary memory, if the reference bit is not set. And if the page is set, the reference bit is cleared and thus a second chance is given to that page as the name suggests .Second chance algorithm degenerates into FIFO, if all the bits are cleared.[1]

1.7 Proposed Algorithm :
In proposed hybrid algorithm, two paging algorithms are considered Least Recently Used and Second Chance Algorithm. In this algorithm, the mechanisms of these two algorithms are combined.
Two conditions are examined for the replacement of a page :
1. it should satisfy LRU criteria
2. it should satisfy SCA criteria
Here in proposed algorithm as Second Chance Algorithm is used, so reference bit value is taken into consideration.
The R-bit has values 0 and 1.
If R-bit is 0, that means it is not set.
If R-bit is 1, that means it is set.
Algorithm :
Step 1 : Start
Step 2 : if free frame is available, then allocate that frame to a requested page.
Otherwise, replace a page according to hybrid algorithm. Go to step 3.
Step 3:

i) First, check if that page has not been used from a longest time.
ii) check if reference bit=0
if both the conditions are true then select that particular page for replacement.
Otherwise, goto step 5.
Step 4 : if the page is referenced again and it is already present in memory, then
reference bit = 1
Step 5 : In step 3 ,
i) if first condition is true

ii) if second condition is false i.e. if reference bit = 1 then,
a. apply both the conditions in Step 3 on the remaining pages in memory
b. reference bit = 0;
Step 6 : if for all the pages reference bit =1 , then reference bit =0
Otherwise, go to step 2.
Step 7 : Exit.

Experimental Analysis :
example 1 :
using LRU :

7	0	1	2	0	3	0	4	2	3	0	3	2	1	2	0
7	7	7	2	2	2	2	4	4	4	0	0	0	1	1	1
-	0	0	0	0	0	0	0	0	3	3	3	3	3	3	0
-	-	1	1	1	3	3	3	2	2	2	2	2	2	2	2
				*		*					*	*		*	

Number of page faults using LRU : 11

Table 1 : reference string evaluation using LRU

Using SCA :

7	0	1	2	0	3	0	4	2	3	0	3	2	1	2	0
7_0	7_0	7_0	2_0	2_0	2_0	2_0	4_0	4_0	4_0	0_0	0_0	0_0	1_0	1_0	1_0
-	0_0	0_0	0_0	0_1	0_0	0_1	0_0	2_0	2_0	2_0	2_0	2_1	2_0	2_1	2_1
-	-	1_0	1_0	1_0	3_0	3_0	3_0	3_0	3_1	3_0	3_1	3_1	3_0	3_0	0_0
				*		*			*		*	*		*	

 Number of page faults using SCA : 10

Table 2 : reference string evaluation using SCA

Using Hybrid Algorithm (LRU+SCA) :

7	0	1	2	0	3	0	4	2	3	0	3	2	1	2	0
7_0	7_0	7_0	2_0	2_0	2_0	2_0	4_0	4_0	3_0	3_0	3_1	3_{1-0}	3_0	3_0	0_0
-	0_0	0_0	0_0	0_1	0_1	0_1	0_1	0_1	0_0	0_1	0_1	0_{1-0}	1_0	1_0	1_0
-	-	1_0	1_0	1_0	3_0	3_0	3_0	2_0	2_0	2_0	2_0	2_{1-0}	2_0	2_1	2_1
				*		*				*	*	*		*	

Number of page faults using Hybrid algorithm : 10

Table 3 : reference string evaluation using hybrid algorithm(LRU+SCA)

example 2.
Using LRU :

1	2	3	4	1	2	5	1	2	3	4	5	2	1
1	1	1	4	4	4	5	5	5	3	3	3	2	2
-	2	2	2	1	1	1	1	1	1	4	4	4	1
-	-	3	3	3	2	2	2	2	2	2	5	5	5
				*	*			*					

Number of page faults using LRU : 11

Table 4 : reference string evaluation using LRU

Using SCA :

1	2	3	4	1	2	5	1	2	3	4	5	2	1
1_0	1_0	1_0	4_0	4_0	4_0	5_0	5_0	5_0	3_0	3_0	3_0	2_0	2_0
-	2_0	2_0	2_0	1_0	1_0	1_0	1_1	1_1	1_0	4_0	4_0	4_0	1_0
-	-	3_0	3_0	3_0	2_0	2_0	2_0	2_1	2_0	2_0	5_0	5_0	5_0

**

Number of page faults using SCA : 12

Table 5 : reference string evaluation using SCA

Using Hybrid Algorithm :

1	2	3	4	1	2	5	1	2	3	4	5	2	1
1_0	1_0	1_0	4_0	4_0	4_0	5_0	5_0	5_0	3_0	4_0	4_0	4_0	1_0
-	2_0	2_0	2_0	1_0	1_0	1_0	1_1	1_1	1_1	1_0	5_0	5_0	5_0
-	-	3_0	3_0	3_0	2_0	2_0	2_0	2_1	2_1	2_0	2_0	2_1	2_1

Number of page faults using Hybrid algorithm : 11

By considering above examples, we can not predict that out of LRU and SCA, which algorithm will give less number of page faults. As depending on reference string number of page faults can differ.
The hybrid algorithm gives the optimized outcome for any kind of reference string.
As the page fault reduces, system performance increases.
Hybrid Algorithm = BEST OF (LRU || SCA)

CONCLUSION :

For some reference strings LRU seems to be working better and for some second chance algorithm is good. So,we can say that these two algorithms are not giving generic performance results for all reference strings. That is LRU and SCA algorithms are reference string independent.
So, this proposed algorithm which is hybrid of LRU and second chance algorithm is giving consistently best performance for any kind of reference string.That means, this hybrid algorithm is reference string independent.

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ROLE OF THE JAVA IN IOT TO KEY UP THE BUSINESS: A STUDY

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ABSTRACT : In the current era Internet of Things (IoT) is ruin the world and Iot has been also known as a component of upcoming internet and ubiquitous computing. It also creates a truly elegant atmosphere to get connected with everything everywhere at any time. It consists of the distributed architecture with rich assorted components, and many more. This article provides the significance of Java for (IoT) to key up the business. The Java for IoT acts as a bond joining the various domains of applications communicating over diverse interfaces. First, to enable the better understanding of the current gap and future directions in this field a comprehensive review of the existing systems for IoT is provided here. And it also proposed for Business enhancement /growing system, and based on that feature field wise classification is performed on the existing IoT on business. Internet of things cabinets a dream wherein internet will be part of physical entities inculcated in day to day life. It doesn't mean that physical objects will be exchanged by virtual ones indeed it means that they will be worked remotely and will serve as a physical access points to internet facilities. The IoT dream is stuck by the conviction of constant progress & innovations in communication technology, Electronics & Information technology.

Keywords: *IoT, Java, Business, Embedded system.*

INTRODUCTION:

Internet of things showcases a dream wherein internet will be part of physical entities inculcated in day to day life. It doesn't mean that physical objects will be replaced by virtual ones indeed it means that they will be operated distantly and will serve as a physical access points to internet facilities. The internet on things dream is stranded by the conviction of constant improvement & innovations in communication technology, Electronics & Information technology.

For making Internet of things to work, Smart object will have to play a vital role as we have experienced competence of embedded communication and information technology to transform utility of these objects. With help of sensors they can identify their context via built in networking feature their communication to internet services, people & between them is accessible.

Internet of things shall also influence World Wide Web and its many technologies as an infrastructure for smart objects. For illustration "Web of Things" which utilizes simple embedded HTTP servers and Web 2.0 technology. URLS are used in Web of Things to address smart objects and they are controlled by common HTTP methods such as GET and PUT. Constrained Application Protocol (CoAP), a light-weight protocol providing mechanisms similar to HTTP.[6][1] is used to connect low end devices.

Last year has been remarkable for IOT as it has transformed itself from hype to a feasible business project and software giants like Google, Apple & CISCO are considering to invest their money in IOT. Other than software companies it is also an opportunity for Telecom companies working on machine to machine model(M2M).IOT will be a core business as we require communication between smart objects and people through internet. There will be a new segment wherein telecom operators will target Concerning wearable devices for business.[7][1]

II.   JAVA AND INTERNET OF THINGS

Let us understand java first, it is a programming language and a dialect or accent of IT professionals. Don't be shocked if java dictates upcoming revolution of internet in coming years. It was innovated for embedded computing and later on rationalized for real time application. And that is why java is best suited for IOT.

Since 1969 till date we have seen significant increase in consumption of networked devices accessing internet. In near future humans will have four basic needs food, clothing, shelter and internet. Like humans demand for internet will also increase for embedded processor from billion to ten billions. Internet will be there in every walk of life. Here are some amazing facts with date about internet which may help us to analyze journey of internet and its advancement. This also reflects future of IOT which is very vivid.

1982-1989: Birth of the TCP/IP internet.
1985-1989: Commercialization of the Internet begins.
1990-1991: Advent of the World Wide Web.
1990-1998: Conventional desktop computers re-engineered as intrinsically networked devices.
1996-present: Slowly but surely, we enter the age of global domination by mobile networked devices (akaIoT).

HTP/2 a networking protocol is restructured to nurture machine-to-machine communications. Thing see is another illustration of kit helpful for fulfilling hardware requirements of IOT. Such supporting technologies are now available online

Silicon Valley sage Tim O'Reilly has emphasized that the result will not be just the usual caricature of pointless connections from coffee machines or refrigerators to the 'Net at large. With enough sensors and automation, IoT is really about human augmentation. Java will be a workhorse in that coming disruption.

How IoT works

According to Andrew C. Oliver for bringing IOT into practice we require a team consisting of humans and computers

Technical roadmap of Iot is shown in diagram
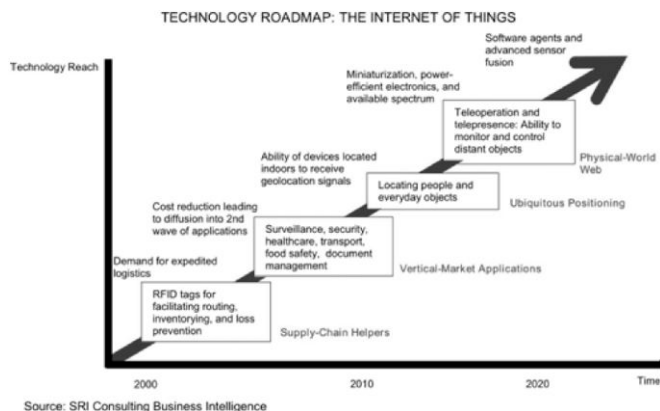
Fig 1: Technical roadmap of Iot

Since IOT needs three communicating models between human & Devices, Human & human and between devices. Consider a refrigerator which is not only aware about when it requires maintenance but also it can place order for those things which are not available in its inventory. The success of pervasive computing will be that it recedes into the background, working out facts and events and remedies with other connected devices. The beauty of IOT is that human will no more think for meager things that will be handled by devices itself only results will be discussed with humans.
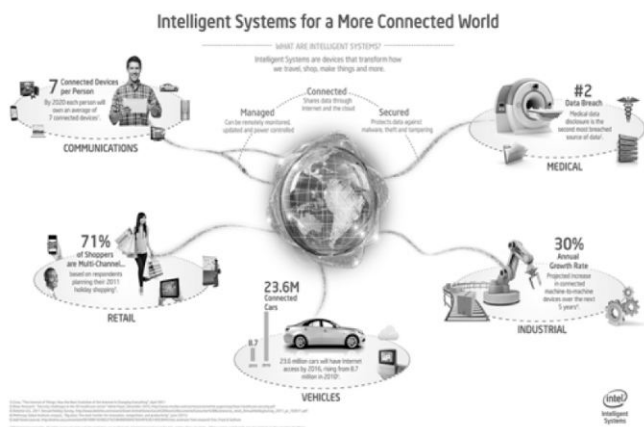
Fig 2 : Intelligent system[17]

The most ordinary instance is the most influential. Leave aside just-in-time agricultural pest treatments, miniaturized bomb-sniffers, improved medical diagnostic technology, or similarly impressive applications of IoT in recent news. Think instead of the humble vending machine -- one that's properly stocked, well maintained, and always silently awaiting your command.[4]

When you place your bills in a vending machine and push buttons to indicate your purchase, several mechanisms interact to ensure the satisfaction of your hunger. You don't have to understand or agree with all the details of implementation; your stomach is just happy with the results. Now, we have IoT-enabled vending machines. When you make a purchase from an IoT-enabled vending machine, your purchase triggers actions spanning the globe to keep inventory in balance and parts well-maintained, at a total cost 30 percent lower than the pre-IoT model.

Java for embedded computing

Very few may know that initial java originated for embedded computing. In nascent stages java was used in television set-top interfaces. James Gosling's one of the fundamental theme for java was device to device communication & these theme is now equipped to shore up the Internet of Things.

Javas capabilities are tailor made for IOT. Lot of investments is done worldwide to alter java for new generation programmers and trying to make it feasible for production systems that rely on it. Till date many of such applications and system are tested.

For programmers while performing embedded it is necessary to distinguish between java platforms. Nothing actually changes in coding or syntax of program it remain the same as it is for application programs. The libraries, and especially the development (and testing) environments, are specialized for embedded Java programming, however. Just be sure that you have the right tool chain for the embedded environment you target.

Isn't Java too big for embedded systems?

As embedded devices are often tightfisted on computing resources, Java wasn't always a feasible first choice for embedded systems. In comparisons to java Assembler, C, and even Python performed better than java in systems with constrained memory, CPU power, or other hardware issues. This objection has become a myth in the past few years, however, as the average size of an embedded environment has grown. Resource requirements have also shrunk with the introduction of new techniques for compiling Java for embedded environments.

Java embedded programming in 2015

The journey to provide proper platform to embedded system started way back in 1996 but it was short of energy. Currently that momentum is available ecosystem of Java standards and tools for embedded programming are ready to leverage it.

From 2000 to 2010, J2ME (Jave 2 Platform, Micro Edition) was used for java based embedded applications or micro computing. Now a days for any embedded applications it is common that J2ME is used. While Java ME and its concepts -- especially profiles and configurations --remain crucial, mobile Java developers tend to focus more on Android, and HTML5 for user interfaces. Cellular telephone handsets are the most visible embedded computers, and roughly four out of five mobiles sold now are based on Android. (Although Android supports Java ME, the two have different product lifecycles, and it's not entirely clear who will decide what the next generation of application environments for practical embedded devices will be.)[3]

Profiles and configurations are critical notion in embedded

programming. An embedded profile such as MIDP is a gathering of APIs supported on devices of interest. A configuration is a framework specification. While not strictly true it can be useful to think of profiles as belonging to configurations, including most prominently the CLDC or Connected Limited Device Configuration. (Also see "Jim Connors' Weblog" to learn more about profiles and configurations applicable to IoT.)

In addition to Java ME's profiles and configurations, a handful of enterprise Java technologies hold potential for embedded development. Java Management Extensions (JMX) is used for distributed resource management and observe and could one day complement embedded definitions neatly. Real-time Java also holds an important place in embedded programming for IoT.

Java's real-time model and tools

Real time application require gathering and responding to data immediately where data is mostly variable in nature. Embedded applications are mostly exposed to sensors and effectors in medical and production diaspora. e.g. Smoke detector is a real time system which has to respond immediately when anything goes wrong.

Java was not born for real time computing, In real time computing margin of error is very less whereas James gosling wanted to make java feasible for real time computation. Java had problems regarding reliability and consistency which was a taboo in real time computing. These problems were related to garbage management of java which resulted in inconsistency and non-reliability of it. Real-Time Specification for Java (RTSJ) and related standards addressed temporal indeterminacy with support for periodic and sporadic task scheduling, task deadlines and CPU time budgets, garbage-collecting threads, and allowances that enable certain tasks to avoid garbage collection delays. RTSJ was approved in 2002 and has been implemented for a number of Java VMs.

Although RTSJ was formally listed as latent in the Java Community Process until February 2015, specification experts have been vigorously at work refining and updating it throughout the last decade. As an example, JamaicaVM is an RTSJ implementation supported by aicas GmbH, available at no charge for educational and other non-commercial use.

Real-time's timeline

Timeline which is necessary for embedded real time standards are usually longer as compared to consumer software. Life of consumer software is predicted to be from six months to one year nut on the other hand real time systems are expected to work for decades without any error. Error in real time medical software may result in death of patients. Published standards that impact these applications take correspondingly longer to draft.

More recently, Oracle has endorsed Java SE for real-time systems, signifying that Java SE has been improved adequately to meet soft real-time necessities. Soft here have at least two discrete related meanings. One is that necessities have to do with normal behavior; for instance, it's good enough that an average bank transaction will post within 300 milliseconds. This is in contrast to hard real-time necessities, such as the need that a particular locomotive-switching solenoid closes at worst within one-and-a-quarter seconds of

the application receiving a specific alarm. The most important requirement for hard real-time systems, in this sense, is that the worst case must be predictable.

Soft real-time is good enough for many embedded and IoT applications. For applications that require hard real-time support, Java developers largely turn to JSR-302: Safety Critical Java Technology. This spec is a subset of the Real-Time Specification for Java, and parts of it depend on the CLDC. Among other features, Safety-Critical Java defines its own concurrency model and real-time threads. The Open Group industry consortium originally began work on Safety-Critical Java in 2003. Asked about the spec's status, JSR-302 specification lead Doug Locke estimated that its long gestation will lead to an approved specification this spring, with a reference implementation possible by early May 2015.

Next up in Java embedded

Java holds much promise for embedded programming, and there is work to be done in order to enable it to meet the coming explosion of demand and possibility in IoT. Tens of billions of Java-capable devices will go into use as part of the IoT network over the next few years. My next article on this topic will feature specific examples of programming for embedded Java environments in both hobbyist and commercial contexts, along with a deeper explanation of why RTSJ 2.0 will impact Java far beyond traditional domains for real-time programming.[8]

III.   Role of Java in IOT

The Internet of Things (IoT) is a field experiencing constant development. For the software development community athwart the globe, IoT has become one of the most imperative areas of the Future Internet. Java is by now key in the growth of emerging IoT technologies and Java aficionados state that Java will be the leading IoT platform.

The Internet of Things: A New Model

First, one should comprehend the degree to which IoT is varying our model of interacting with the Internet. The major feature is that now things will converse with things across the Internet, processes can interoperate at local and global level. Preset rules for devices and systems will result in automated decisions and actions, without a human intervention.

Java and IoT: Back to the Roots

If we should mention an essential attribute of IoT that would be interoperability: multiple and assorted devices working together in a synchronized manner. On the other hand, if we should name the main characteristic of Java, that would be platform independence. Java was shaped exactly to connect different devices, from different suppliers, running on different operating systems.

IoT stands on a junction of old and new hardware platforms, M2M computing, big data and cloud computing, linked by various APIs. In order to provide an integrated, secure and inclusive platform for the Internet of Things architecture, Oracle launched Java IoT Platform including Java ME, Java ME 8, and the three embedded frameworks: Java ME Embedded, Java SE Embedded, and Java Embedded Suite.

Java Predestined to Lead in IoT

Due to its platform independency, Java is behind the internet, the banking systems and the retail enterprise. By design, Java provides a consistent architecture that enables the creation of vertical applications crossing data from collection at the edge nodes (with Java ME), to the gateway communication layers (using Java SE) and up to the cloud for processing and management (with Java EE).

As Mr. Károly Simon, Ph. D. specialized in Java technologies, explains: "Java works well both on computers of different sizes and boards such as RaspberryPi. It also works effectively with Arduino and tools such as NetBeans. The embedded space offers great opportunities for developers and Java offers appropriate support. It is of great importance that developers that have programmed for enterprise can shift their knowledge to embedded using the same architecture, communication and security protocols. This enhances flexibility and scalability."

Embedded Systems Take the Lead

Smart homes, independent manufacturing, industrial mechanization, smart cities and edge computing rely on two major pillars: embedded systems and Internet. This megatrend of automating and miniaturizing every possible device is in fact achievable due to embedded systems. On top of it, there is a major restriction that must be met by leading systems: real-time performance.

Due to the rising Internet of Things applications, embedded versions of Java have been improved and there is work undergoing for JDK9. IoT applications by description have to be handy across a broad range of processor types, thus Java wins in relevancy.

Oracle's Java available in different configurations to address specific devices and markets provides a complete, secure platform for building embedded solutions:

Oracle Java ME Embedded for small and medium devices

Oracle Java SE Embedded for medium and larger devices and gateways

Oracle Java Embedded Suite for increased intelligence on gateway devices

Java Card for secure, easy-to-use, and interoperable identity services

As the largest development ecosystem on the planet, Java is supported by a community of more than 9 million developers and backed by Oracle's ongoing investment in existing and new Java products all optimized for embedded environments.

Java is Powering Edge Environments

At the heart of the Internet of Things, area like electronics, robotics, 3D printing benefit of Java platform's competence. Their applications form edge environments such as telehaptics, telematics, telehealth. Once again, Java propels embedded universe to redesign M2M and human to machine interactions.

One of the reasons behind this phenomenon is that Java allows an easy and prompt adjustment to new sensor technologies. In addition, Java lets development teams reprocess code from one design to another and from one device class to another. They can also influence code developed in the Java community.

The advances arrive in home automation, smart grid capabilities, remote healthcare or hospitality are notable.[10][11]

Java could participate in bigger part in networking for the Internet of things. The Kona Project, proposed on openjdk.java.net this week, would define and implement Java APIs for networking technologies and protocols commonly used in IoT.

"The primary goal of the project would be to define APIs that can be efficiently implemented and used on embedded devices," said Oracle official Riaz Aimandi in a posting to the opened mailing list. "These APIs would be defined in such a way that they could be potentially used with Java ME (Micro Edition), although the project would at first focus on the implementation for Java SE (Standard Edition)." Current plans call for creating the project outside of the Java Community Process, the formal process for amending official Java specifications.

The project's first protocol would be Constrained Application Protocol (CoAP), to be contributed by ARM as a specialized Web transfer protocol for use in IoT. "[The proposal] should have support for UDP connector with Datagram Transport Layer Security (DTLS) handled outside of other CoAP APIs," Aimandi said in the posting.

Other connectors, such as TCP, could be added afterward, along with technologies such as Bluetooth. Aimandi suggests both Oracle and ARM participate in Kona. He did not respond an email inquiry about Kona from InfoWorld on Wednesday.

An analyst at Forrester Research, Jeffrey Hammond, quoted the lack of standardized communications protocols in IoT and a need for reference implementations: "There are dozens of existing industry-specific communication protocols for machine-to-machine communication. As IoT emerges, we're also seeing a number of new communication protocols. CoAP is one; MQTT is another I've run into. At this point it's uncertain whether we'll end up with a second generation of the IoT equivalent of a 'Tower of Babel' or see cross-industry consolidation around a few -- probably open -- standard protocols like COAP or MQTT." With reference implementations in popular languages like Java or C, the industry could tilt away from the "existing mess that the machine-to-machine world finds itself in," Hammond said.[5]

Oracle and, lately, the Eclipse Foundation have been promoting Java's usage in the Internet of things, which could potentially enable billions of devices ranging from refrigerators to TVs to cars. But Java faces myriad competition, with platforms like Google's Java-based Android, Microsoft's Windows Embedded, and Apple iOS in the mix.

Before you start to format your paper, first write and save the content as a separate text file. Keep your text and graphic files separate until after the text has been formatted and styled. Do not use hard tabs, and limit use of hard returns to only one return at the end of a paragraph. Do not add any kind of pagination anywhere in the paper. Do not number text heads- the template will do that for you.[9]

The vision of IoT is to create an automated system of computers, devices, and sensors that process their own data instead of depending solely on people for input. As a result, the

system as a whole can have a view of what's taking place at any location, at any point in time. This would lead to a world of connected systems that could greatly reduce waste, lower costs, and eliminate loss for just about any human-machine activity. Java has an important role to play in this ecosystem. Given its ability to run on a wide range of devices from mobile and embedded systems with limited CPU and memory, to servers with immense power and capacity Java can power the world of compute resources with ubiquitous connectivity in the coming decades.[12]

IV. THE IOT WILL IMPACT BUSINESS MODEL EVOLUTION & NEW BUSINESS OPPORTUNITIES

Implementation of IOT will result in creation of a new value chain which will be complex and competitive. Firstly we need to connect smart object which will be omnipresent. This will help smart devices to communicate between themselves and render services new and innovative types of services. This creates new forms of interaction between players in the value chain, resulting in greater complexity in service creation, distribution and delivery, and as a result, higher intensity of competition. Towards this, the The IoT will impact business model evolution. Communications value chain reflects the addition of two 'smart' elements to the other aspects prior to the IoT:9 Smart module: The generic name for modems, wireless modules, gateways and other components that connect the smart object to a network. Smart object: Products or devices designed to communicate with others through a smart module or a network. Examples range from light bulbs, cameras, cars, to printers. Automotive manufacturers and appliance manufacturers are examples of companies that produce smart objects.[13]

Value chain for smart, IoT-enabled solutions

	Smart modules	Smart objects	Operate network	Enable	Integrate systems	Provide service
Illustrative products / services	• SIM card • Sensor • Actor • Aggregator • Transponder	• Camera • Car • Domestic appliance • Electricity meter	• Network • Connectivity • Quality • Availability	• Platform • Enabling capabilities • Applications, devices and maintenance • Storage	• Interfaces • Back-end • Configuration • Hardware	• Development • Service creation • Provisioning • Billing • Analytics
Example participants	• Qualcomm • Ericsson • GE • Huawei • ZTE • Cinterion • Sierra Wireless • Telit	• Canon • Ford • Bosch • Samsung • LG • Jawbone • Fitbit • BMW • Mahindra	• Telefonica • Vodafone • AT&T • Cisco • Juniper • Orange • Telecom Italia • Deutsche Telekom	• IBM • Accenture • Go Daddy • Google • MIX Telematics • SensorLogic • ei3	• IBM • Accenture • TCS • Capgemini • HP • Deloitte • CSC	• Flipkart • Amazon • You Tube • Dropbox • Oracle • WirelessCar • Hughes Telematics

Individual / Government / Enterprise — Extension into multiple industries

Source: Arthur D Little research, PwC analysis and modification

Fig 3 : smart IoT Embedded solution

The IoT presents the telecommunications industry with new chance for growth. The IoT ecosystem proposes a new sign of opportunity for the telecommunications industry to expand its core competence into new areas, as present perspective of escalation from mobile voice and data mature. In order to do so, operators will play the role of innovators who obtain new skills and create new opportunities, thereby contributing to realizing the socio-economic potential of IoT services. This role is important for the success of the IoT because a number of core features of smart mobile connectivity are significant to facilitate IoT elucidation to be successful. These attributes include ubiquity and quality of connectivity, networks' ability to deal with highly differing patterns and regularity of usage, The IoT presents new business opportunities. Privacy and security, requirements to bill and charge for use and the ability to manage all of this on a mass scale of billions of connections, often communicating across regions and multiple territories. The IoT opportunity comes at a time when the mobile industry is looking out for new growth paths. In developed markets, after years of enlargement in the early 2000s, the industry has been experiencing waning or negative growth in more recent years. After a decade of exceptional growth, most emerging markets will be steady over the next few years. The highly successful horizons of growth in mobile have come on the back of increasing diffusion and saturation of voice and data services. In this framework, the IoT-related opportunity will symbolize a key opportunity for the industry to grow as consumer voice and data services drench. 14 PwC M2M total service revenue split, 2022 Source: Machina Research Connectivity services Other services in the IoT value chain 91% 9% Machina Research estimates that within the IoT, connectivity services alone may amount to 39 billion USD by 2022.2 fascinatingly, IoT connectivity revenue will be only 9% of all IoT enabled revenues. Given the important scope of the IoT beyond connectivity, some telecom operators may decide to focus to leverage their role in the avenue of connectivity to also move to other aspects of service revenue in the IoT. Operators will have to force innovation by obtaining skills and devising new partnerships in order to compete in new areas which are an extension to their traditional business model. Vodafone, for example, has partnered with Advanced Metering Services (AMS) in order to provide smart metering solutions in New Zealand, combining a bespoke technical solution with new price plans that ensure smart metering meets the needs of energy retailers, consumers and distribution companies (15). Such association will enable operators to efficiently offer innovative IoT services whilst competing with diverse players. MyDoctor@Home is a remote monitoring service that allows patients suffering from chronic illnesses to monitor blood pressure, heart rate, oxygen levels and electrocardiogram directly from their home.16 Telecom Italia provides the connectivity services but in a bid to increase its revenue opportunity the operator has also developed extensions, including a cloud computing solution delivered through scalable, on-demand data center capacity. Implication: Mobile operators will have to invest in skills development, partnerships and alliances, as well as strategic acquisitions. Governments need to ensure that operators are not disadvantaged in extending to broader roles across the industry due to existing sector guidelines. Implication: Governments must encourage local SMEs as well as larger businesses to participate in the global IoT opportunity. The IoT opens new opportunities for SMEs to reach more markets and customers. The IoT-enabled world creates significant new opportunities for small and medium sized enterprises. Two features of the IoT-enabled world will drive the SME

opportunity. Firstly, the emergence of a global production and distribution model will open up new avenues for small businesses to participate in opportunities across markets which they have not accessed before. For example, a diabetes monitor manufacturer will be exposed to opportunities across multiple markets if it partners with a global healthcare services provider. Secondly, with IoT services creating new ways to access customers, SMEs have new opportunities to compete for customer access once reserved for larger companies. For example, consumer applications providing IoT-enabled services are now able to scale globally at a pace which has not been seen before. SMEs are likely to participate in the IoT across the value chain, not only in apps but also in areas such as smart device manufacture, data analytics, cloud services and storage. The emergence of IoT services provides a platform for governments to ensure that SMEs are sufficiently exposed to IoT opportunities, meaning that export growth and employment impacts from the IoT are maximized. The IoT enables large business to operate more efficiently, improve distribution and reduce costs. The large business benefit from the IoT is likely to be significant across many industries, and will be felt through cost reduction and operating efficiency, as well as through access to new revenue opportunities. Participation in the IoT opportunity will be critical to large businesses in order to protect current customer relationships, as well as to build new value. Governments have a role to play in ensuring that larger businesses also understand the global IoT opportunity[e]

A. Impact of IOT on business

The Impact of IoT on Business Over the last decade, technology has advanced at a rapid pace driven by innovation. Machine-toMachine (M2M) technology, with its seemingly limited possibilities, evolved into the Internet of Things (IoT) that promises unprecedented opportunities for accelerating growth and improving key aspects of the business. In a world governed by IoT, business operations will undergo radical changes that will impact all stakeholders in the business ecosystem. Understanding M2M and IoT M2M refers to the technology that connects devices of the same type (wireless or wired) and enables them to communicate with each other, and provide information that helps increase efficiency. On the other hand, IoT is about connecting the physical world to the digital world via embedded technology. It creates a connected world by facilitating seamless communication and interaction between all kinds of smart objects and harnesses the data streaming in from these objects. M2M is considered an integral part of IoT as it helps bridge the gap between the digital and physical worlds. M2M and IoT solutions aspire to create business value and answer complex innovation problems through simplification of business processes for higher efficiency. They also help reduce costs and risks. How Is IoT Going to Change Business as We Know It? We believe the IoT is going to have far-reaching implications on the future of business. Emergence of new business models: IoT will lead to a highly connected, hyper-competitive market, where all players are digitally connected with each other. It will generate explosive levels of data and make contextual business data available to all business entities. Gainful and contextual consumption of data will help businesses gain significant competitive advantage, and ultimately result in the creation of a highly optimized, self-corrective supply chain. Furthermore, IoT will fragment existing markets, disrupt current business models, and lead to the emergence of new business models. Increased emphasis on collaboration: Today, most industries exist in silos. However, in an IoT dominated world, business entities will need to forge partnerships with each other to remain relevant to their customers and retain their competitive edge. Collaboration will become indispensable for businesses to provide enhanced and integrated products and services to their customers at competitive price points. IoT driven cross industry orchestration, as illustrated in Figure 1, will result in an 'Internet of Services'. More services will emerge to holistically cater to business operations, and each industry will be either a service provider or consumer, or both. 5 As the IoT space matures, the network and connectivity aspects will be efficiently managed, and data will be transferred over acceptable protocols in line with industry defined standards. IoT data will thus be readily available to consumers in the context that is most relevant to them. Industry players will collaborate seamlessly to exchange and harness valuable insights provided by contextual IoT data. Typically, product industries such as manufacturing, healthcare, retail, logistics, and utilities will be the predominant data generators, while also consuming data from their partners. On the other end, services industries including banks and insurance companies will become the predominant consumers of IoT data, while the telecom industry serves as the backbone of IoT communication. The template is designed so that author affiliations are not repeated each time for multiple authors of the same affiliation. Please keep your affiliations as succinct as possible (for example, do not differentiate among departments of the same organization). This template was designed for two affiliations.[9] [14]

B. Multiple ways IOT make marketing smarter

The Internet of Things (IoT) may seem to be business Catchword but in fact it is technological uprising that will change our lives. IOT is a gigantic wave of novel prospect that is intended to amend the appearance of technology as we know it. IoT is the interconnectivity between things using wireless communication technology (each with their own unique identifiers) to connect objects, locations, animals, or people to the internet, thus allowing for the direct transmission of and seamless sharing of data.

In a nutshell, it is about regular devices that will communicate with help of network without inference of humans or instruction by humans. IOT will also change Individual perception towards public utility services like   traffic, weather, pollution, and the environment are monitored and how data is collected.

 For instance If there are chances of rain sprinkler as an smart device will check weather condition and will only start if there are no chances of rain thus saving electricity as well as water . Smart devices will give us deeper control over our resources.

Companies like Nike Fuelband, Google Glass, Fitbit is using IOT and this shows IOT is accepted by industries. Many more are in queue to adopt IoT.

IOT won't remain restricted to smart refrigerators or other smart devices perhaps it would actually extend its application in enhancement of business. Marketing strategy to be specific will be highly influenced by IOT. Here's 5 ways that IoT will improve marketing ROI:

1. Easy recording of Sales Transactions

Businesses are dependent upon sales and for bringing about sales we need customer database. This database includes where when how and why your product is demanded and used, feedbacks of consumers, sales data of your competitors.

Smart devices can even understand consumer behavior and predict consumers shopping habit. They can give day to day data of sales without any cooperation from humans and consumers will never know that they are being monitored.

Even customers can use these smart devices to improve their products by providing honest feedbacks to smart devices.

2. Smarter CRM: Instantaneous Customer Analysis

CRM i.e. Customer relationship Management requires huge amount of data to be gathered and arranged so that marketer can use that for generating business or maintaining existing customers. IOT will do more than gathering and arranging data. Consider conventional system which keeps records of date of birth of customers. Conventional system will remind marketers to wish that customer on his birthday but it is not generating any business, IOT on the other hand would directly wish the customer and will generate some offers depending upon their consumer behavior or their purchase on customers last birthday.

For marketers, this can be invaluable, given that the buyer's chain of command is often long, and decisions take more time to be made. IoT devices can streamline this process by helping you understand where your prospect is in their buying journey, so that you'll be able to make every second of every day count towards resolving issues and serving them the right information that will nurture them to ultimately close a deal.

3. Devices That Know They're Dying

Everyone is fed up of remembering dates of maintaining their devices for e.g when did you serviced your vehicle . In case of smart devices it would be completely their concern. They will decide when and how much maintenance they require.

We have seen automobiles giving some dim signals regarding their maintenance but with IOT instead of whole automobile every device shall communicate for its own maintenance. Diagnosing will be simple and solution will be given by devices themselves.

If we talk about conventional devices, nothing much can be done when anything goes wrong with devices it completely stops functioning and we have to call somebody to repair it or we order new product. In both the cases we need to wait for repairperson or new product to arrive

IoT devices could get rid of that down-time, by constantly checking their own functions and contacting technical support when necessary. And should a major, irreparable problem be detected, the IoT device could easily order a replacement for itself, so that when it finally does shut down, the new model will already have arrived and be ready to be put into service.

Most of the times we observe that people don't upgrade their product as they are afraid that it may cause a hindrance in smooth functioning of their devices or it may be time consuming. This leads to exposure of their devices to risk of getting damaged or other issues. Smart devices would search and download upgradation on their own in idle time.

4. Predictive Social Media

Nobody ever believed that social media or a virtual tool inclusive of facilities of communication would be a great hit. Today almost every celebrity uses twitter and is followed by their fans on it. Facebook is widely used social media everyone who uses internet regularly has a Facebook account. Marketers never thought that social media have any potential. Today 74% of brands believe that web traffic is increasing due to social media..

Iot will take social media to next level allowing automatic posts between devices and developing new communities of people using specific devices to use social media.

IOT's biggest advantage will go to marketers, what they have to do is to develop and target this new community. Marketers have a daunting task of searching potential customers but with the help of IOT identification of customers will become easy through social media.

5. Imagine a 100% CTR (Click Through Rate)

Brought together, these factors all point towards one final goal: smarter, more relevant advertising.

As increasing numbers of our once-unconnected devices and objects are being fitted with sensors and given constant network accessibility, the face of advertising is going to change for both the marketer and the consumer.

No longer will marketers rely on banner ads or popups based off a website you visited on Tuesday; most IoT devices will be completely unable to process or even display such crude ploys.

As a result, the age of the interruptive commercial will finally come to an end on the consumer side. In it's place will be a new world in which advertising must be beneficial and completely relevant where no prospect is served an advertisement that doesn't 100% align with their interests, behaviors, and past purchases.

How is this possible? An example would be a light bulb going dark in your "smart" home. The connected home could not only make note of the need for a replacement, but could also provide the homeowner a digital coupon for a new bulb sent directly to their smartphone. Even better, the exact number of hours that the light bulb has been in use can be recorded and transmitted, letting you know that the light bulb is coming to the end of its life.

Not only will the consumer save time by only being served

relevant ads, but marketing will no longer waste thousands of dollars on irrelevant advertising.

Marketers would need to have a detailed understanding of their consumers in order to take advantage of the new opportunities being made available, but those who are able to make the transition will find that the IoT allows them the opportunity to stop being marketers, and finally start being valued business resources.[16]

Work Smarter with the Internet of Things

Now you don't need to take care of your devices any more they will do it by themselves. The most awaited thing anybody wants is internet of thing and it will soon hit out at you very fast its coming with more than 75 billion connections by 2020.

Just change your way of thinking about communication, devices and business Internet of things will give a new dimension to it, indeed it will revolutionize this era. This all will be made possible by taking java at disposal. "Work smarter and fast"[15]

CONCLUSION :

In this article the role of java in IoT is enlighten to enhance the business. It has introduced the impact of IoT on business model, its evolution & new business opportunities, and discussed. It also describes the work of IoT. In day to day life may more innovation are introduced, many more are expecting in near future. A strong and secured language-Java, featured with portability, object oriented, robust, Multithreaded, high performance, distributed, platform indecency, etc, which helps to develop very powerful tools, combined with concept of IoT. This paper contributes the healthy discussion on the Easy recording of Sales Transactions, Smarter CRM, Predictive Social Media, and more, in combination with IoT, which can be useful in future scope of IoT(Research & Development).

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STUDY OF BEST PRACTICES IN KNOWLEDGE MANAGEMENT BENEFICIAL FOR SOFTWARE DEVELOPMENT TEAM"

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ABSTRACT : Knowledge management is an emerging discipline that promises to capitalize on organizations' intellectual capital. A software organization's main asset is its intellectual capital. This systematic review identifies empirical studies of best practices in knowledge management usedby software team while performing software development process. If we apply Knowledge Management best practices in nutshell by Software Development Team, create a knowledge repository which can be used by other Software Development Team in the organization. Tangible knowledge repositories can be easily and effectively managed by organization. This Tangible knowledge repository becomes intellectual capital to the organization. Our Planning tool will help to Software Development Team how effectively use KM for innovation, to improve performance and minimize the risk.

KEYWORDS : Software Development Process (SDP)), Software Development Team (SDT), Knowledge Management (KM), Knowledge Management Process(KMP)

INTRODUCTION:

A software organization's main asset is its intellectual capital. *Knowledge management* is an emerging discipline that promises to capitalize on organizations' intellectual capital. An organization's intellectual capital consists of *tangible* and *intangible* assets. Tangible assets, which correspond to documented, explicit knowledge, usually include manuals; directories; correspondence with (and information about) clients, vendors, and subcontractors; competitor intelligence; patents; licenses; and knowledge derived from work processes (such as proposals and project artifacts). Intangible assets, which correspond to tacit and undocumented explicit knowledge, consist of skills, experience, and knowledge of an organization's people.

Purpose of this research is to study how SDT use best practices in KM while doing SDP tasks effectively for innovation, to improve performance and minimize the risk.

1. OBJECTIVE OF THE RESEARCH

- To identify best practices in knowledge management used by software team while performing software development process.
- To create Planning Tool which will help to SDT how effectively use KM for innovation, to improve performance and minimize the risk.

2. RESEARCH METHODOLOGY

In this research, methodology for research used is literature review. Data is collected from the secondary resources like, books, magazine, journals, websites, which cited in the references.

3. CONCEPTS

4.1 KNOWLEDGE MANAGEMENT

Knowledge Management, (KM) is a concept and a term that arose approximately two decades ago, roughly in 1990.Gartner Group created definition of KM, "Knowledge management is a discipline that promotes an integrated approach to identifying, capturing, evaluating, retrieving, and sharing all of an enterprise's information assets. These assets may include databases, documents, policies, procedures, and previously un-captured expertise and experience in individual workers" [1].

Knowledge Management Process (KMP)

Fig : Knowledge Management Cycle

i. Create Knowledge: The tasks in this phase are conducting research activities in order to discover the knowledge in the organization, exploiting past experiences in the organization to discover new knowledge, creating new knowledge through the continuous learning in the organization, preparing an appropriate culture and system in order to create new knowledge in the organization [2].

ii. Capture Knowledge: The tasks in this phase are searching for several sources of knowledge that is necessary and related for performing the work, perceiving and sensing needs and requirements of work from knowledge resources, acquiring knowledge that already exists in the organization from its appropriate sources at appropriate times where it is needed, extracting the knowledge of other people in the organization, participation in training workshops and sessions

in order to acquire more knowledge [2].

iii. Codify Knowledge: The tasks in this phase are classification and categorization of existing knowledge in the organization according to its nature into categories such as administrative, technical, financial etc., storing knowledge in the organization in locations that are easy to retrieve, mapping knowledge in the organization so it can be easily accessed whenever needed, organizing knowledge in the organization in a way that is understandable to all organizational members [2].

iv. Communicate Knowledge : The tasks in this phase are considering source, nature, and type of knowledge when transferring and sharing in the organization, motivating organizational members for participation in their creative and intellectual resources, providing information and communication technology in order to transfer knowledge among people in the organization , exchanging knowledge among people in the organization through documents, manuals and catalogues, accessing knowledge in the organization anywhere anytime when it is needed[2].

v. Capitalize Knowledge : The tasks in this phase are investing and utilizing organizational knowledge in new ways and methods of doing work, enhancing the feeling of individual responsibility towards the knowledge of the organization, application of knowledge to making creative and intellectual resources available and to improving overall performance of organization, improving the decision-making process and problem solving through application of knowledge, utilizing the knowledge that is embedded in procedures, rules, and norms in the organization in order to direct the future behavior of organizational members[2].

4.2 SOFTWARE DEVELOPMENT PROCESS

i. Requirement Analysis-. It is performed by the senior members of the team with inputs from the customer, the sales department, market surveys and domain experts in the industry. This information is then used to plan the basic project approach and to conduct product feasibility study in the economical, operational, and technical areas. The outcome of the technical feasibility study is to define the various technical approaches that can be followed to implement the project successfully with minimum risks.

ii. Design: Based on the requirements specified in SRS, usually more than one design approach for the product architecture is proposed and documented in a DDS - Design Document Specification. This DDS is reviewed by all the important stakeholders and based on various parameters as risk assessment, product robustness, design modularity , budget and time constraints , the best design approach is selected for the product.

iii. Development: In this stage of SDLC the actual development starts and the product is built. The programming code is generated as per DDS during this stage. Developers have to follow the coding guidelines defined by their organization and programming tools like compilers, interpreters, debuggers etc. are used to generate the code. The programming language is chosen with respect to the type of software being developed.

iv. Testing: This stage is usually a subset of all the stages as in the modern SDLC models, the testing activities are mostly involved in all the stages of SDLC. However this stage refers to the testing only stage of the product where products defects are reported, tracked, fixed and retested, until the product reaches the quality standards defined in the SRS.

v. Deployment: Once the product is tested and ready to be deployed it is released formally in the appropriate market.

vi. Maintenance: Once the product is tested and ready to be deployed it is released formally in the appropriate market. After the product is released in the market, its maintenance is done for the existing customer base.

4.3 SOFTWARE DEVELOPMENT TEAM

i. Project Manager (Business and Software Development Process)
Project Manager is Responsible for all the business and software development process activities. Project Manager is responsible for develop a project plan, Manage deliverables, Recruit project staff, Lead and manage the project team, Determine the methodology used on the project, Establish a project schedule, Assign tasks to project team members, Provide regular updates to upper management

ii. Software Architect (Requirement Analysis, Design, Deployment and Maintenance)
Software Architect duties are to define, document, and communicate it, make sure everyone is using it, and using it correctly, make sure the software and system architectures are in synchronization, make sure the right modeling is being done, to know that qualities like performance are going to be met, give input as needed to issues like tool and environment selection, identify and interact with stakeholders to make sure their needs are being met, make sure that the architecture is not only the right one for operations, but also for deployment and sustainment, resolve disputes and make tradeoffs, resolve technical problems, maintain morale, understand and plan for evolutionary paths, plan for new technology insertion, manage risk identification and risk mitigation strategies associated with the architecture

iii. Developer (Development)
A software developer is a person concerned with activities of the software development process, including the research, design, programming, and testing of computer software.

iv. Test Engineer (Testing)
The Test Engineer role is responsible Identifying the Target Test Items to be evaluated by the test effort, Defining the appropriate tests required and any associated Test Data, Gathering and managing the Test Data, Evaluating the outcome of each test cycle.

v. Administrator (Design and Development of Database)
A Database Administrator is a specialist that models, designs and creates the databases and tables used by a software solution. This role combines Data Administrator (logical) and DBA (physical).

1. RESEARCH

5.1 Software Organization Knowledge Area:
When individuals team up to solve a problem, they form a *community of practice*. When individuals communicate and exchange information related to a common topic, but for solving different problems within or outside a company, they form *communities of interest*. These

communities heavily utilize web technology for knowledge sharing. In software development, learning occurs during projects. For organizational learning, knowledge from all projects must be documented, collected and organized into a repository that will support decision making for future projects [3].

i.   Business Knowledge: Knowledge created in business activities Like Market survey, business Plans, Scope management, Feasibility study report, Customer relationship management(CRM)

ii.   Functional Domain Knowledge: Knowledge created while working in domain area of an individual expertise.

iii.   Project Management Knowledge: Knowledge created while managing project like project planning, resources planning, project assessment and quality maintenance.

iv.   Technical Knowledge: Knowledge created while doing technical tasks like design, coding, testing, deploying and maintenance of the project.

v.   User Requirement Knowledge: Knowledge created while doing requirement analysis.

5.2   Study of Best Practices

I	**Thomas H. Davenport(1997)**	
	"Building Successful Knowledge management Projects"	
	Create Knowledge Repositories	Enhance Knowledge Environment,
	Manage Knowledge as an Asset	Improve Knowledge Access
II	**Brian D. Newman (2001)**	
	"A Framework for Characterizing Knowledge Management Methods, Practices, and Technologies"	
	Analyze Knowledge Flows and Identify Gaps	Management Products
	Selection of Knowledge	Internal Development of Knowledge Management Solutions.
III	**Josephine Chinying Lang (2001)**	
	"Managerial concerns in Knowledge management"	
	Encourage knowledge creation and utilization in organizations	Reward to the contribution of knowledge
	Inadequate care of organizational Relationships	**Provide linkage between knowledge management and corporate strategy**
IV	**Georg Disterer (2002)**	
	" Management of project knowledge and experiences"	
	Retention of Experienced knowledge	Utilization of Knowledge experiences
	Transfer Knowledge within the projects	Product and project documentation
V	**Mikael Lindvall (2003)**	
	"Software System Supprot for Knowledge management",	
	Use Software tools for knowledge management	Data and Knowledge discovery through Knowledge bases
	Document and content Management	**Expert networks**
	Competence management	Intellectual property management
	E-Learning Management system	Collaboration services

VI	DimitrisApostolou (2003),	
	"Experiences from knowledge management implementations in companies of the software sector"	
	Integrate KM within normal business processes.	Linking KM strategy with corporate strategy
	Perform Knowledge Analysis	**Reusing Best Practice Knowledge**
	Focus on exploiting knowledge sources	Facilitate knowledge exchange in communities
VII	**Kevin C. D'Souza (2006)**	
	"Managing Knowledge inGlobal SoftwareDevelopment Efforts: Issues and Practices"	
	Choosing the right global knowledge management strategy	**Distributed knowledge management architectures**
	Capturing knowledge from global software projects.	**Understanding knowledge reuse from KMSs**
VIII	**Birgit Renzl (2006)**	
	"Trust in management and knowledge sharing: The mediating effects of fear and knowledge documentation"	
	Trust in management	Avoid Fear of losing one's unique value
	Documentation of knowledge	**Knowledge sharing within teams**
IX	**William R. King (2009)**	
	"Knowledge Management and Organizational Learning"	
	Collective learning and collaborative decision making	support organizational processes involving innovation
	Organizational Learning	individual learning
X	**Richard McDermott (2001)**	
	"Overcoming cultural barriers to sharing knowledge"	
	knowledge sharing to solve practical business problems	**Align reward and recognition to support sharing knowledge**
	Build on existing networks	**Leaders and influential peers exert pressure to share.**
XI	**MiladJasemi (2012)**	
	"Knowledge Management Practices in a Successful Research and Development Organization"	
	Implementation of a KMS	Documentation of experiences
	Project team files documentation	**Knowledge map**
	Publications, Theses and Patents	

XII	**Alan Frost (2015)**			
	Article on : Best Practices Published on http://www.knowledge-management-tools.net			
	Appoint Chief Knowledge Officer(CKO)		KM , KMS and KM Tools	
	KM and Organizational Culture Change		KM and Knowledge Retention	
	KM and the External Network		**KM and Core Competencies**	

5.3 Planning Tool:For Team members about Knowledge Activity and Best Practices

	SDLC Phases	Knowledge Activity	Best Practices			
			I	II	III	IV
Team Members	Requirement Analysis	Create				
		Capture				
		Codify				
		Communicate				
		Capitalize				
	Design	Create				
		Capture				
		Codify				
		Communicate				
		Capitalize				
	Development	Create				
		Capture				
		Codify				
		Communicate				
		Capitalize				
	Testing	Create				
		Capture				
		Codify				
		Communicate				
		Capitalize				
	Deployment	Create				
		Capture				
		Codify				
		Communicate				
		Capitalize				
	Maintenance	Create				
		Capture				
		Codify				
		Communicate				
		Capitalize				

CONCLUSION :

After reviewing related articles and research papers the researcher has tried to correlate SDP process to KM process. If SDT follows KM process in nutshell it will create huge knowledge repository. Our study shows relation within software development team and knowledge activities done in KM at various levels are tangible in nature. Tangible knowledge repositories can be easily and effectively managed by software team. This Tangible knowledge repository becomes intellectual capital to the organization. This review suggests best practices adopted by team members while doing software development and innovation. This Planning Tool helps project managers how effectively use this knowledge management by software team so that they can improve performance, adopt innovation and minimize risk.

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HYBRID LEAST FREQUENTLY USED(HLFU) PAGE REPLACEMENT ALGORITHM

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Abstract: This paper introduces the new page replacement algorithm Hybrid Least Frequently Used(HLFU)which gives better performance than LFU. Decrease the overall page fault rate is the basic idea of proposed algorithm. This paper in brief demonstrate the advanced version of LFU which is referred as Hybrid LFU. The conceptof Hybrid LFU is when largest count of two or more pages are found same using LFU , instead of using FIFO for selection of victim page choose the page which has less frequency count in future for next five pages(except the page being replaced)

Keywords: Page replacement, LFU, Page Fault, Hybrid LFU, Memory Management Unit(MMU)

INTRODUCTION:

Main memory is an important and very limited resource in a computer and main memory management is one of the important function of operating system. The operating system divides the virtual address space into units called pages. Main memory is also divided to fixed size unit called frames. Each page used can be either in secondary memory or in a page frame in main memory. An address generated by the CPU is known as logical address or virtual address and address seen by memory unit is referred as physical address. At the execution time logical address must translate to physical address and this run time mapping is done by memory management unit(MMU). MMU uses address mapping information located in page table to make the translation. If the given virtual address is not mapped to main memory, the MMU traps the operating system. This trap, called page fault, gives the operating system an opportunity to bring the desired page from secondary memory to main memory, and update to page table accordingly[2]. While executing a process if the process references a page which is not available in the main memory the processor treats this invalid memory references as a page fault. When page fault occurs operating system should bring that page from secondary memory to main memory, if in main memory frame is not available for page, operating system should eliminate one of the page from main memory to make space for newly arrived page from secondary memory. To do this task various page replacement algorithms are available like FIFO, LRU, Optimal Page Replacement algorithm, MRU, LFU, MFU etc. Virtual memory system requires effective page replacement algorithms in case of a page fault, to decide which pages should be ejected from memory[3]. There many algorithms have been proposed for page replacement and each algorithm is tries to reduce the page fault rate while acquiring minimum overhead.

2. Page Replacement Algorithms

Page replacement algorithm uses approach in which if no frame is free, find one which is not currently being used and free it, frame can be free by writing the contents to swap space and change the page table to indicate that page is no longer in memory, and the freed frame can be used to hold the page for which the page fault occurred.[4] There are various page replacement algorithms are present , some of them are as follows :-

2.1 Available Page Replacement Algorithms
I . First In First Out(FIFO) :
FIFO page replacement takes the approach of First In First Out, this is the is the simplest page replacement algorithm among all. As the name suggest it chooses the oldest page for replacement. This algorithms takes low overhead and also little book keeping on the part of the operating system[2]. This algorithm requires queue data structure to hold all pages in memory, replace the page at the head of the queue and when page is brought into memory insert it at the tail of the queue. FIFO page replacement algorithm suffers from Belady's anomaly : Page Fault rate may increase as the number of allocated frames increases[3].

II. Optimal Page Replacement
Optimal page replacement algorithm replaces the page which has not been used for the longest period of time in future. This algorithm never suffers from Belady's Anomaly. This algorithm gives lowest page fault rate among all the algorithm. As this algorithm requires the knowledge of future string it is difficult to implement.

III. Least Recently Used (LRU)
Least Recently Used algorithm replaces the page that has not been referenced for longest period of time. LRU replacement associates with each page the time of that page's last use. At the time of replacement LRU chooses the page that has not been used for the longest period of time. The problem with the LRU algorithm is difficulty in implementation - determine an order for the frames defined by the time of last use. As like Optimal Page Replacement Algorithm LRU replacement also does not suffer from Belady's anomaly.

IV. Least Frequently Used(LFU)
Least Frequently Used algorithm is the Counting Based Page Replacement algorithm, this algorithm replaces the page with the smallest frequency count in the past. The idea behind this selection is that an actively used page should have large reference count.

V. Second Chance
Second chance algorithm is uses the basic idea of FIFO page replacement algorithm, every page is associated with reference bit, when page has been selected for replacement

reference bit is checked, if it is zero then replace the page but if it is one give the second chance to the page and move on to select the next page in FIFO order.

2.2 Proposed Algorithm : Hybrid LFU (Least Frequently Used)

This algorithm based on the concept in which while applying the LFU if two or more pages are found same for the largest count, instead of applying FIFO page replacement algorithm to them, select the page which has less frequency count in future for next five pages(except the page being replaced).The reason behind this selection is that the page which occurs maximum number of times in future will have less chance of being replaced.

Algorithm
Step 1 : Start
Step 2 : For every page fault find out the first free frame for the page in the reference string.
Step 3: If there is no free frame available then count the frequency of each page in the past within the frame and find out the page with the lowest frequency count.
Step 3: If two or more pages having same count find out the count of that pages in future for next five pages (except the page which is being replaced).
Step 4: Replace the page from the frame which is having smallest count.
Step 5: Repeat the steps 1 to 4 for each page in the reference string.
Step 6: Stop.

2.2 Experimental Analysis :

Example 1: Consider the reference String:5, 0, 6, 2, 0, 3, 0, 4, 2, 3, 0, 3, 2, 6, 2
Page Replacement by using LFU :
Reference String :

5	0	6	2	0	3	0	4	2	3	0	3	2	6	2

Page Frames

5	5	5	2	2	2	2	4	4	3	3	3	3	3	3
	0	0	0	0	3	3	3	2	2	2	2	2	6	2
		6	6	6	6	0	0	0	0	0	0	0	0	0
✓	✓	✓	✓	X	✓	✓	✓	✓	✓	X	X	X	✓	✓

Number of Page Faults: = 11

Page Replacement by using Hybrid LFU:

Reference String :

5	0	6	2	0	3	0	4	2	3	0	3	2	6	2

Page Frames

5	5	5	2	2	2	2	4	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		6	6	6	3	3	3	3	3	3	3	3	6	6
✓	✓	✓	✓	X	✓	X	✓	✓	X	X	X	X	✓	X

Number of Page Faults: = 8

Example 2: Consider the reference String: 7, 0, 1, 2, 0, 3, 0, 4, 2, 3, 0, 4, 2, 1, 2, 0, 7, 0, 1

Page Replacement by using LFU :

Reference String :

7	0	1	2	0	3	0	4	2	3	0	4	2	3	0	4	2	1	2	0	7	0	1

Page Frames

7	7	7	2	2	2	2	4	4	3	3	3	2	2	2	4	4	1	1	1	7	7	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	1	1	3	3	3	2	2	2	4	4	3	3	3	2	2	2	2	2	2	2
✔	✔	✔	✔	X	✔	X	✔	✔	✔	X	✔	✔	✔	X	✔	✔	✔	X	X	✔	X	✔

Number of Page Faults: = 16

Page Replacement by using Hybrid LFU:

Reference String :

7	0	1	2	0	3	0	4	2	3	0	4	2	3	0	4	2	1	2	0	7	0	1

Page Frames

7	7	7	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
		1	1	1	3	3	4	4	3	3	4	4	4	4	4	4	1	1	1	7	7	1
✔	✔	✔	✔	X	✔	X	✔	X	✔	X	✔	X	✔	X	X	X	✔	X	X	✔	X	✔

Number of Page Faults: = 12

Example 3: Consider the reference String: 1, 2, 3, 4, 2, 1, 5, 3, 2, 1, 2, 3, 7, 1, 3, 2, 1, 2, 3, 6

Page Replacement by using LFU :

Comparative Analysis of Page Faults of LFU and Hybrid-LFU Page Replacement Algorithm :

Examples	Page Faults using LFU	Page Faults using Hybrid-LFU
Example 1	11	8
Example 2	16	12
Example 3	10	9
Example 4	10	8

CONCLUSION:

This paper has discussed various page replacement algorithms like FIFO, OPT, LRU, LFU, Second Chance. In this paper LFU page replacement algorithm is compared with the proposed Hybrid LFU(HLFU) page replacement algorithm and from the comparative analysis of both the algorithm i.e Least Frequently Used(LFU) and Hybrid Least Frequently Used(LFU), it is concluded that the proposed algorithm i.e Hybrid LFU(HLFU) is more efficient because it gives less page faults as compared to simple LFU algorithm and the upcoming researches have focused on this algorithm, to increase the performance of system and to decrease the page fault rate.

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PREDICTION OF STOCK MARKET SHARE VALUE USING MACHINE LEARNING TECHNIQUE

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ABSTRACT:- To identify correct time for buying and selling of share is one of the important tasks for making profits in share dealing. To achieve this objective, stock market share data must be automatically analyzed and identify future or predicted share value. Data mining's prediction technique is useful for this purpose. In present study time series analysis of WEKA tools is used. Result of experimental work was evaluated with Mean Absolute Error and Root Mean Squared Error technique. Experimental result shows that predicted values are mostly accurate.

Keywords:- Data mining, time series analysis, WEKA, Mean Absolute Error, Root Mean Squared Error

INTRODUCTION:

We know that due to automated data collection and inexpensive tools; large amount of data is available in digital form. This data contains important knowledge or pattern. Depends upon user's need this knowledge or pattern arediscovered and take appropriate decision. To discover knowledge or hidden pattern we need some technology. Answer of this question is Data Mining. Data mining is technology which is used to discover hidden knowledge or pattern from large amount of data.[1]

In India; large populations are financially in middle level. Most of them are investing their money in share market. Depending on market conditions; they gain profit or they loss their money. For making profit in share dealing; they take advice from share broker and pay some amount to them. To remove this intermediate person/ organization there is need a technique which can analysis stock market data and suggest some move. Stock market analysis is one of the important research challenges in this world.

Data mining is one of technology useful for analysis of stock market data. Data mining technology has divided into two technique- predictive and descriptive techniques.[1] Predictive technique is useful for prediction purpose and descriptive technique is useful for portfolio management.

Present study focuses on prediction of stock market trends. Prediction in stock market is useful for those who want to make high returns within short period of time in share dealing. Present study also useful to identify right time for buying and selling of shares. Present study hasused State Bank of India's datawhich is one of the listedorganizations in BSE of India.Present study uses time series analysis technique which is useful for day to day prediction of SBI share prize. Present study predicts next 5 days stock prize for SBI share.

This paper arranged in 5 sections. First section is about introduction about present study. Second section focuses on related work. In third section experimental work is explained. Fourth section is about observations gained from present study and in fifth section concluding remark and future scope is explained.

Related Work
Author uses hybrid decision tree based technique for prediction of stock values. C4.5 decision tree is used to extract feature and then induce rule are generated from these features. Result of decision tree based technique is compared with Artificial Neural Network (ANN) based trend prediction and Naïve Bayes trend prediction technique and experimental evolution shows that tree base technique is good than ANN and Naïve Bayes technique. [2]

In the paper, author has used time series analysis for prediction of financial data. Author says that financial market data are nonlinear in nature so the author has used time series testing on nonlinear model. Nonlinear time series technique gives good result for forecast. [3]

In the paper author has used financial data of NIKKEI 255 for weekly prediction purpose. For this they have used Support Vector Machine (SVM) technique. Experimentally SVM is compared with Linear Discriminant Analysis, Quadratic Discriminant Analysis and Elman Backpropagation Neural Networks techniques and results shows that SVM was good than all these techniques. Also author has proposed a model by combining SVM with other classification techniques and result of this combination of model was outstanding. [4]

Author has used Artificial Neural Network (ANN) technique for predicting Stock prizes. ANN has generate a model by adjusting weight for each connection. For adjusting weight author has used Genetic Algorithm (GA) technique. Author explain that GA technique was useful for improvement in learning technique as well as it improves space complexity and removes irrelevant data. GA optimizes weights and threshold values between network layers. Among all techniques, ANN with GA technique has outstanding results. But this technique has some limitations such as ANN used in this technique has only 12 hidden layers and 12 input layers. [5]

In the paper author suggest hybrid combinational method of classification and clustering technique for prediction of stock market data. For experimental work shanghai stock market data is taken. This data is first clustered with k-means clustering technique and then the clustered data is classified by using decision tree technique. This technique predicts stock close value accurately and efficiently than other systems. Result of algorithm was checked on yearly and monthly data. [6]

In the paper author hasdiscoverd best timing for buying and selling of shares on the basis of past date. For this purpose decision tree classification technique is used. The algorithm

CRISP-DM uses 3 companies' data which are listed in Amman Stock Exchange (ASE). For experimental work two years share trading data is considered. Main drawback of this system is that result was not perfect or accurate.[7]

In the paper author uses ten different algorithms such as Linear and Quadratic discriminant analysis, K-nearest neighbor, Naïve Bayes, tree base classification, Support vector machine (SVM) and Least Squares SVM (LS-SVM) etc. for prediction of stock values. Hang Seng of Hong Komg stock market data is used for experimental work. Experimental result shows that SVM and LS-SVM predicts more accurate values than other algorithms. More precociously SVM is better in terms of hit rate and error rate. [8]

Experimental Work:-

Working Environment:-

Experimental Work is carried out with Intel Core i3, 3.3 GHz processer, 2 GB RAM and Windows XP operating system. For present study WEKA 3.8 tool is used.

Dataset: -

SBI stock market data is downloaded from BSE stock exchange website. [9]Data is downloaded on 27-07-2016 at 11.00 AM. The data consist of 13 attributes namely Date, Open Price, High Price, Low Price, Close Price, WAP, No.of Shares, No. of Trades, Total Turnover (Rs.), Deliverable Quantity, % Deli. Qty to Traded Qty, Spread High-Low, Spread Close-Open. Data consists of 4156 records from 03-July-2000 to 26-07-2016. For experimental work we have taken only 5 attributes namely Date, Open Price, High Price, Low Price, Close Price. This data is available in two forms so there is need to make this data in common format. So some preprocessing was done on the data and experimental data was created and used for present study work.

WEKA:-

WEKA is data mining tool developed by University of Waikato in New Zealand using Java language. WEKA is environment useful for knowledge analysis. For Knowledge analysis different data mining techniques are implemented such as classification, clustering, association, forecast etc.This tool is very handy and simple to use and also it is freely available on the internet. Due to this we have used WEKA for present study [10]. Weka 3.7.3 and higher versions added forecast plugin which is useful for creating forecasting model. For generation of model it uses time series analysis and forecasting environment with historical data.Present study uses forecast technique for prediction of stock value of SBI. Linear regression algorithm is used for prediction purpose.

Time series analysis:-

Stock market data consist of time stamp data i.e. it contains ordered sequence of date/time values equally spaced data/time interval. [11]To process or analyze such time interval data; time series analysis in used. Present study deals with prediction of stock market data so time series analysis technique is used. Time series analysis is useful to predict next n values over some period of time. [12]

Time series analysis are useful in many fields such as prediction of Share, GDP analysis, long tern data analysis, scientific predictions, engineering and medical fields etc.[3]

Experimental Result:-

Following table shows Actual and prediction values for next 5 days. This table shows high, low, open and close stock predicted values for SBI share.

Date	Open Price		High Price		Low Price		Close Price	
	Predicted	Actual	Predicted	Actual	Predicted	Actual	Predicted	Actual
27-Jul-16	230.15	227.15	232.20	227.15	226.09	226.80	226.57	228.65
28-Jul-16	230.75	229.50	232.30	229.50	226.61	229.25	226.73	230.95
29-Jul-16	230.18	230.70	231.76	230.70	226.06	228.35	226.12	229.05
1-Aug-16	229.76	230.95	231.69	232.60	225.68	225.65	226.29	227.45
2-Aug-16	230.34	229.55	231.81	230.90	225.70	227.00	226.40	227.85

Table 1:-Shows actual and predicted values for SBI Share

Following table shows Mean absolute error and root mean squared error calculated using table 1.

Error Simulation	Open	High	Low	Close
Mean Absolute Error	1.350	2.146	1.393	2.368
Root mean squared error	3.019	4.798	3.114	5.296

Table 2:-Simulation of error of SBI share for Open, High, Low and Close prize.

Following graph shows MAE and RMSE obtained by Open, high, low and close prize values.
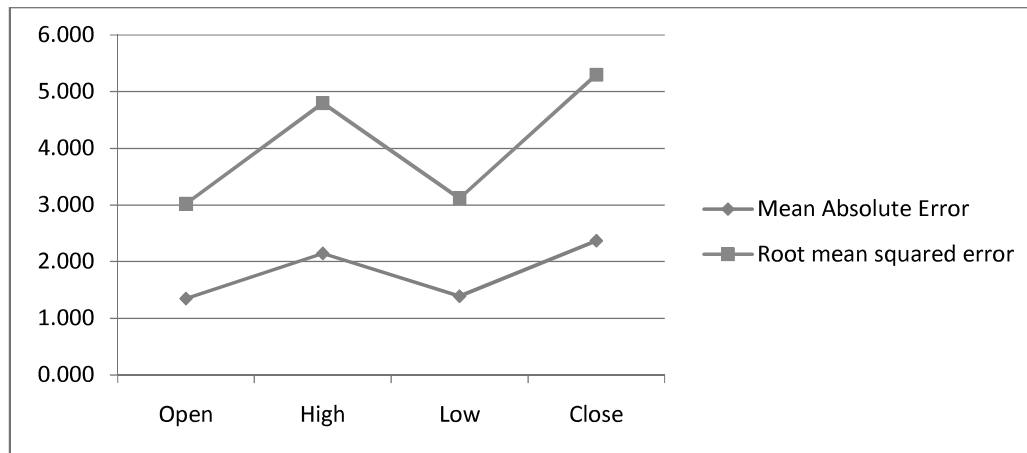
Figure 1:- Graph shows Mean absolute error and root mean squared error of SBI share for Open, High, Low and Close prize.

Perform evaluation

Performanceevaluation can be used for checking result of data. Present study uses most commonly and used performance evaluation technique namely i)MeanAbsolute error (MAE) and ii)Root mean squared error (RMSE). These measures generally useful for identification of variations in errors in forecast data.[13] Here forecast has been generated on training data and then it is applied to each point by stepping through data. Generated predictions are collected and summarized using above merits for each step i.e. all 1-step prediction are collected and summarized then 2-step and so on up to 5-step. We need evaluate the result so that experimental dataset is divided into 2 parts training and testing dataset. 70% of data is worked as training and remaining 30% data issued for testing purpose.

Observations:-

For present study SBI share data is used. Table 2 shows Actual and predicted values for SBI share for 5 days. Predicted values are obtained by experimental work and actual values are collected from share value of SBI share from BSE website. Form this table it is clearly shows that actual and predicted values are very close to each other i.e. present study identifies predicted values accurately. Also table 2 shows Mean Absolute Error and Root mean squared Error values for open, high, low and close. MAE value for high is 2.14 and RMSE value is 4.79 which are very lessthat means our predictions are accurate. Similarly MAE and RMSE values for open are 1.35 and 3.09, for low these are 1.39 and 3.11 and for close these are 2.36 and 5.29 respectively. These all values are near to zero or less. So we say that our prediction is accurate.

CONCLUSION :

Predicating stock value is one of the important challenging task for middle level persons in developing country like India. It is useful for the investors of stock market for deciding right time for buying and selling of shares based on the historical prices of shares. Present study deals with this problem. In present study we have used time series analysis technique for prediction of SBI share. Stock investor can use this model for taking decision about right time of buying and selling of share.

Present study evaluates result by two most popular merits MAE and RMSE. We have collected actual value of SBI share and compared with predicted value. Present study shown MAE for high value is 2.14, which are very less. Similarly MAE for open, close and low are also very less i.e. near to zero. So present study accurately predict open, high, low and close prize values for SBI share.In future we may use different algorithms for reduce MAE and RMSE value.

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FUZZY LOGIC IN RELATION TO USE MAGNESIUM IN GRAPE VINEYARDS

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ABSTRACT: The grape is one of the major important fruit crops of the Maharashtra. The high input used crop gives more profit through export as foreign exchange. However, at present, the input in the form of fertilizer for e.g. Magnesium, requirement is increasing, so cost also increases. Doses of Magnesium are decided by the experts after soil testing. In the present study, the soil samples are collected from different vineyards of the Maharashtra and Karnataka State. In this paper to decide the actual requirement of Magnesium, the Fuzzy Information System (FIS) is developed. The laboratory data obtained from the analysis of soil testing report is used as an input to FISand output results are compared with the results suggested by the expert. It is found that the Magnesiumrequirement suggested by FIS of any grape vineyard is less than the laboratory expert suggestions. Results help to reduce the cost of production without affecting the yield level of the grape vineyard and to maintain the soil quality. Development of Fuzzy Inference Systemisbased on MATLAB Simulation GUI Tool.

Key Words: Magnesium, Grapes, Soil, Fuzzy Inference System**,** Mat Lab.

INTRODUCTION:

In India, Grape is grown on an area of about 1.19 lakh hectares with an annual production of 25.85 lakh metric tons. In Maharashtra, it is grown on an area of 90,000 hectares with production of 21.60 lakh metric tons (National Horticulture Database, India, 2015). For the development of framework of vine, all plants need an adequate supply of macro- and micro-elements in order to match their normal physiological and biochemical functions[3]. Besides basic mineral nutrients (nitrogen, phosphorus and potassium), some other elements (magnesium, iron, zinc, boron, etc.) are considered to be essential for plant metabolic processes as they are co-factors and/or activators of many metabolic enzymes [1]. Theexcess of nutrient and its deficiency can both lead to physiological disorders in the vines. Nutrient deficiencies occur when plants cannot reach sufficientavailability of nutrients for their basic metabolism in the surrounding environment, while in case of abundance of minerals, especially trace metals (e.g. zinc, copper, manganese), sometimes toxicity phenomena can occur. An understanding of the seasonal uptake and partitioning of mineral nutrients of grapevines is essential in order to manage fertilizer applications. The availability of mineral nutrients is often determined by the soil chemical properties and nutrient interactions.

Magnesium (Mg) in grapevines plays two main roles. First, magnesium is an essential component of the chlorophyll molecule and is vital for photosynthesis. Magnesium is an essential macro-element for plant growth. Magnesium deficiency can impair export of photosynthate from leaves[4], and reduces photosynthetic efficiency [23].Lack of Mg can also increase the incidence of bunchstem necrosis in grapes[15].

Generally nutrients can be applied directly into the soil (in the solid form or dissolved in water) or sprayed on the leaves. Soil feeding is the most ancient normal fertilization practice; however it depends on many factors from soil type to plant characteristics and its physiological state and therefore cannot be generalized [3].

The nutrient requirement of grapevine is assessed by the researcher. This is based on the soil test report. It has been noted that the suggestions for requirement of the nutrients from the same vineyard may vary from laboratory to laboratory. The nutrient requirement of each vineyard is differentand is based on the nutrient status of each garden. The method used for analyzing the nutrient in a given sample varies from laboratory to laboratory. This shows that vagueness is present in nutrient suggestion. There is also vagueness in the interpretation of the test results. To avoid this we have developed FIS for suggestion of Magnesium requirement.The principal contribution of fuzzy logic- is its high power of precision[13,14]. Most of the practical applications of fuzzy logic are associated with its relational facet. Considering this, Fuzzy Inference System (FIS) suggests the Magnesium requirement of grape vineyard based on the soil testing report. The objective of this paperis to avoid the vagueness in Magnesium treatment to soil and generate more yields.

Laboratory Data Base:

The soil samples were collected from the fields of Solapur, Sangli, Nasik, Pune districts of Maharashtra andBelgaon, Bijapur, Gulbarga districts of Karnataka. The soil samples were thentestedin the laboratory of Maharashtra Rajya Draksh Bagaitdar Sangh, Manjri Farm, Pune (Maharashtra).Total 800samples of different grape vineyards are collected.

Soil samples are given in table 1.

Table1: Magnesium in soil (ppm/gm.)

Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg
1	1275	41	1125	81	1225	121	200	161	800
2	1075	42	1800	82	1250	122	200	162	700
3	1125	43	1450	83	1075	123	1325	163	1025
4	1125	44	1500	84	1075	124	1110	164	1770
5	975	45	1325	85	1175	125	450	165	900
6	1250	46	1100	86	1100	126	500	166	1570
7	1100	47	1225	87	1200	127	525	167	1375
8	800	48	1025	88	1200	128	981	168	1350
9	700	49	1075	89	1200	129	1135	169	1650
10	1025	50	1225	90	900	130	1166	170	1450
11	1770	51	1350	91	1100	131	1337	171	1500
12	900	52	1725	92	1125	132	1199	172	1725
13	1570	53	2000	93	1350	133	979	173	1925
14	1375	54	1675	94	950	134	768	174	1225
15	1500	55	1450	95	1200	135	1007	175	1375
16	1725	56	1875	96	1025	136	1252	176	1425
17	1925	57	1325	97	1250	137	1336	177	1400
18	1225	58	1375	98	1200	138	1336	178	1450
19	1375	59	925	99	1825	139	1875	179	1650
20	1425	60	1175	100	1250	140	2675	180	1550
21	1400	61	1200	101	1575	141	2400	181	1800
22	1650	62	1100	102	1400	142	1550	182	1650
23	1550	63	1150	103	1500	143	1800	183	1750
24	1800	64	1225	104	1750	144	1150	184	1775
25	1650	65	1225	105	1400	145	975	185	1775
26	1750	66	1325	106	1500	146	950	186	1975
27	1775	67	1425	107	1800	147	1075	187	1725
28	1775	68	1400	108	1375	148	1100	188	1625
29	1975	69	1325	109	1375	149	1275	189	1675
30	1725	70	1050	110	1250	150	1000	190	2100
31	1625	71	1200	111	1475	151	1150	191	1300
32	1675	72	1175	112	950	152	650	192	1600
33	2100	73	1650	113	1000	153	600	193	1200
34	1300	74	1725	114	1025	154	1275	194	1475
35	1600	75	1750	115	825	155	1075	195	1350
36	1450	76	1525	116	700	156	1125	196	700
37	1425	77	1225	117	800	157	1125	197	1900
38	1900	78	1075	118	650	158	975	198	2250
39	1775	79	1075	119	575	159	1250	199	1450
40	1250	80	1425	120	925	160	1100	200	1425

Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg
201	1900	241	1700	281	1650	321	1500	361	32
202	1775	242	1400	282	1725	322	1750	362	41
203	1250	243	1075	283	1750	323	1400	363	31
204	1125	244	1250	284	1525	324	1500	364	61
205	2225	245	1400	285	1625	325	1800	365	54

Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg
206	1400	246	1025	286	1850	326	1375	366	81
207	1100	247	1025	287	1700	327	1725	367	81
208	1800	248	1725	288	1225	328	1375	368	83
209	1675	249	2000	289	1075	329	1250	369	1110
210	1450	250	1675	290	900	330	1475	370	275
211	1275	251	1450	291	1050	331	650	371	1250
212	2000	252	1875	292	1225	332	950	372	700
213	1425	253	1325	293	850	333	1000	373	450
214	1275	254	1375	294	875	334	1025	374	500
215	1500	255	1325	295	1075	335	825	375	525
216	1650	256	1325	296	1000	336	700	376	2275
217	1425	257	1375	297	1075	337	800	377	981
218	1275	258	925	298	1425	338	650	378	1135
219	1500	259	1175	299	1225	339	575	379	1166
220	1325	260	1200	300	1250	340	925	380	1337
221	1100	261	1100	301	1075	341	200	381	1199
222	1200	262	1150	302	1075	342	200	382	979
223	1025	263	1225	303	1175	343	900	383	768
224	1225	264	1225	304	1100	344	1325	384	1007
225	1025	265	1325	305	1200	345	63	385	1252
226	1075	266	1425	306	1200	346	60	386	1336
227	1225	267	1400	307	1200	347	37	387	1336
228	1350	268	1325	308	900	348	37	388	1746
229	1175	269	1050	309	1100	349	74	389	1761
230	1300	270	1200	310	1125	350	37	390	1571
231	1700	271	1175	311	1350	351	33	391	1875
232	1175	272	2200	312	950	352	26	392	750
233	1275	273	1425	313	1200	353	62	393	1000
234	1475	274	1575	314	1025	354	100	394	1225
235	1325	275	375	315	1250	355	50	395	1572
236	1150	276	300	316	1200	356	35	396	1979
237	1400	277	200	317	1825	357	35	397	1934
238	1450	278	500	318	1250	358	37	398	1675
239	1275	279	500	319	1575	359	53	399	1725
240	1275	280	1275	320	1400	360	30	400	2675

Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg
401	2400	441	865	481	1225	521	1031	561	425
402	1550	442	960	482	1040	522	1375	562	650
403	1800	443	1100	483	835	523	1187	563	600
404	1300	444	1450	484	850	524	1062	564	300
405	1125	445	2332	485	1000	525	1125	565	475
406	1150	446	2496	486	700	526	1593	566	400
407	975	447	1400	487	950	527	1531	567	400
408	950	448	1825	488	767	528	937	568	275
409	1075	449	1400	489	740	529	1437	569	275
410	1100	450	1300	490	1025	530	1312	570	1075
411	1275	451	1425	491	900	531	1468	571	700
412	1000	452	1016	492	615	532	1125	572	675

413	1781	453	892	493	1450	533	1625	573	900
414	1906	454	1369	494	1931	534	1718	574	450
415	2187	455	830	495	1906	535	2250	575	375
416	2100	456	1652	496	1718	536	1625	576	400
417	1100	457	1197	497	1000	537	781	577	1125
418	1500	458	1141	498	1187	538	1550	578	600
419	1400	459	1135	499	1687	539	1075	579	950
420	1150	460	1400	500	1906	540	1425	580	825
421	650	461	1450	501	1562	541	925	581	1098
422	525	462	1525	502	1750	542	975	582	1265
423	550	463	1325	503	1968	543	1500	583	1260
424	975	464	1575	504	1281	544	1050	584	1494
425	1625	465	1475	505	1062	545	2275	585	975
426	1000	466	1325	506	1062	546	750	586	1203
427	750	467	1525	507	1218	547	750	587	625
428	1825	468	1450	508	1218	548	675	588	800
429	1775	469	1400	509	1281	549	1100	589	1025
430	725	470	1450	510	1343	550	1350	590	1625
431	925	471	1500	511	1250	551	1600	591	1050
432	1225	472	1100	512	1312	552	925	592	1075
433	1500	473	1050	513	1125	553	500	593	1075
434	1650	474	1325	514	1156	554	400	594	1400
435	1650	475	750	515	1312	555	450	595	975
436	1875	476	1075	516	1218	556	425	596	1150
437	1650	477	1111	517	1281	557	325	597	1000
438	1075	478	1215	518	1093	558	500	598	1500
439	1275	479	834	519	562	559	350	599	1650
440	1550	480	850	520	1437	560	300	600	1150

Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg	Farmer No.	Mg
601	925	641	1525	681	1493	721	1275	761	975
602	1075	642	1725	682	850	722	1150	762	1550
603	825	643	1775	683	1850	723	1025	763	1200
604	300	644	1725	684	2800	724	1275	764	875
605	650	645	1575	685	1250	725	875	765	1200
606	575	646	1950	686	1225	726	1100	766	1550
607	1550	647	1925	687	1200	727	1775	767	1875
608	1325	648	1775	688	1200	728	1300	768	1425
609	925	649	1525	689	1250	729	1275	769	1075
610	1325	650	1975	690	600	730	1525	770	700
611	1275	651	1375	691	750	731	1625	771	900
612	1350	652	1450	692	1075	732	1500	772	600
613	1375	653	1525	693	1175	733	1750	773	1000
614	975	654	1200	694	1550	734	1150	774	1375
615	1300	655	1850	695	1550	735	1475	775	1700
616	1325	656	1350	696	1725	736	1925	776	1325

617	1650	657	2000	697	625	737	1375	777	1850
618	1350	658	1450	698	1900	738	1800	778	2350
619	1500	659	1525	699	1900	739	1600	779	1950
620	1775	660	1575	700	775	740	1825	780	1750
621	1300	661	1450	701	1150	741	1600	781	1025
622	1725	662	1225	702	1250	742	1925	782	1375
623	1625	663	1325	703	1100	743	1100	783	1200
624	1775	664	1050	704	1025	744	1675	784	1650
625	2025	665	1771	705	975	745	1725	785	1250
626	1625	666	1750	706	925	746	1900	786	1325
627	900	667	1100	707	1175	747	1850	787	400
628	1700	668	1125	708	975	748	1425	788	925
629	675	669	750	709	1000	749	1175	789	700
630	1825	670	1575	710	875	750	1500	790	775
631	1000	671	1075	711	725	751	1900	791	675
632	1200	672	1825	712	1400	752	2150	792	725
633	1025	673	1250	713	850	753	2400	793	575
634	1675	674	1125	714	1100	754	2600	794	825
635	2000	675	1636	715	1175	755	2100	795	750
636	1350	676	850	716	1400	756	575	796	1075
637	1750	677	1475	717	1075	757	1600	797	1850
638	1925	678	1425	718	1400	758	1450	798	1875
639	2100	679	1250	719	1325	759	1300	799	1250
640	1950	680	1508	720	1237	760	1000	800	1250

Database: The data base developed by researcher using normal method under laboratory observations are presented in table 2.

Table 2: The data base used developed for input and output parameters in grape vineyard

Class No.	INPUT (ppm)	OUTPUT			
		30-60 days after pruning (Kg/acre)	Foliar spray 30-60 days after Pruning (gm/litre)	60-90 days after pruning (Kg/acre)	Foliar spray 60-90 days after Pruning (gm/litre)
	Magnesium	Mg1	Spray1	Mg2	Spray2
1	0 - 250	38	5	38	5
2	250 - 500	33	5	33	5
3	500 - 750	30	5	30	5
4	750 - 1000	27	5	27	5
5	1000 - 1500	22	5	22	5
6	1500 - 2500	15	5	15	5
7	2500 - 3500	11	5	11	5

3.1. Fuzzification: It is the process of conversion of precise quantity to a fuzzy quantity which is the first step in Fuzzy inference System. It includes Data base and Rule base.

a. Data Base:

The fuzzy system represents structured information in the form of a fuzzy set (FS). The input and output universe are modeled using FS[11]. It consists of fuzzy domains such as:

VL (Very Low), JL(Just Low), L (Low), N (Normal), H (High), JH (Just High), VH (Very High).

Magnesium domain is used as input for FIS which may carry out the Fuzzification for suggestion of Magnesium to the soil specific vineyard. The suggestion of Magnesium varies in the range of 0 kg/acre to 3500 kg/acre. The seven fuzzy sets for input variable Magnesium are shown in Table 3.
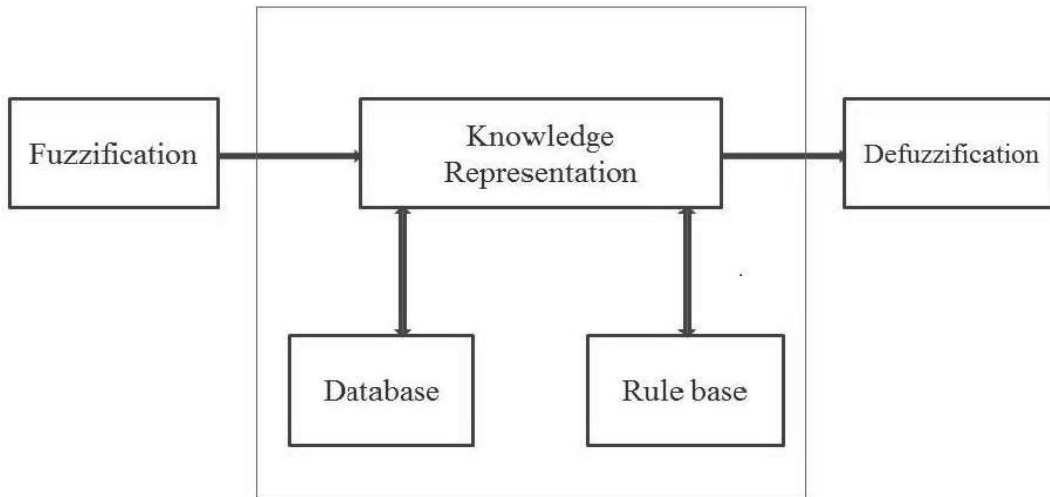
Fig.1: Block diagram of Fuzzy Inference System
Input and output variables of Fuzzy Inference System are shown in Fig.2
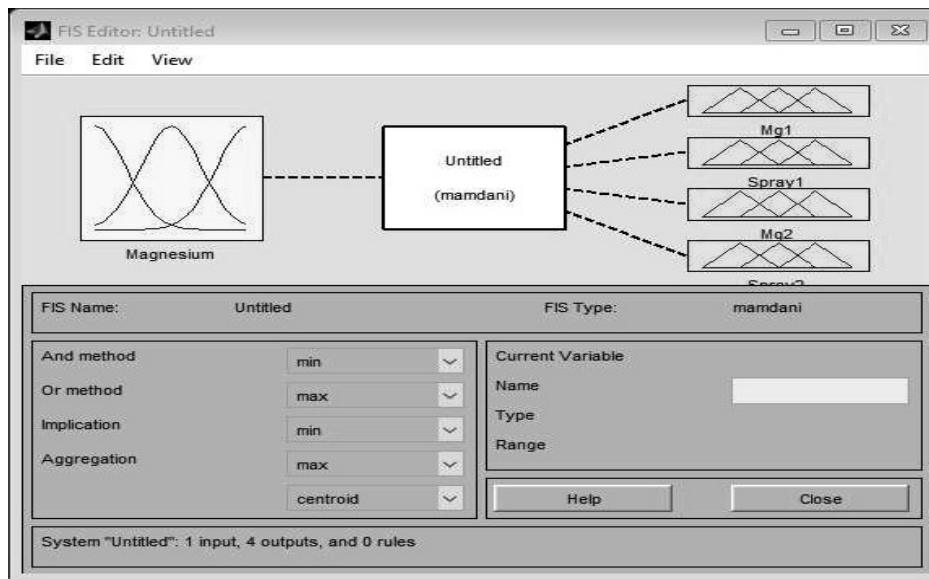
Fig.2: Fuzzy Inference System

Table 3:Fuzzy Set for input variable Magnesium

Sr.No.	Magnesium Measured (Membership Function)	Fuzzy sets for Magnesium (kg /acre)
1	μ_{VL}	L(0, 0, 250)
2	μ_{JL}	Λ(0, 250, 500)
3	μ_L	Λ(250, 500, 750)
4	μ_N	Λ(500, 750, 1000)
5	μ_H	Λ(750, 1000, 1500)
6	μ_{JH}	Λ(1000, 1500, 3500)
7	μ_{VH}	⅃(1500, 3500, 3500)

Depending upon the potassium value in the soil of individual garden, the doses of Magnesium through organic and inorganic grades are to be supplied. The linguistic values for suggested Potassium are chosen as: **VH (Very High), JH(Just High), H (High), N (Normal), L (Low), JL (Just Low), VL (Very Low).The values of** Magnesium **are within the range of 11-38 kg/acre. Here** Magnesium Spray **is constant as 5gm/liter.It is shown in table 4.**

Table 4: Fuzzy set for output variable Inorganic fertilizer

Obs. No.	Fertilizer (Membership Functions)	Fuzzy set	
		30-60 days after pruning (Kg/acre)	60-90 days after pruning (Kg/acre)
1	μ_{VH}	L (38, 38, 33)	L (38, 38, 33)
2	μ_{JH}	Λ (38, 33, 30)	Λ (38, 33, 30)
3	μ_{H}	Λ (33, 30, 27)	Λ (33, 30, 27)
4	μ_{N}	Λ (30, 27, 22)	Λ (30, 27, 22)
5	μ_{L}	Λ (27, 22, 15)	Λ (27, 22, 15)
6	μ_{JL}	Λ (22, 15, 11)	Λ (22, 15, 11)
7	μ_{VL}	⌐ (15, 11, 11)	⌐ (15, 11, 11)

Membership function for input variable Magnesium measured in soil is shown in Fig.3.
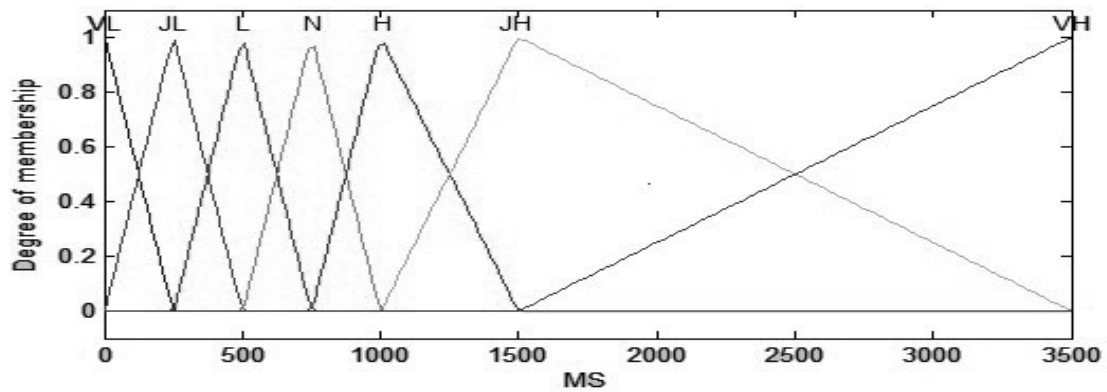
Fig 3: Fuzzy membership function for Magnesiummeasured

Membership functions for output variables i.e. fertilizer and foliar spray are shown in Fig.4a, 4b respectively.
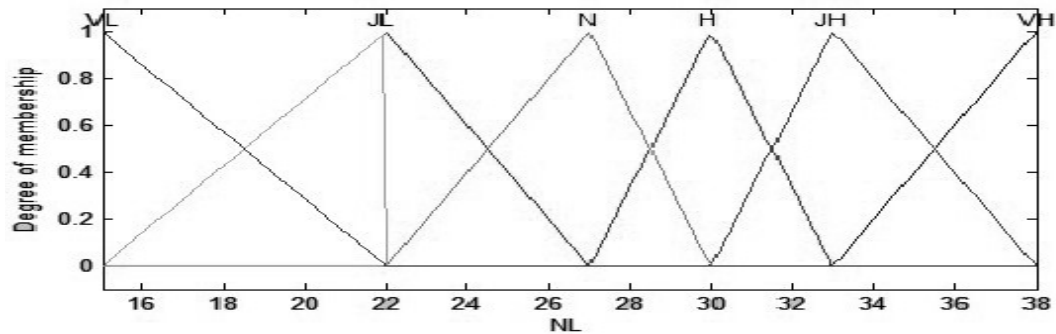
Fig 4a: Fuzzy membership function for Magnesium suggested
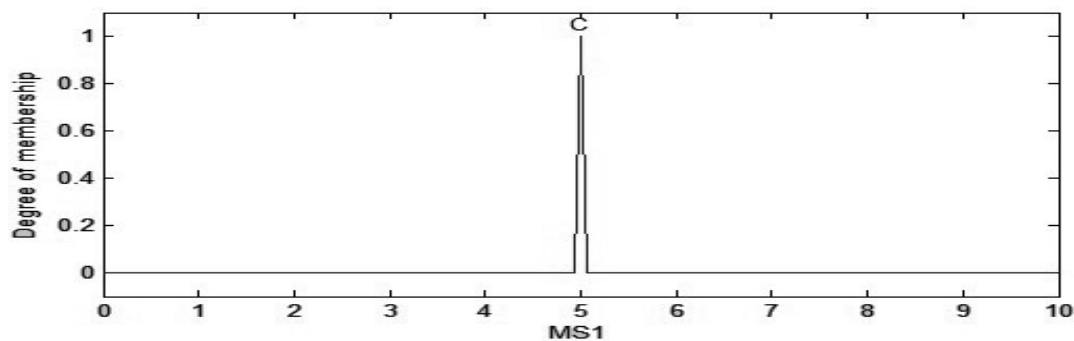
Fig 4b: Fuzzy membership function for Magnesium suggested

b. Fuzzy Rule base: In this rule base, 07 rules are developed by researcher and shown in table 5.

Table 5:The fuzzy rule basedeveloped is given below.

If Mg is		Then Mg1		And Spray1 is		And Mg2 is		And Spray2 is	
	VL		VH		C		VH		C
	JL		JH		C		JH		C
	L		H		C		H		C
	N		N		C		N		C
	H		L		C		L		C
	JH		JL		C		JL		C
	VH		VL		C		VL		C

The fuzzy rule base is read as:

If Magnesium is Very Low ThenMagnesium1is Very High and Spray1 is constant and Magnesium2 is Very High andSpray2is constant.

Fig.5 shows the GUI rule base of MATLAB.
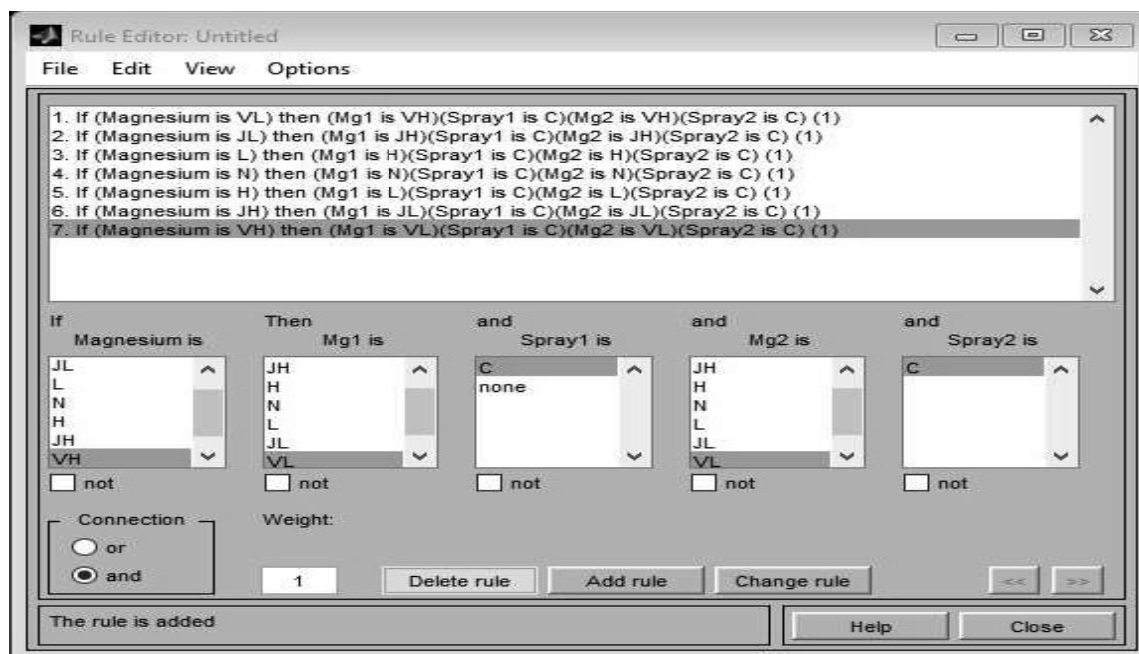
Fig. 5: Rule base for inference system

4. Work flow of FIS: FIS.PS works according to the flow chart as shown in fig.6.
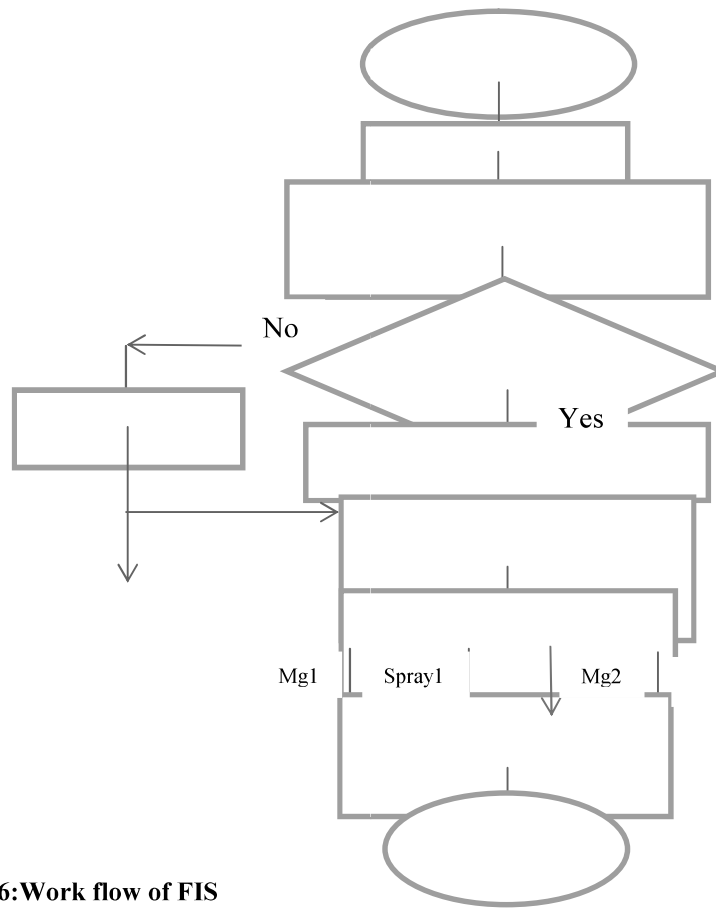
Fig.6: Work flow of FIS

5: Defuzzication: It is the process of conversion of fuzzy quantity to a precise quantity.
Here centroid Defuzzification method is used and shown in fig.7.

Fig.7: Defuzzication of the System

6: Practical Results for Suggestion of Magnesium:

The data given in the table 6 shows suggested value for Magnesiumbased on the status of Magnesium available in the soil samples of different farmers. The data suggested by FIS gives requirement of exact quantity of fertilizer during the season. This can help to save cost of fertilizer and produce more yields.

Table 6: Suggestion of Magnesium:

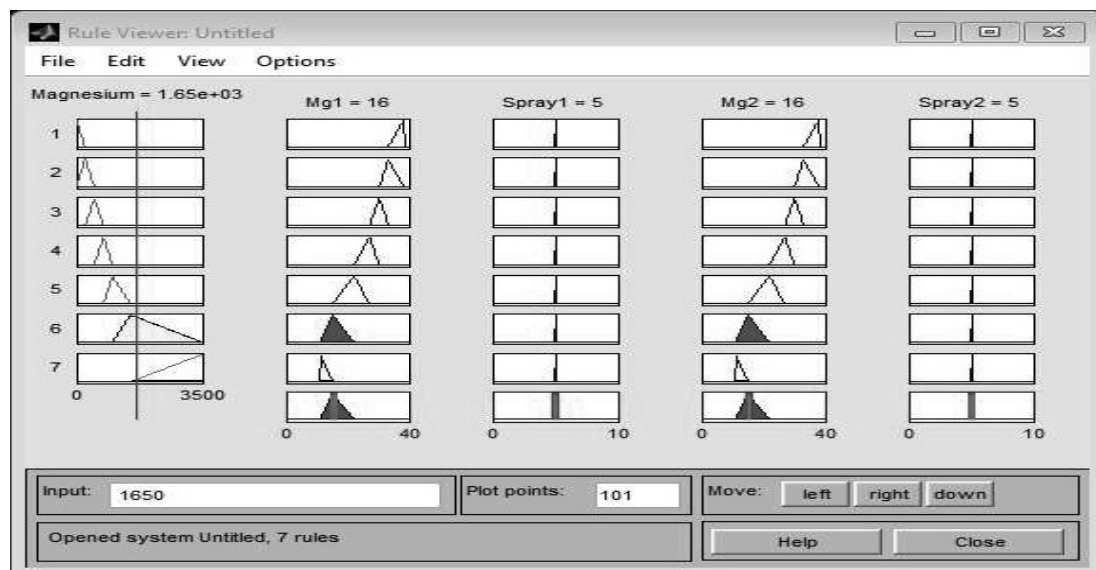| Sr.No.	Farmer No.	Input Data (ppm)	Magnesium suggested by Expert				Magnesium suggested by FIS			
			Mg1 (kg/ acre)	Spray1 (gm/ litre)	Mg2 (kg/ acre)	Spray2 (gm/ litre)	Mg1 (kg/ acre)	Spray1 (gm/ litre)	Mg2 (kg/ acre)	Spray2 (gm/ litre)
1	127	525	30	5	30	5	29.24	5	29.24	5
2	772	610	30	5	30	5	27.89	5	27.89	5
3	338	650	30	5	30	5	27.47	5	27.47	5
4	725	875	27	5	27	5	22.96	5	22.96	5
5	114	1025	22	5	22	5	21.33	5	21.33	5
6	223	1025	22	5	22	5	21.33	5	21.33	5
7	506	1062	22	5	22	5	21.32	5	21.32	5
8	79	1075	22	5	22	5	21.32	5	21.32	5
9	438	1075	22	5	22	5	21.32	5	21.32	5
10	102	1400	22	5	22	5	20.57	5	20.57	5
11	652	1420	22	5	22	5	20.45	5	20.45	5
12	768	1425	22	5	22	5	20.45	5	20.45	5
13	641	1523	15	5	15	5	14.67	5	14.67	5
14	766	1550	15	5	15	5	14.66	5	14.66	5
15	731	1625	15	5	15	5	14.66	5	14.66	5
16	634	1675	15	5	15	5	14.66	5	14.66	5
17	733	1750	15	5	15	5	14.64	5	14.64	5
18	389	1761	15	5	15	5	14.64	5	14.64	5
19	777	1850	15	5	15	5	14.45	5	14.45	5
20	767	1875	15	5	15	5	14.45	5	14.45	5

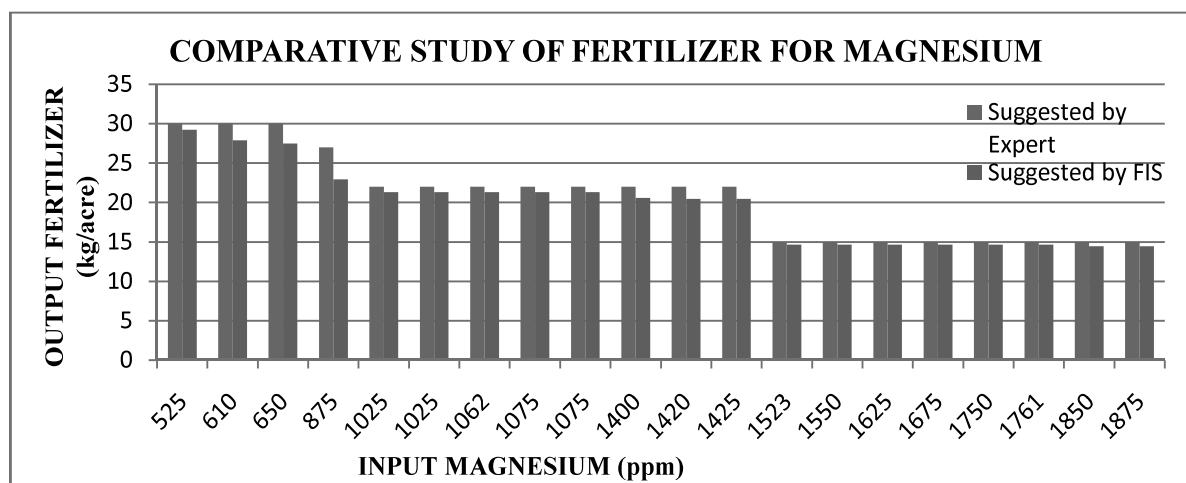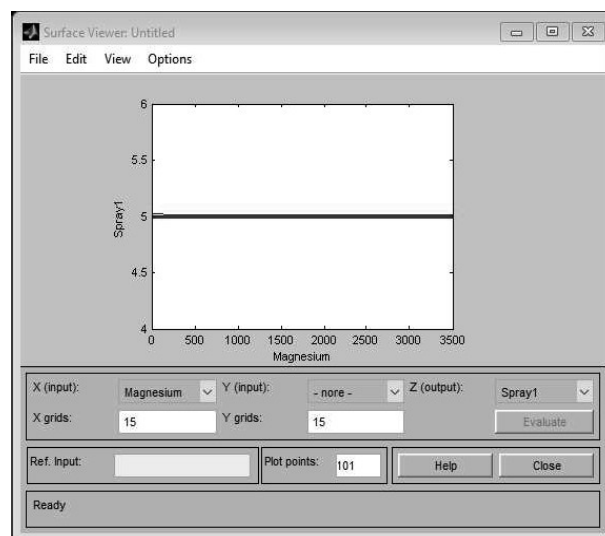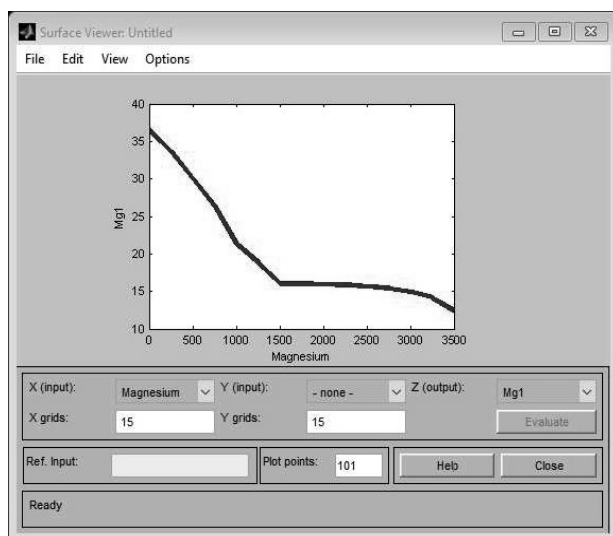Magnesium suggested by FIS gives better result as shown in graph fig.8.

Fig.8: Comparative study of fertilizer for Magnesium

7. Surface Viewer:
The Surface Viewer is a GUI tool that examines the output surface of a stored in a file, a.fis, for any one or two inputs. It gives the nonlinear relationship between input and output.

Fig.9a: Surface viewer of the systemFig.9b: Surface viewer of the system

CONCLUSION:

Laboratory expert does not indicate exact quantity of fertilizer Magnesium to be used for the soil. The FIS system helps to suggest the accurate quantity of Magnesium used for the soil. This reduces the cost of production of grapes and it also increases the yield.

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RESEARCH ISSUES AND CHALLENGES IN WIMAX: AN INTEGRATED APPROACH

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ABSTRACT : WiMax is the emerging technology adopted and used by most of the organization within their campus for internet connectivity. Many researchers have studied and contributed towardsWiMax. In this paper, we tried to understand the issues and challenges identified WiMax communication since formation of WiMax till date. Through systematic literature review of research papers, white papers and thesispublished, we tried to locate the issues aroundWiMax and also found the contribution made by researcher'syears wise, countrywise and topic wise. Our finding shows that most of the researchers have focused on security and privacy issue in WiMax. Apart from this there are other issues like performance, scheduling, interoperability etc.

Keywords: WiMax, Issues, Challenges, Systematic Literature review.

INTRODUCTION:

With growing IT industry, Wi-Fi and WiMax are most adopted and used technology in these days. WiMax is worldwide interoperability for microwave access [1].It is wireless communication technology for internet access within organizational campus. Due to wide range, it is most adoptable technology by many organizations especially in educational sector.

In spite of the widespread adoption, researchers are actively reporting and studding the issues in WiMax technology. Some of the most identified issue is security and privacy.The goal of this paper is to identify all issues raised by the researchers in integrated way. WiMax has been formed in 2001.Hence we tried to find all issues raised by the researchers from 2001 till date i.e. till 2016.

1. Objective of research

In this paper, we tried to find the answer to following research questions(RQ):

RQ1: What are the current issues and challenges in WiMax?

RQ2: How the interest of issues has been changed over the period of years?

RQ3: What is the contribution of researchers in getting this solution with respect to solve particular issue?

RQ4: What are the interests in obtaining the patents in WiMax?

To find the answer to these questions, a systematics literature review through various research papers published from 2001 till date has beenstudied. The guidelines proposed by **Kitchenham**[78] are used for this process.In rest of the paper, detailed research methodology is explained and the all issues are discussed. Afterthose limitations are explained, future work is discussed and conclusion is drawn.

2. Systematic Literature review

3.1. Search Process

The research papers are reviewed which are peer reviewed and from topmost databases as IEEE, Science Direct , Springer Link, ACM Digital Library and EBSCO.The search process has been done using Google scholar using following query.
(WiMax AND (Issue OR issues OR challenge OR challenges OR problem OR problems OR limitation OR limitations OR disadvantage OR disadvantages))
Initially we searched all papers using above criteria which the above query. The search process has one on 24th Nov 2016.Hence papers indexed after this are not included here.

3.2. Inclusion Criteria

We have included all the papers published from 2001 till 2016 which contains the wordsWiMax and issues/challenges/problems in its title. We also include thesis and patents papers for our study.

3.3. Exclusion Criteria

The titles which don't contain the word WiMax and issues/challenges/problems are excluded. Some non-English papers are removed from the study. Some notes/tutorials obtained are also removed from our research process.

3.4. Data Collection

From the papers obtained, we extracted following information,

- Title
- Type of publication
- Year of publication
- Country of the author
- Issue Discussed.

This information is extracted using MS-Excel and then each paper is reviewed on one-to-one basis in order to get the information for issues in WiMax.

3.5. Data Filtering and analysis

After giving the query we received 47 items , the we filtered our results as follows:

	Initial Items Found	247
(-) Removed as titles doesn't contain "WiMax"		52
(-) Removed as non relevant material		27
(-) Non-English Material		02
(-) General paper/Overview paper		33
	Final papers found	133

Table.1:Final no. of papers found

We received 133 papers which we have considered for statistical analysis and for actual discussion we have considered 77 papers.

3.1.   Results

From the results obtained, we received data as following cases:

Case 1) papers published countrywise and topic wise:

Country	All Issues	Security	Scalability	Performance	Architectural & Design	Privacy	Scheduling	Capacity Evaluation	No. of papers
Australia	0	4	0	0	0	0	0	0	4
India	0	40	0	12	2	1	1	0	56
KSA	0	2	0	0	0	0	0	0	2
Lebanon	0	2	0	0	0	0	0	0	2
Macedonia	0	2	0	0	0	0	0	0	2
Malaysia	3	4	0	0	0	0	0	0	7
New Zealand	1	1	0	0	0	0	0	0	2
Pakistan	0	7	0	1	0	0	0	0	8
Rohtak	1	0	0	0	0	0	0	0	1
Romania	0	4	0	0	0	0	0	0	4
Serbia	0	0	0	1	0	0	0	0	1
South Africa	0	3	0	0	0	0	0	0	3
St. Louis, MO	0	0	0	0	0	0	1	1	2
Sweden	1	0	0	0	0	0	0	0	1
Taiwan	0	7	1	0	0	0	0	0	8
UK	0	5	0	0	0	0	0	0	5
USA	0	11	0	0	0	0	3	1	15
	7	98	2	16	2	1	5	2	133

Table.2: country wise no. of papers published
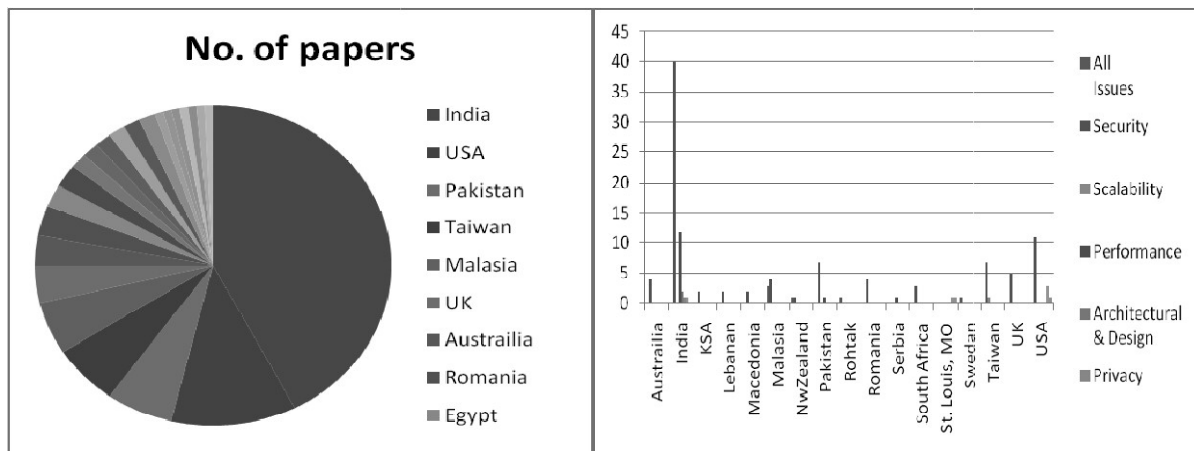
Figure.1: country wise no. of papers published

From the graph,it can be observed that in India and USA, most of the papers have been published and security is main concern that researchers has preferred for study.

Case 2) Paper published in peer reviewed journals:

Journal Name	No. Of Papers
IEEE	38
ACM	3
Spinger	6
EBSCO	4
Other	82
	133

Table.3: Journal database wise no. of papers published
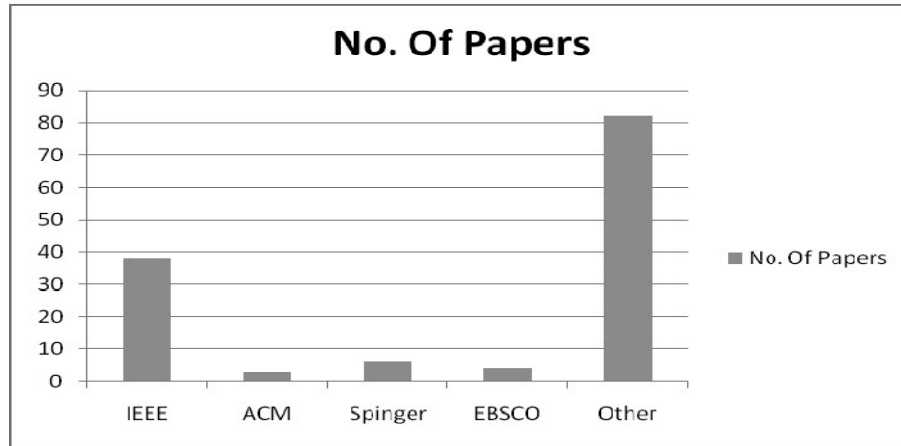
Figure 2: Journal database wise no. of papers published

The chart shows amongst topmost databases of journals, in IEEE maximum papers are published and more than that other peer reviewed journals are the source of maximum papers.

Case 3) Yearwise publication

Year	No. Of Papers
2001 to 2003	0
2004	2
2005	9
2006	10
2007	11
2008	19
2009	13
2010	16
2011	7
2012	12
2013	14
2014	10
2015	5
2016	5
	133

Table.4: Yearwise wise no. of papers published
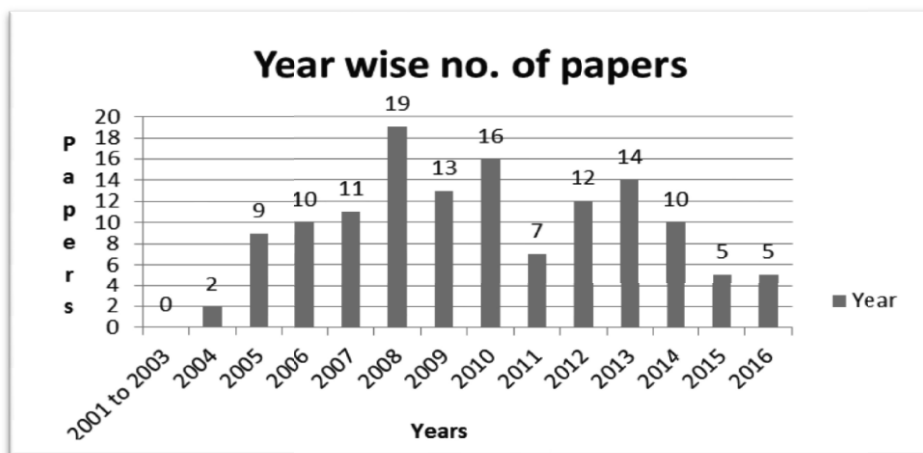
Figure.3: Year wise no. of papers published

The graph shows that though WiMax has been formed in 2001, till 2003 not even a single paper had been published, but pioneer year was 2008 for maximum papers publication, 2008 to 2010 and 2012 to 2014 are the best years for WiMax paper contribution.

Case 4) Category of Issuewise:

Issue	No. Of papers
All Issues	7
Security	98
Scalability	2
Performance	16
Architectural & Design	2
Privacy	1
Scheduling	5
Capacity Evaluation	2
Total	133

Table.5: Issue Category wise no. of papers published
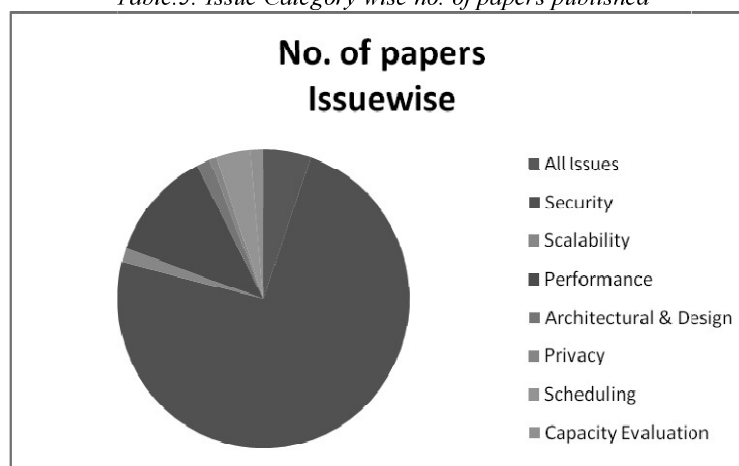
Figure.4: Issue Category wise no. of papers published

The graph shows that maximum contribution of the researchers is in security issue and next to this performance and scheduling are also most selected issues.

3.7. Discussion

In order to find the answer for following question:

RQ1: What are the current issues and challenges in WiMax? Thepapers are studied one by one and following issues and challenges are found:

Security-

WiMax is considered to be wireless connectivity for long distance,hence more number of users come into picture in its usage. Therefore security problem arises mainly in WiMAx.Some of the security issues like *authentication, encryption, availability, Jamming attack, scramblingattack, water torture attack and forgery attack. Authentication* is the process of identifying each user in network each subscriber station (SS) must have a X.509 certificate to identify each subscriber in the network. To implement such certificate is the main task.Wireless LAN standard management frames are not *encrypted*which incitesattacker to access personal information of subscribers.*Availability* is yet another issue raised by researchers [2], which means as WiMax is wireless network accession, the networkshould be available 24X7 is the vital challenge in WiMax.*Jamming attack* is caused by some external noise which reduces the capacity of the channel. *Scrambling attack caused by attackers which disturbs*WiMax frames at physical layer. *Water torture attack is caused by attackerwhich initiates*subscriber station to drain its battery or consume computing resources by sending a

series of fake frames.*Forgery attack*is also caused by attacker with a sufficient radio transmitter can write to a wireless channel.Muchenjeet al. [3] have focused on *Authentication,* **Confidentialityand integrity**issue.Confidentiality is to keep the data privately and *integrity* refers to provide integrity to the payload of the MAC layer of WiMax.Dubeyet al. [6] have focused on *Authentication, Authorization* and *encryption. Authorization. Authorization* is another side of the authentication, which provides the access to registered users in WiMax.Kuppuswamyet al. [7] have implemented new public key algorithm which reduces problems in *authentication*.Sandhu et el. [8] have focused on Authorization and some physical layer threats Zou, Yulong, et al.[1]Alzaabi, M., et al[18] have discussed algorithms for authentication and encryption.Ravinder Kumar et al. [28] focused on authentication, authorization and encryption.Jha et al.[29] have discussedJamming attack, scrambling attack, water torture attack, forgery attack, confidentiality, data privacy,integrity,signal theft and authentication.Rengaraju et al.[34] focused on authentication, authorization.Sanjay P et al.[36] have focused on authorization,authentication,encryption and availability.

To be summarized, we found following Security issues and possible solutions are identified.

Level	Sub-issues	Solutions Suggested by researchers
Application Layer Threats	Authentication [2,3,6,7,8,18,28,29,34,36]	New public key algorithm [7] Implement Extensible Authentication Protocol to WiMAX networks ,which is added in 802.16e by IEEE[3] Defining Privacy Key Management (PKM) protocol in security sub layer[6] Use HMAC (Hashed Message Authentication Code) for sender's identification[28] Use Authentication Key (AK) generation algorithms[34]
	Confidentiality [3,29]	Use Data Encryption Standard (DES)[29]
	Authorization [6,28,34,36]	ImplementX.509 certificate[6,28]
	Availability [2,36]	---
	Encryption [2,6,18,34,36]	ImplementingTraffic Encryption Key (TEK) [6,28,34]
	Malware attack[17]	----
	SQL injection[17]	
	Cross-site scripting[17]	
	SMTP attack[17]	
	Privacy[29,34]	Use HMAC (Hashed Message Authentication Code) for sender's identification[29]
Physical Layer Threats	Jamming Attack [2,8,29]	Increase power of signals or signal bandwidth using frequency spread spectrum (FHSS) or direct sequence spread spectrum (DSS).[2]
	Scrambling Attack [2,8,29]	Use anomalies monitoring beyond performance norm (or criteria) to detect scrambling and scramblers[2]
	Water Torture Attack[2,8,29]	Discard fake frames[2]
	Forgery Attack [2]	Mutual authentication[2]
	Integrity [3,29]	
Mac Layer Threats	Eavesdropping[8]	------
	Masquerading [8]	
	Denial of Service[8,34]	Introducing nonce or time stamps [34]
Network Layer Threats	Black hole Attack[8]	-------
	Greyhole Attack[8]	
	Wormhole Attack[8]	
	IP spoofing[17]	
	IP hijacking[17]	
	Smurf attack [17]	
Transport Layer Attacks	TCP sequence prediction attack[17]	
	UDP flood attack[17]	
	TCP Flooding[17]	

Table.5: Summary of security issues and solutions by researchers

Performance-
In this category, researchers have focused on throughput measurement and improvement. Network accession for better speed at required quality is yet another major problem in WiMax.[4,9]. It can been increased by various compression techniques.[5].WiMax gives better performance than Wi-Fi[10]. Throughput, end-to-end delay, jitter delay, Peak Signal Noise Ratio (PSNR)], maximum sustained rate, maximum reserved traffic rate,latency,packet loss and packetdelivery

ratio are the QoS Parameters that effects the performance of WiMax [11,53,47,64,65]. Selection of appropriate routing protocol enhances the performance of WiMax.[12].Under Mobile WiMax, 3G systems gives best performance presently.[38].WiMax is the better tool for making India into Digital India by substituting WiMax for communication in rural India.[38,42,70]. Orthogonal FrequencyDivision Multiplexing (OFDM) based WiMax improves the performance[52,80].The capacity of mobile WiMax is doubledwhensilence suppression is used.[51,96]

To be summarized following are the parameters studied under performance

QoSParameters	Techniques for Improvement
Throughput End to end delay Jitter delay Peak Signal Noise Ratio (PSNR). Maximum sustained rate, maximum reserved traffic rate, latency, packet loss packet delivery ratio	Selection of Right Routing protocol Orthogonal Frequency Division Multiplexing (OFDM) [52] Silence Suppression Technique[51]

Table.6: Summary of Performance issues and solutions by researchers

Scheduling-
Scheduling is another problem raised by the researchers. Selection of proper scheduling algorithm improves the performance, scheduling criteria has be set for betterment. [20,92].Scheduling algorithms selection should be done from MAC layer to application layer.[13,16]

Architectural & Design
The problems arise while implementing the WiMax are referred as architectural & design issues.
While implementing the WiMax selection of IC protocol, selection of frequency modulation and radio frequency architecture effects the overall performance of WiMax.[1,87,58]

Privacy
It is nothing but another side of security in which 3.1 Denial of Service (DoS)and Key Space Vulnerability are the two major concerns which provokes attacker to attack and access the information through WiMax Communication.[79]

Capacity Evaluation
In order to increase benefits of WiMax, the capacity has be extended, which can be done using proper accounting of overheads.There are various methods available toreduce the overheads in capacity evaluation and extension.[63].

Scalability
In WiMax, for multimedia files transmission, scalability issue has been addressed by the researchers. scalable video streaming with feedbackinformation of the available transmission bandwidth is criticalin which the transmission packets can be further separated intomultiple levels of importance [24,25,26,28]

CONCLUSION :

From the above results and discussion, it can be concluded that,security, performance, scalability, scheduling, authentication are the most issued identified by the researchers. Most of the researchers have selected security concern because in WiMax internet accession fidelity facility can be misused by the attackers and will be harmful in any area of its application. Apart from this performance is most selected area of research as in wireless communication performance and availability are major concerns on which researcher still has to work more. By looking at the number of papers published, more solutions can be found in current problems of WiMax.

1.   Future Work
In this paper we have considered few parameters and all issued that can be found in WiMax. The work can be continued by considering a particular issue in depth and finding or suggesting the best solution.

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A STUDY OF REQUIREMENT VOLATILITY ON SOFTWARE TESTING: A SURVEY W.R.T. IT COMPANIES LOCATED IN PUNE.

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ABSTRACT : Requirement management is one of the important phase and crucial phase of software development process. missing requirements information can cause one to create (or recreate) the needed information during differentSoftware Architecture activities. While backtracking in the software development process is known to becostly, the costs associated with missing requirements in the Software Architecture process. This paper divided into 7 parts.
1. Introduction gives definition of keywords. 2. Requirement Management Survey gives information about failures reports of software, through which researcher have finalized questionnaire. 3. Research Methodology briefs about methodology used for data collection. 4. Data Analysis gives data analysis and explanation about the factors responsible for failure. 5. Conclusion gives researcher opinion about the Research Problem. 6. Suggestions and 7. Future Study The major contribution of this paper is to analyze the requirements management issues and challenges

Keywords-: Requirement, Requirement Management, Requirement Engineering, Requirement Volatility, Software Testing, software Development

INTRODUCTION:

In the software engineering literature project management and requirements management activities are crucial in order to achieve the high quality software system. Due to increase the globalization of software development deriving many benefits to the software companies at the same time it will leads to several problems/issues occurring while managing the requirements in global software development projects which includes [3]Requirements engineering is defined as follows: "Requirement engineering (RE) is a set of activities concerned with Identifying and communicating the purpose of a software-intensivesystem, and the context in which it will be used. Hence, RE acts as the bridges between the real world needs of user, customer, and other constituencies affected by a software system, and the capabilities and opportunities affected by software-intensive technologies". [4]Requirements management is defined as follows: "Requirement management is a set of activitiesthat helps the project team to identify, control, and track requirements and changes torequirements at any time as project proceeds". [5]

Software testing is an investigation conducted to provide stakeholders with information about the quality of the product or service under test.[6] Software testing can also provide an objective, independent view of the software to allow the business to appreciate and understand the risks of software implementation. Test techniques include the process of executing a program or application with the intent of finding software bugs (errors or other defects), and to verify that the software product is fit for use.

Requirements volatility (RV) refers to additions, deletions and modifications of requirements during the systems development life cycle. RV creates rework in design and code that increases the system development cost and time and compromises the system quality. Ignoring requests for requirement changes can cause system failure due to user rejection, and failure to manage RV can increase the development time and cost.[9]

2. REQUIREMENTS MANAGEMENT CURRENT SURVEY

2.1 CIO Magazine
Analysts report said 71% of software projects that fail due to poor requirements management, making it the single biggest reason for project failure. [2]

2.2 Standish Report
The Standish Group research shows a staggering 31.1% of projects will becancelled before they ever get completed. Further results indicate 52.7% of projectswill cost 189% of their original estimates. [1]
The Standish CHAOS Report, which surveyed 9,236 IT projects, found that the top threecauses of project failure were lack of user input, incomplete requirements or changingrequirements. According to the Standish Group International CHAOS Survey U.S.A pastproject performance report is shown in fig.1.

3. Research Methodology

3.1 Research Problem
A good set of requirements are the base for any software project. Requirement gather is playing main role to estimate cost and schedule as well as developing design and testing specifications. [7, 8] Hence quality of requirements playing main role in the success of any software project. Even though requirements are freeze in initial phase of software project but it may got change throughout the software development lifecycle. Change in requirement means it can be addition, deletion or modification. Such kind of change in requirement during SDLC always impacts the cost, schedule and quality of software product [2]. The reason to fail any software product is mainly depends upon the quality of requirements. Hence, a good set of user requirements are needed for any software project, to be successful. But if requirements are not specified clearly, correctly against what the system should do,
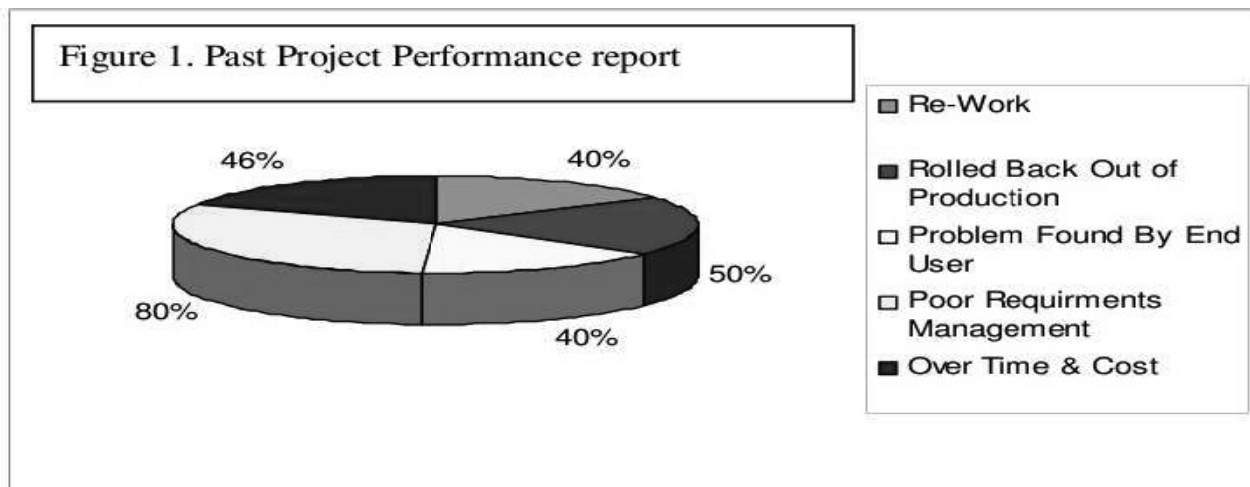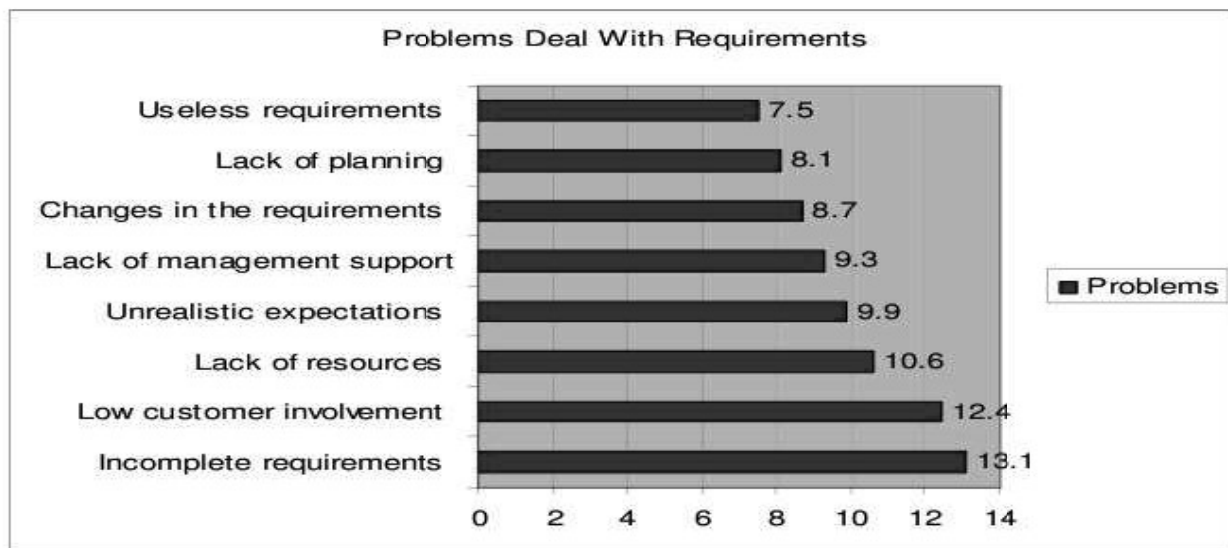
Figure 1. Past Project Performance report

Figure 2: Project Failure Due to Requirements Factor

then many projects will fail in this case. In fact, many systems have just been given a deadline for delivery, a budget to spend, and a vague notion of what it should do.

3.2 Methodology

Data collection for this research is done using purposive, quota and convenience sampling methods. This is out of necessity because it was almost impossible to obtain a perfect random sample. PMC and PCMC study area has been considered in the scope of this research. Software companies reside in Hinjewadi, Kharadi, Viman Nagar, EION IT Park, SB Road area visited to collect sample data.

3.3 Analysis Tool

SPSS 16 Statistical tool has been used for analysis of data for the research.

4. Data Analysis

To understand various hurdles in the software testing and testers problem following points are concerned

for analysis
- Effect of incomplete or inconsistence of requirements on software testing process
  - Overheads in software testing
  - Common requirement issues responsible to affect software testing process.

4.1 Failure of Software Project

21st century known for computerization of all manual works, that human being was doing so far. Computerization made man life easy and this computerization become possible because of integration of hardware and software. Software plays most important role in the automation of most of electronic appliances. Hence, in current market, demand for all types of software is increasing day by day. This demand leads to development of thousands of software applications in turn increase in software industries.

1

	Strongly Agree (SA)-5, Agree(A)-4, Neutral(N)-3, Disagree(D)-2, Strongly Disagree(DS)-1							
Sr. No	Factors	SA(5)	A(4)	N(3)	D(2)	SD(1)	Avg	Rank
1	Lack of user involvement	275	91	34	0	0	7.39	1
2	Long or unrealistic time scale	201	199	0	0	0	7.23	4
3	Poor or No Requirements	237	156	7	0	0	7.35	3
4	Inadequate Documentations	158	198	44	0	0	6.88	11
5	Scope Creep	181	219	0	0	0	7.15	7
6	No Change Control System	172	191	37	0	0	6.97	10
7	Poor testing	231	169	0	0	0	7.35	4
8	Lack of foresight in building efficiency markets	222	141	37	0	0	7.17	6
9	poor managerial decisions	206	178	16	0	0	7.19	5
10	Cost overrun.	184	200	16	0	0	7.1	8
11	Lack of an experienced project manager:	141	236	15	8	0	6.87	12
12	Lack of methodology in the process	163	230	7	0	0	7.05	9
13	Well-defined Schedules	238	155	7	0	0	7.35	2

Table 4.1: Factors responsible for failure of software project

Every year many software industries are spending billion on IT application development. Statistically, 31% of projects will be cancelled before they ever get completed. 53% of projects will cost twice as of their original estimates, overall, the success rate is less than 30% [2]. Why did the project fail? From symptom to root cause -what are the major factors that cause software projects to fail? What are the key ingredients that can reduce project failure?

Following are the points are considered in this research for the project failure.

1.Lack of user involvement-: In requirement gathering process mainly user involvement is important to gather correct requirements.

2. Long or unrealistic time scale-: Project must be delivered and developed on schedule; if it is too long schedule software can be in failure state.

3. Poor or No Requirements-: If gathered requirements are incorrect or ambiguous then developed software can be in failure state.

4. Inadequate Documentations-: In early phase of software development all requirements and designs must be written in proper format called as documentation.

5. Scope Creep -: It is term used for trimming or missing of requirements during development process of software.

6. No Change Control System-: If changes are suggested by client during development phase and if those are cultivated

without change control system, then there is a chance of failure of software.

7.Poor testing-: Proper testing must be there to avoid errors or bugs in software.

8.Lack of foresight in building efficiency markets-: standard must be maintained in other development companies for developing quality product.

9. Poor managerial decisions-: Some time wrong managerial decisions are also one of reason for failure of software.

10. Cost overrun-: Unexpected increased cost in budget.

11. Lack of an experienced project manager-: Experience of project manager matters of developing quality product.

12. Well-defined Schedules.-: If software is developed in proper defined Schedule then project can be successful.

It is quite important to understand the factors responsible for software project failure. Table No. 4.1 shows the various factors, which are responsible for software project failure. To meet the objective a questionnaire has been designed by using various factors which define the various points responsible for failure of any software project. It is observed that for each document the average scale is in between 1 to 5 that is in between strongly disagree to strongly agree. In fact all the values are above 3.5 which mean that with respect to all the parameters much approval is observed. In a 5-point Likert scale, having categories like strongly agree, agree, neutral, disagree and strongly disagree clubbed into

three categories. The reason for using Likert scale is that the responses by the respondents should not become monotonous while answering the questions. Hence researcher has also applied 5-point Likert scale and calculates weighted average value. There is very less difference between the comparative value of rank order average value and 5-point Likert scale value. [1]

It is seen that the highest average value is 7.39 for the 'Lack of user involvement' followed by 'Poor or No Requirements', 'Poor Testing' and 'Well-defined Schedules' which are 7.35. The average value for factor 'Long or unrealistic time scale' is 7.23 followed by 'poor managerial decisions' is 7.19. The average value of 'Lack of foresight in building efficiency markets' is 7.17, followed by 'Scope Creep' is 7.15. The average value of 'Cost overrun' is 7.1 followed by 'Lack of methodology in the processes is 7.05. The average value of 'No Change Control System' is 6.97 and 'Inadequate Documentations' is 6.88 followed by 'Lack of an experienced project manager' is 6.87.

As per most of respondents, it is clear that 'Lack of user involvement' followed by 'Poor or No Requirements' is most important factor responsible for the failure of software project. Off course, user means end user involvement is most important as end user only going to tell his demands or request to business analyst and if end user only unavailable in the requirement gathering meeting then there is no point to discuss anything, anymore. Average 7.39 respondents are agreed to have end user in the requirement gathering meetings or sessions.

Even if end user is available in requirement gathering meeting or session but requirements quality remains poor then also it leads to failure of software project. Poor requirements can get collected if business analyst having less domain knowledge. Also if end user does not have understanding what exactly he wants then also quality of requirement becomes poor. Poor or non-qualitative requirement can become base for any software project and it creates failure throughout SDLC process. Hence, in this research 7.39 responds recommended to have good quality of requirements.

If end user is available and quality of requirement is also good but if testing team executes test cases wrongly then also it creates failures in software project. As per 7.39 respondents, testers should always execute test cases based on the business functionality and requirements written in Functional Requirement Document (FRD). Hence, in this research recommendation needs to provide to testing team to follow testing best practices for the test case execution and in turn to reduce software failures.

Project management is the key factor for the success or failure of any software project. For qualitative project management, well-defined schedule is mandatory factor. If project will have well- defined schedule then all the teams like requirement team, development team, designer team, testing team etc. will follow the same time lines to meet the project success. Hence, 7.39 respondents agreed to have well-defined schedule to reduce failure in software project.

As we saw well-defined schedule for software project plays vital role in the success of project, but well-defined schedule mean short and realistic. If project schedule becomes long and unrealistic then it surely leads to failures in software project. About 7.23 respondents agreed to this point and hence researcher strongly recommends that project schedule time scale should be short and realistic.

In software project execution, many situations can come where managerial level people need to take decision and provide answer to client. If project goes in RED situation where customer is not happy and he is demanding software in very short period of time then in that case managerial decision plays very important role to keep customer calm and happy. But if managerial decision becomes poor then customer won't allow us to work and can take break deal with Software Company. Hence, as per average 7.19 people poor managerial decision leads to failures in software project and therefore, there is need to improve managerial decision skills to increase success rate of software project.

If we developed any product then for selling that product marketing plays vital role. But if we don't have foresight about our project efficiency then in the market product won't get sell. The average 7.17 respondents saying 'Lack of foresight in building efficiency markets' is most important factor and software companies need to focus on this point. Also there is need to have future knowledge about the market of developed software project.

Around average 7.15 respondents are giving importance to 'Scope Creep' factor. Scope creep means project scope should not get trim if we are dealing with success of software project. Scope creep generally happens if project schedule is long and unrealistic. Hence, as discussed above to avoid scope creep there is needed to have well-defined, short and realistic project schedule.

If there is lots of changes in requirements or development team created faulty software component or taken too much time to developed software product, also testing team could not finish testing within specified time then project cost can get overrun. The average 7.1 respondents agreed that 'Cost overrun' could lead to failures in software project. Hence, project management or team lead needs to focus on work status of requirement, development and testing team. Need to resolve all the issues coming throughout SDLC phase so that it can not overrun cost of the software project.

For error free SDLC process there is standard defined by software engineering for each phase. Requirement team should follow the best standard practices for requirement engineering process, development team should follow best development practices for the coding of software components, and testing team should follow the best testing practices. But if there is lack of methodology present in these best practices then it will lead to project cost overrun and in turn lead to failure of software project. Average 7.05 respondents are agreed with 'Lack of methodology in the process' lead to failure of software project and hence this research recommends best practices and methodology should be followed throughout SDLC process.

To record the changes taken place in requirements by the end user or customer, software management should create change control system and update it as and when required. The average 6.97 respondents agreed that 'No Change Control System' always lead to failure of software project. If project management do not use Change Control System then it won't be possible to record changes made in requirements and it will

miss out few important functionality in proposed software project. Hence this research recommends that change control system should be mandatory and gets updated as and when required.

Documentation throughout SDLC process plays vital role to transfer knowledge from one team to another. If requirement team does not provides adequate documents to development team then development team can not come up with component design and specification documents appropriately and if development team does not provides FRD, component design and specification documents to testing team, then testing can not come up with appropriate testcases. Hence, each team should provide adequate documents to other team. Because Inadequate Documentation can lead to the failure of software project and in survey around average 6.88 respondents agreeing that 'Inadequate Documentations' lead to software failures and there is need to have adequate documentation throughout SDLC process.

Experienced resources always play vital role in the success of software project. If resources are fresher or new joiners then they don't have product/domain knowledge and hence they cannot understand business functionality easily and quickly. Experienced person can easily communicate with customer on the domain knowledge, business functionality issues etc. Hence, around average 6.87 respondents are agreeing that 'Lack of an experienced project manager' lead to software failure. Therefore, there is need to have experienced resources in the all the teams of software company.

4.8.2. Impact of poor requirement gathering on software testing process

Poor requirement gathering is nothing but issues present in the collected requirements from client or customer. A poor requirement is nothing but erroneous requirement. As we saw in the section of failure of software process, poor requirement always affect complete SDLC cycle and hence in software testing point of view, there is need to understand what kind of work actually getting affected mainly in software testing team. Software testing team mainly deals with following list of tasks:

1.   Addition of test case
2.   Deletion of test case
3.   Modification of test case
4.   Re-execution of test case
5.   Verification of newly added functionality due to requirement change
6.   Test results creation for newly added requirement

Above listed tasks of testing team are well known in software industry. Hence, it is quite important to understand, among six tasks which task is getting impacted most due to poor requirements. Table No. 4.2 shows the various tasks performed by software testing team. To meet the objective a questionnaire has been designed by using various tasks of software testing team. It is observed that for each task has the average scale in between 1 to 5 that is in between strongly disagree to strongly agree. In fact all the values are above 3.5 which mean that with respect to all the parameters much approval is observed. In a 5-point Likert scale, having categories like strongly agree, agree, neutral, disagree and strongly disagree clubbed into three categories. The reason for using Likert scale is that the responses by the respondents should not become monotonous while answering the questions. Hence researcher has also applied 5-point Likert scale and calculates weighted average value. There is very less difference between the comparative value of rank order average value and 5-point Likert scale value. It is seen that the highest average value is 4.62 for the 'Addition of test cases' followed by 'Modification of test cases' is 4.47. The average value of 're-execution of modified test cases' is 4.46 followed by 'Test result creation for newly added test cases'. The average value of 'Deletion of test case' is 4.16 followed by 'Verification of Newly added functionality due to Requirement Change' that is 4.

If there is change in requirement or requirement is incorrect then it might affect to the complete list of above tasks. Test case creation, review and update in test cases are basic activity of software testing team. While writing test cases, test team follows Functional Requirement Document (FRD) and as we know that FRD is nothing but one of the requirement document created by requirement team. But if FRD is incorrect or incomplete then test cases created by testing team can also be incorrect because incorrect FRD obviously lead to incorrect or incomplete test cases. Incorrect or incomplete requirements means poor requirement and if requirement is poor then definitely it affects on the work of software testing team.

As per 4.62% of respondents saying that "Addition of test cases" is most frequent task tester needs to do when requirement is poor. Because when requirement is incomplete, then testing team needs to add test cases in the existing list of test cases to cover the newly added requirements.

Also around 4.47% respondents are agreeing that "Modification of test cases" task is frequent task done by testers when requirement is poor because if requirement is incorrect then after correcting of requirement, testing team need to update existing test cases as per updated requirements.

Along with test case addition or modification, around 4.46% respondents are focusing on 'Re-execution of modified test cases' because once test cases added or updated as per updated requirement then testing team starts re-execution of newly added or updated test cases to verify the updated functionality mentioned in revised requirement document.

Along with test cases creation, testing team always need to do test results as well. Around 4.39% of respondents are saying after re-execution of newly added test cases, testing team need to create test results as well.

Once addition, modification and re-execution of test cases done by testing team then there is needed to verify all the executed test cases along with their test results. Hence, around 4% or respondents are saying 'Verification of Newly added functionality due to Requirement Change' is important work that designer and testing team lead need to do due to poor requirements.

Researcher of this research recommends that designer team and management always need to focus on to reduce errors in requirement documents so that further phase of SDLC will not get impacted and it will not lead to failure of software project.

Factors	SD	D	N	A	SA	Total	Avg	Wt.Avg (Likert Scale)	Rank Order
Addition of Test Case	0	0	0	153	247	400	4.62	4.6	1
	0	0	0	38.25	61.75				
Deletion of Test Case	0	0	61	215	124	400	4.16	4.15	5
	0	0	15	53.75	31				
Modification of Test Case	0	0	0	214	186	400	4.47	4.46	3
	0	0	0	53.5	46.5				
Re-Execution of Modified Test Cases	0	0	0	215	185	400	4.46	4.5	2
	0	0	0	53.75	46.25				
Verification of Newly added functionality due to Requirement Change	0	0	62	276	62	400	4	4	6
	0	0	16	69	15.5				
Test Results creation for newly added requirement	0	0	0	246	154	400	4.39	4.39	4
	0	0	0	61.5	38.5				

Table 4.2: Work of Software testing process
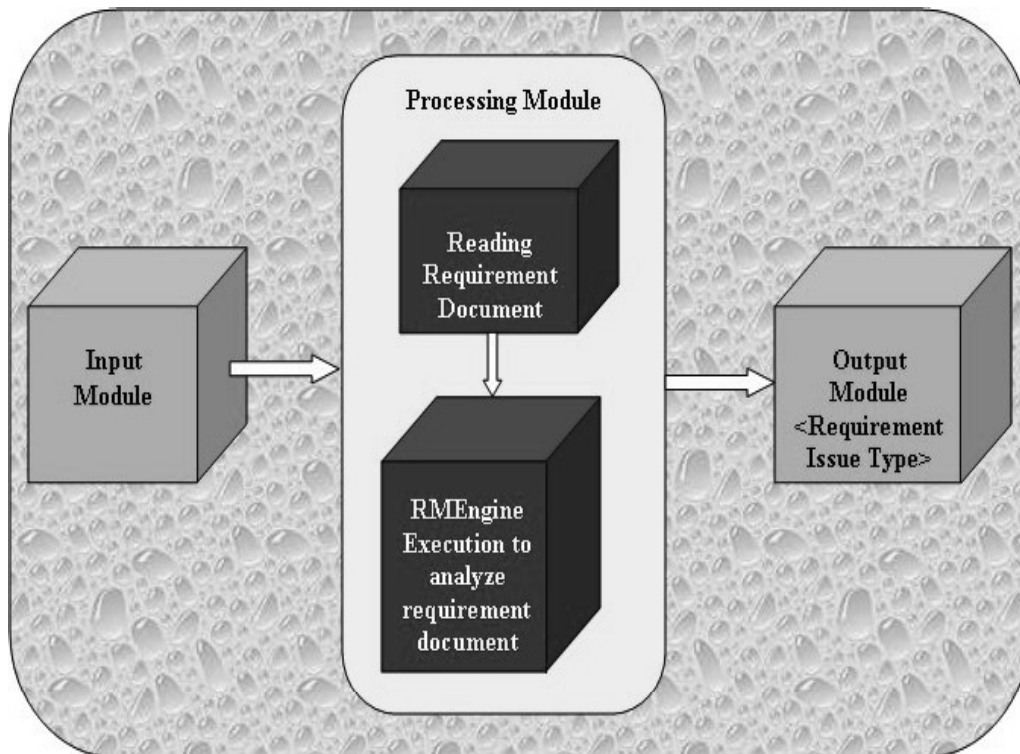
Figure 3.Suggested Model Requirement Management to Reduce Software Failures (RMRSF).

CONCLUSION :

Researcher concludes that if Requirements are correct and quality based then software can be developed without errors and if requirements are consistent then Test Case designing is also consistent so that testers can only concentrate on testing job and perfect testing can be done.

Hence Requirement gathering and analysis is very important process in software development. This process should be completed with good set of requirements so that and requirements must be documented well in format so that ambiguity can be resolved. And hence if requirements are correct then development and testing process also be performed without failure of software.

Suggestions

Software Requirement Specification is the base for all the phases of SDLC of software product. But if Software requirement Specification is incorrect or incorrect then it impacts on all the phases of SDLC phases. Here suggested that developers, software testers should read and understand requirement carefully before starting their work.

7. Future Work

Considering the present state of impact of poor requirement gathering process on software testing, a model to reduce software failure in testing phase will be designed through the present research work. This new model is called Requirement Management to Reduce Software Failures (RMRSF). The main functionality of RMRSF model can provide better software testing actions for corresponding poor requirement. Model always has 3 phases like input, processing and output   RMRSF model integrates the functionality of different modules like Input module, processing module and output module.   Figure 3 shows the work flow of RMRSF model. The workflow of RMRSF model is divided in 3 phases: Input phase, processing phase and Output generation phase.

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PERFORMANCE ANALYSIS OF AODV AND DSDV ROUTING PROTOCOL IN MANET

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ABSTRACT: Wireless mobile ad-hoc networks are networks without any physical connections. In these networks there is no fixed topology due to the mobility of nodes. There is also interference, multipath propagation and path loss problems in wireless network. Hence a dynamic routing protocol is needed for these networks to function properly. Many routing protocols have been developed for accomplishing this task. The purpose of this paper is to study, understand, analyze and discuss DSDV and AODV mobile ad-hoc routing protocols .DSDV one is a proactive protocol depending on routing tables which are maintained at each node and AODV is a reactive protocol, which find a route to a destination on demand, whenever communication is needed. Performance metrics such as End to End delay, throughput and packet drop ratio, in both DSDV and AODV routing protocols is considered, we conclude that DSDV is best suited for only smaller networks and AODV is suited for large network.

INTRODUCTION:

An ad-hoc network is nothing but collection of wireless hosts forming a temporary network without any centralized administration. While mobile ad-hoc network (MANET)is nothing buta self-organizing and self-configuring multihop wireless networks having dynamic nature due to mobile network[4]. Here nodes in wireless network not only act as hosts but also routers [3]. This paper is arranged as (A) contains challenges in MANET,(B) explains classification of routing protocol in MANET,(C) explains selected routing protocols ,(D) in nothing but conclusion.

A)   Challenges in MANET:

1)   Asymmetric links:
In wired network there is symmetric links present but this is not the case in wireless ad-hoc network. For example in MANET, if node A sends a signal to node "B", it does not say anything about quality of connection in reverse direction [5].

2)   Routing Overhead:
In wireless ad-hoc network, nodes are dynamically changing its position so most of the routes become outdated with time which leads to increase in control packets in network to maintain connectivity in the network.

3) Interference:
This is major problem in MANET, as link between nodes connects and breaks depending upon transmission characteristics. As one transmission might interfere with other, one might overhear other transmission and can corrupt the transmission.

4)Dynamic Topology:
As in MANET, topology is changing frequently, updating routing table should also be frequent. For example in fixed wired network, routing tables are updated for every 30 sec.[5]

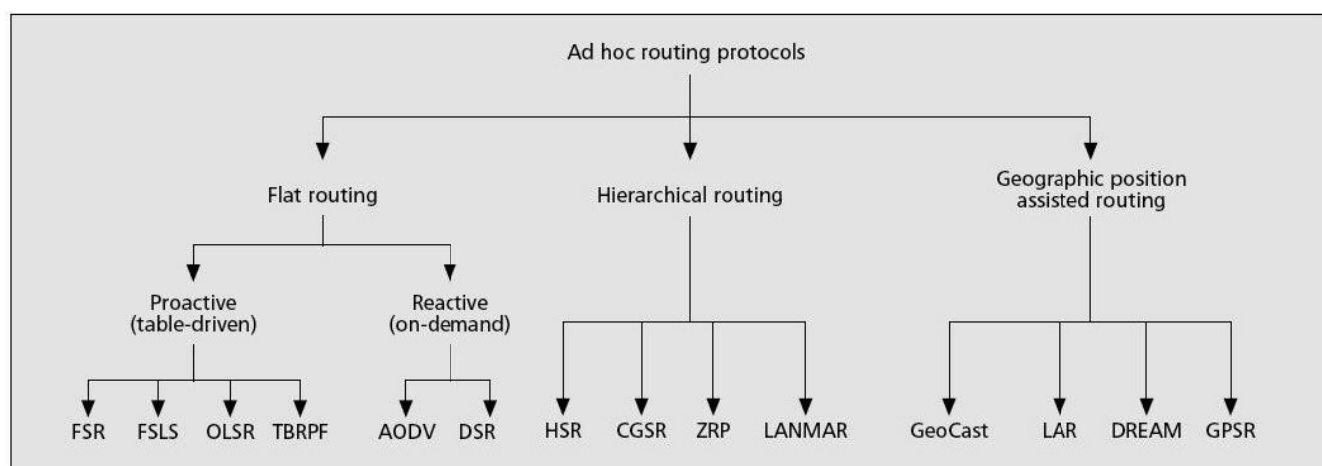### B)   Classification of Routing Protocol in MANET

Figure-1:Classification of Routing Protocols in Mobile Ad-hoc Networks

Classification of routing protocol can be done on bases of routing strategy and network structure.

Routing Based on routing Strategy-Here the routing protocol can be table drive and source initiated

1)Table Driven-It is also called as proactive protocols since routing information in maintained even before it is needed [10]. Every node in network maintains routing information of every node in network. Many of this routing protocolcome from link state routing. In link state routing protocol, a router does not provide information about destination but about topology of the network. Whether the link is in active state or the inactive state, this information is flooded throughout the network and then every router in the network then builds its own picture of the current state of all the links in the network.

The proactive protocols are not suitable for larger networks, as they need to maintain node entries for each node in the routing table of every node. This causes more overhead in the routing table leading to consumption of more bandwidth.

2) Source Initiated-Here routes are created only when these routes are need i.e. on demand [9]. As name suggest, need for route is initiated by source. This process is completed once route is found or all permutation is applied and there is route maintenance procedure to keep up the valid route.

Network structure strategy- Here the routing protocol can be flat,hierarchical and geographical.

1) Fat Routing-In flat routing, routing information is distributed to all routers that are connected to each other.

2) Hierarchical Routing-Here network is divided into number of clusters and cluster is further is divided into regions. Each region contains routers.

Geographical Routing-Here routing is done based on geographical information.

A)   Overview of selected MANET Protocols

1)   Destination Sequenced Distance Vector Protocol(DSDV)

It is proactive protocol based on modification of conventional Bellman-ford routing algorithm,which adds new attribute such as sequence number,to each route table entry at each node. Routing table is maintained at each node. This protocol was motivated for the use of data exchange along changing and arbitrary paths of interconnection which may not be close to any base station. Periodic transmission of updates of routing tables helps in maintaining the topology. In case of any new significant change for routing information, updates are done immediately i.e. event based. DSDV protocol requires each mobile node in the network to advertise its own routing table to its current neighbors. The advertisement is done either by broadcasting or by multicasting.

It is a distance vector protocol, the router simply forwards the packet to the neighboring host

(or destination) with the available shortest path in the routing table and assumes that the receiving router will know how to forward the packet beyond that point [1].

The data broadcast by each node will contain its new sequence number and the following information for each new route:

The data broadcast by each node will contain its new sequence number and the following information for each new route:

Destination Address	Hop count	new sequence number, originally stamped by the destination

Operation of DSDV at Layer -2:
To avoid broadcast and save bandwidth which is required to find IP address for corresponding MAC address at layer-3,solution is to provide information of layer-3 at layer-2 itself [2].
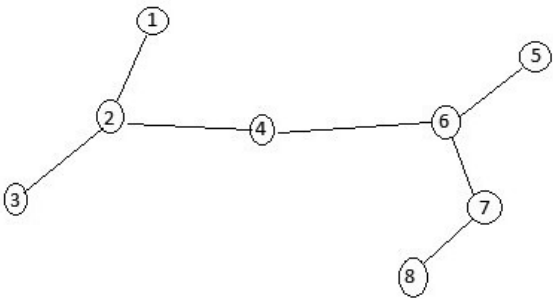
Figure 1: Movement of Mobile host in AdhocNetworks.

Consider the above fig. 1 which has 8 hosts in the network. We will have a look at the changes to the Node4 routing table with reference to the movements of Node1.

Initially, all the nodes advertise their routing information to all the nodes in the network and hence the routing table at Node4 initially looks like Table-1

Destination	Next Hop	Metric	Sequence Number	Install	Stable Data
Node1	Node2	2	S406 Node1	T001 Node4	Ptr1 Node1
Node2	Node2	1	S128 Node2	T001Node4	Ptr1 Node2
Node3	Node2	2	S564 Node3	T001 Node4	Ptr1 Node3
Node4	Node4	0	S710 Node4	T001 Node4	Ptr1 Node4
Node5	Node6	2	S392 Node5	T001 Node4	Ptr1 Node5
Node6	Node6	1	S076 Node6	T001 Node4	Ptr1 Node6
Node7	Node6	2	S128 Node7	T001 Node4	Ptr1 Node7
Node8	Node6	3	S050 Node8	T001 Node4	Ptr1 Node8

Table-1: Initially routing table at node-4

And the forwarding table at the Node4 would look like this Table-2:

Destination	Metric	Sequence Number
Node1	2	S406 Node1
Node2	1	S128Node2
Node3	2	S564 Node3
Node4	0	S710 Node4
Node5	2	S392 Node5
Node6	1	S076 Node6
Node7	2	S128 Node7
Node8	3	S050 Node8

Table-2: Forwarding table at the Node4.

But, when the host Node1 moves its location as shown in the fig. 1 nearer to Node7 and Node8 then, the link between Node2 and Node1 will be broken resulting in the assignment of infinity metric at Node2 for Node1 and the sequence number will be changed to odd number in the routing table at Node2. Node2 will update this information to its neighbor hosts. Since, there is a new neighbor host for Node7 and Node8; they update their information in the routing tables and they broadcast. Now, Node4 will receive its updated information from Node6 where Node6 will receive two information packets from different neighbors to reach Node1 with same sequence number, but different metric. The selection of the route will depend on less hop count when the sequence number is the same. Now the routing table will look like Table-3.

Destination	Next Hop	Metric	Sequence Number	Install	Stable Data
Node1	Node6	3	S516 Node1	T001 Node4	Ptr1 Node1
Node2	Node2	1	S238 Node2	T001 Node4	Ptr1 Node2
Node3	Node2	2	S674 Node3	T001 Node4	Ptr1 Node3
Node4	Node4	0	S820 Node4	T001 Node4	Ptr1 Node4
Node5	Node6	2	S502 Node5	T001 Node4	Ptr1 Node5
Node6	Node6	1	S186 Node6	T001 Node4	Ptr1 Node6
Node7	Node6	2	S238 Node7	T001 Node4	Ptr1 Node7
Node8	Node6	3	S160 Node8	T001 Node4	Ptr1 Node8

Table-3: Routing Table of node4 after change in position of node1.

Destination	Metric	Sequence Number
Node1	3	S516 Node1
Node2	1	S238 Node2
Node3	2	S674 Node3
Node4	0	S820 Node4
Node5	2	S502 Node5
Node6	1	S186 Node6
Node7	2	S238 Node7
Node8	3	S160 Node8

Table-4: Forwarding Table after change in position of node1.

Advantages of DSDV
--DSDV protocol guarantees loop free paths[6].
 Count to infinity problem is reduced in DSDV[6].
 We can avoid extra traffic with incremental updates instead of full dump updates.
 Path Selection: DSDV maintains only the best path instead of maintaining multiple paths to every destination. With this, the amount of space in routing table is reduced.

Limitations of DSDV
-There is wastage of bandwidth due to unnecessary advertising of routing information even if there is no change in the network topology.[7]
 DSDV does not support Multi path Routing.
 It is difficult to determine a time delay for the advertisement of routes.[8]
 It is difficult to maintain the routing table's advertisement for larger network. Each and every host in the network should maintain a routing table for advertising. But for larger network this would lead to overhead, which consumes more bandwidth.

2) Ad-hoc On Demand Distance Vector(AODV)-
In distance vector, routers tell how far it thinks the destination is and also tell direction to reach there. When router receives this information if forms routing table with following entries.

Destination addresses	Next Node	Hop count	Sequence Number

from above information then select the shortest route to the destination. Using a distance vector protocol, the router simply forwards the packet to the neighboring host (or destination) with the available shortest path in the routing table and assumes that the receiving router will know how to forward the packet beyond that point.

It is improvement of DSDV,but AODV is reactive protocol. It reduces number of broadcast by creating routes in demand. That is if any source wants to send packets to a destination, it broadcast a route request packet(RREQ).The neighboring nodes in turn broadcast packets to its neighbor till it reaches its destination. During this forwarding process,intermediate nodes are recorded from which first copy of packet is reached. This record is stored in their route tables,which helps for establishing a reverse path. If additional copies of the same RREQ are received later on, they are discarded. The replay is send using reverse path. For route maintenance,when a source nodes moves,it can re-initiate a route discovery process. In case of link failure in the path,source node is informed and source node may decide to re-discover route.

When a node (say, source node 'S') has to communicate with another (say, destination node 'D'), it increments its broadcast-id and initiates path discovery by broadcasting a route request packet RREQ to its neighbors. The RREQ contains the following fields:

source-address	source-sequence# -to maintain freshness info about the route to the source.	Broadcast-id-unique for each broadcast	destination-address	destination-sequence# - specifies how fresh a route to the destination must be before it is accepted by the source.	hop-count

The (source-address, broadcast-id) pair is used to identify the RREQ uniquely. Then the dynamic route table entry establishment begins at all the nodes in the network that are on the path from S to D.

RREP has following format

source address	destination address-	destination sequence number-Time stamp generated by destination node	hop count	lifetime

Working of AODV at intermediate nodes:

If an intermediate node has a route entry for the desired destination in its routing table, it compares the destination sequence number in its routing table with that in the RREQ. If the destination sequence number in its routing table is less than that in the RREQ, it rebroadcasts the RREQ to its neighbors. Otherwise, it unicasts a route reply packet to its neighbor from which it was received the RREQ if the same request was not processed previously (this is identified using the broadcast-id and source-address). Once the RREP is generated, it travels back to the source, based on the reverse path that it has set in it until traveled to this node. As the RREP travels back to source, each node along this path sets a forward pointer to the node from where it is receiving the RREP and records the latest destination sequence number to the request destination. This is called Forward Path Setup.

An intermediate node update its routing table when it receives another RREP, it checks its destination sequence number and propagates new RREP only if
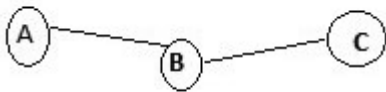
- Destination sequence number is greater, OR

If the new sequence number is same and hop count is small,

OR Otherwise, it just skips the new RREP.

This ensures that algorithm is loop-free and only the most effective route is used.

Suppose Node "A "wants to send data to Node "C" as shown in following figure.

Step1

Node A – generates RREQ packet <A,1,1,C, ,0> and broadcast to its neighbor nodes. Here hope count is zero since RREQ is generated by source node "A".

Step2

Node B- receives RREQ from Node "A". Node "B" checks RREQ 's sequence number. If route is present in "B" routing table which has greater sequence number then node "B" generates RREP to its originator. Otherwise node "B" just increments hoop count in RREQ packet and broadcast to its neighbor <A,1,1,C, , 1> and also makes entry in its routing table

Routing table of Node"B"

Destination node	Next node	Hop count	Sequence Number
A	A	1	1

This step is repeated any number of intermediate nodes.

Step3

Same process takes place at node"C" as in step no.2. When node"C" receives RREQ packet from node "B", node "C" finds that it is request for him itself and node "C" generates RREP<C,A,140,0> .

Routing table of Node"C"

Destination node	Next node	Hop count	Sequence Number
A	B	2	1

In reverse path from C-B-A goes through following steps.

Step1

Node "C" broadcast RREP to its neighbor (i.e. "B")

Step 2

When node" receives RREP from node "C" ,it makes entry in its routing table with incremented hop count. And RREP <C, A, 140, 1> re-broadcast-ed. Records the latest destination sequence number to the request destination. This is called **Forward Path Setup**.

Routing table of Node"B"

Destination node	Next node	Hop count	Sequence Number
A	A	1	1

Step 3

When node "A" receives RREP and increments hop count and makes entry in its routing table.

Routing table of Node "A"

Destination node	Next node	Hop count	Sequence Number
C	B	2	140

Advantage of AODV:

Because of its reactive nature, AODV can handle highly dynamic behavior of Vehicle Ad-hoc networks.
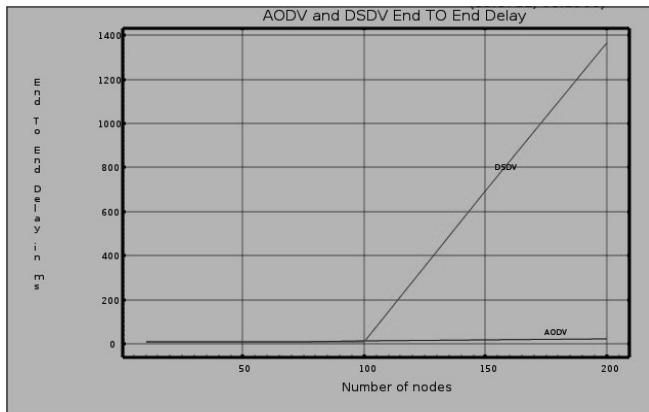
Used for both unicasts and multicasts using the 'J' (Join multicast group) flag in the packets.

Disadvantages of AODV:

Requirement on broadcast medium: The algorithm expects/requires that the nodes in the broadcast medium can detect each other's broadcasts.

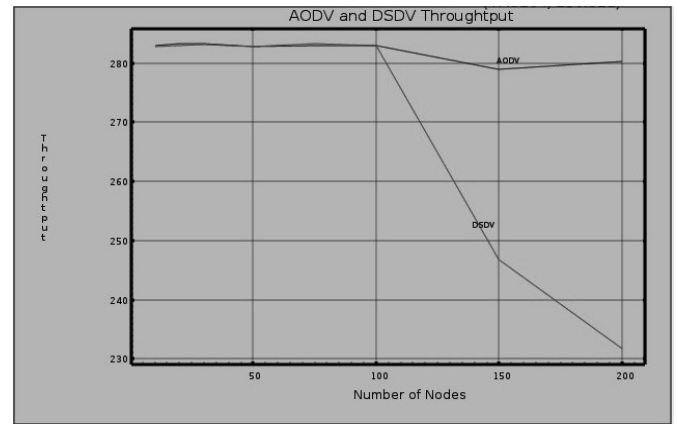We have done simulation in NS 2.34 using following Parameters:

Parameters	Values
Routing Protocol	AODV, DSDV
Simulation Area	500m X 500 m
Simulation Area	600 sec
Number of Nodes	10,20,30,50,75,100,150,200
Queue Length	100
Queue Type	Priority Queue
Mobility Models	Random WayPoint Mobility Model
Pause Time	10 sec
Speed	1.5 meter/sec
CBR Traffic	Agent -UDP, Packet Size-512 , Max packet Size-1000, Send rate-8 mbps, Maximum Connection-9
Mac_Protocol	802_11

Graph-2:Throughput in AODV and DSDV Routing protocols
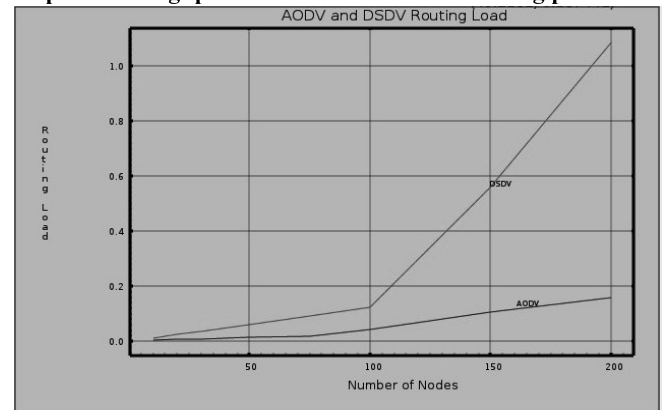
Graph-3: Routing Load in AODV and DSDV Routing protocols

is better than DSDV as it doesn't maintain any routing tables at nodes which results in less overhead and more bandwidth. It can be assumed that DSDV routing protocols works better for smaller networks but not for larger networks. So, conclusion is that, AODV routing protocol is best suited for general mobile ad-hoc networks as it consumes less bandwidth and lower overhead when compared with DSDV routing protocol.

Application of DSDV:
DSDV routing protocol is better to be used in small hotels and cafeteria area where rush is less.

Application of AODV:
AODV routing protocol is better to be used in Shopping Mall and Airport area where rush of people is more.


Graph-1:End to End Delay in AODV and DSDV Routing protocols

CONCLUSION :

Graph-1, Graph-2, Graph-3 reveals that, DSDV routing protocol consumes more bandwidth, because of the frequent broadcasting of routing updates. While the AODV

Number of Nodes	End To End Delay	Throughput	Routing Load
Less than(>)100	Both AODV And DSDV routing protocol have same performance	Both AODV And DSDV routing protocol have same performance	Both AODV And DSDV routing protocol have same performance
Greater than(<)100	AODV routing protocol have far better performance	AODV routing protocol have far better performance	AODV routing protocol have far better performance

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PERFORMANCE ANALYSIS OF SVM CLASSIFIER FOR RECOGNITION OF MARATHI HANDWRITTEN LEGAL AMOUNT WORDS ON BANK CHEQUES

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ABSTRACT : Marathi is one of the official language used in Maharashtra and 4th widely used language in India. In the state of Maharashtra official forms and documents are filled using Marathi language. The documents like handwritten bank cheques, postal addresses and government documents can be written in Marathi. Recognition of Handwritten Marathi words will help for digitization of these documents.A dataset containing 3510 handwritten legal amount words written in Marathi languages (Devanagari script) is presented in this paper along with a three feature extraction techniques with SVM classifier to recognize handwritten legal amounts present on Indian bank cheques.

Keywords- Image Processing,Zernike Moments, Zone based feature recognition,SURF Features,SVM etc.

LITURATURE REVIEW

An automatic bank cheque reading system can save time as a large number of cheques have to be processed every day in a bank. From last few decades the success achieved in character recognition can further proceed for word recognition.The recognition of handwritten information and theverification of signatures present on bank cheques still remaina challenging problem in document image analysis [2–4].To save processing cost and time consumed for cheque clearance many countries aroundthe world have implemented cheque truncation systems (CTS) [9]. Banks are sending physical cheques to home branches because of this the system became more time consuming so instead of sending a physical cheque for clearance, the presenting bank captures the image and this digital form of cheque will go through variousclearing steps, and the transactionwill be settled based on the cheque information. The cheque images can be colored, black and white or grayscale. While in image processing black and white images do not reveal all the subtle features that are there on the cheques. Color images increase storage and network-bandwidth requirements. So itwas decided in countries like India that the electronic images of truncated cheques will be in grey-scale technology [5]. In United States after an image of a cheque is transmitted electronically, those banks that cannot processthe image electronically can print the image replacement document, which is then processed similar to a traditional cheque [6]. In India, under the cheque truncation system , after capturing the image, the paper cheque would be stored with the presenting bank. In case the beneficiary or any other connected persons require the instrument, the payee bank could issue a paper copy of the image return document (IRD), under its authentication. IRD has become a legally recognized replacement of the original cheque for re-presentment [5].

INTRODUCTION:

Languages like Hindi, Marathi, Nepali, Sanskrit ,Konkani are used Devanagari script for writing. Hindi and Marathi are most popular languages in India. Official paper documents like envelops ,bank cheques, railway reservation forms, application forms etc people use local language. Marathi language is the official language of the Indian state of Maharashtra, which is one of the biggest states in the country [9]. The script is written from left to right to form meaningful sentence and has 34 consonants , 13 vowels, and 14 modifiers. Devanagari has only one style of writing. A header line called 'shirorekha' is used to write words.
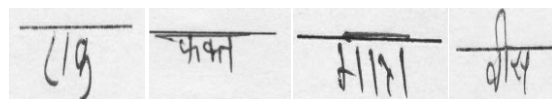

Figure. 1. Sample Amount Word

While filling bank cheque fields like date, payee signature, courtesy amount and legal amount are mandatory to fill. Total 118 words are used to write amount on bank cheques.The amount on a cheque is written in two ways in two different places. The first area(legal) contains the amount written in words and the second area (courtesy) contains the amount written in numerals. It is considered that the amount recognition has to rely on both courtesy and legal amount recognition.This paper mainly deals with the feature extraction of legal amounts. Three types of approaches are used to extract features for word.

IMPORTANT FEILDS OF BANK CHEQUE

Reserve Bank of India (RBI) has some predefined structure for the bank cheques. As clearance of bank cheques is time consuming process , RBI designed new cheques which has MICR code at the bottom.

Form 1st-Jan-2013 RBI replaces and closes all old cheques to the new one having MICR scan code.

Following things are important while writing cheques.

I. Date Verification

As cheque has validity of 6 months only from the date of which is mentioned on the cheque. So date verification is important task of automatic cheque processing system.

II MICR Code Recognition

MICR stands for Magnetic Ink Code Recognition and this code is available for each branch of bank. To know the home branch of payee account we have to recognize MICR code.

III Signature Verification

To cross check whether the signature is authorized signature or not signature verification plays an important role.
IV. Amount Recognition and Verification

The amount on bank cheques can be accepted in two forms
A.   Legal Amount (Written in words)
B.   Courtesy Amount (Written in digit)

The majority of fraud can be possible on amount. So it is necessary to recognize amount first. And then send cheque for clearance.

III LEGAL AMOUNT WORD RECOGNITION

The legal amount is amount written on bank cheques in words. The higher priority is given to legal amountthan the corresponding courtesy amount. as it is difficult to modify. It is a big challenge to recognition legal amount presenton a bank because of the structuralcomplexity of characters and variability of writing styles.There are mainly two types of approaches used for handwrittenlegal amount word recognition: global (holistic) and analytical (local). In analytical approaches, each handwrittenword of the legal amount is recognized by recognizing its constituent characters [9]. For the same, a word is segmented into components like characters or graphemes (part of a character) first. Analytical approaches can still be divided into full character recognition methods and sub-characters recognition method. In global approaches of recognition, the entire image (word) is considered as a single unit (or pattern), and recognition is done without any sort of character-level segmentation. Various techniques for therecognition of handwritten words can be found in the surveys.

Legal amount Word preprocessing involves the following steps
1) Word Extraction from Scanned Document.
2) Binarization.
3) Background Noise removal.
4) Skeletonization.

In this paper comparison of three different feature extraction techniques has been done. The classifier used for classification is SVM.

1)   Zone Based Feature Extraction
2)   Zernike Moments
3)   SURF Features

1) Zone Based Feature Extraction

In this method Universe of Discourse is calculated first. Here Universe of discourse is defined as the shortest matrix that fits the entire word. The Universe of discourse is selected because the features extracted from the word image include the positions of different line segments in the image. So every image should be independent of its Image size.

After the universe of discourse is selected, the image is divided into zones of equal size, and the feature isrecognized on individual zones. For the system implemented, two typesof zoning were used. The image was zoned into 6 equal sized zones. Feature extraction was applied to individual zonesrather than the whole image. This gives more information about fine details of word skeleton. As a single word may have many variations in writing when it is written by different users it may occur different line segments in a word skeleton which may becomes afeature if zoning is used. This is because, a particular linesegment of a word occurs in a particular zone in almostcases. To traverse the entire zone in the skeleton certain pixels are defined as starters, intersections and minor starters.
The features like corner detection, filled area by pixel and the ratio of filled area with the empty area that is solidity are considered.

$$Solidity = (Pixels\ in\ zone) / (Total\ pixels\ in\ zone)$$

For N zones, there will be 6N elementsin feature vector for each zone. For the system proposed, theoriginal image was first zoned into 6 zones by dividing theimage. After zonal feature extraction, following features were extractedfor the entire image based on the regional properties

a) Corner Detection: Various methods are available for corner detection. Harris corner detection is used to detect the corners.
b) Regional Area: It is defined as the the actual number of pixels in the region.
c) Solidity: It is defined as the proportion of the pixels in the convex hull that are also in the region. Computed asArea/ConvexArea. Where convexarea is the the number of pixels in the image considering its convex hull.

The feature set contains all these 3 fields with 6 different zones.

2) SURF Features

Speeded Up Robust Features (SURF) can work as both a local feature detector and descriptor whichcan be used for tasks such as object recognition orregistration or classification or 3D reconstruction. It is inspired by the scale-invariant feature transform(SIFT) descriptor. The standard version of SURF is several times faster than SIFT and claimed by its authors to be more robust against different image transformations than SIFT.SURF uses an integer approximation of the determinant of Hessian blob detector. The Hessian blob can be computed with 3 integer operations using a precomputed integral image. Haar wavelet is used to detect feature. Its feature descriptor is based on the sum of the Haar waveletresponse around the point of interest.
In SURF, square-shaped filters are used   formed. These

square shapes are generated on the basis of an approximation of Gaussian smoothing. Filtering the image with a square is

Some sample word result are compared in the following table.The percentage of recognition is given.

SR.No	Word Images	Zone Based Recognition Rate	SURF Recognition Rate	Zernike Moment Recognition Rate
1	पंच्यालत्तर	84%	87%	85%
2	हेजार	97%	87%	87%
3	फक्ता	87%	94%	97%
4	मारा	92%	94%	90%
5	आठशे	90%	91%	84%
6	सहा	92%	94%	80%
7	दहा	87%	93%	87%
8	अठ्ठावीस	88%	87%	87%
9	सत्तर	80%	85%	82%
10	शंभर	97%	90%	90%

Fig.5.1 Comparison of recognition rate for selected words.

CONCLUSION:

As there are many variations in human handwriting, if handwriting is clear and straight then we can use any feature extraction technique to obtain feature.But if handwriting is poor having skews then SURF Feature extraction will be more suitable option.If there are many variations in person handwriting then Zernike moments are preferred.

The average recognition rate by SVM with Zone base is 89.78 %, SVM with Zernike is 78.26 % and SVM with SURF feature is 83.27 %.

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AN ANALYSIS OF SPOOFING ATTACKS, CAUSES AND PREVENTIONS : CYBER CRIME

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ABSTRACT : The word "spoof" means to trick, or deceive. Therefore, in the IT world, spoofing refers tricking or deceiving computer systems or other computer users. This is typically done by hiding one's identity or faking the identity of another user on the Internet. The main objective of this paper is to enable everyone about spoofing attacks. Spoofing means impersonating another person or computer, usually by providing false information such as e-mail name, URL or IP address. Spoofing can take on many forms in the computer world, all of which involve some type false representation of information. There are a variety of methods and types of spoofing. We would like to introduce and explain some spoofing attacks with their possible prevention techniques in this paper. There are no legal or constructive uses for implementing spoofing of any type. Some of the outcomes might be sport, theft, vindication or some other malicious goal. The magnitude of these attacks can be very severe; can cost us millions of dollars.

Keywords: Spoofing, Filtering, Server, Host,Router, Attacks, ARP,DNS, Web, Domain, Information, URL,Trust, Hacker.

INTRODUCTION:

In networking, the term Spoofing is used to describe a variety of ways in which hardware and software can be fooled. As per the survey in various organizations it has been observed that only 28 percentage users are aware of this cyber crime and 72 percentage are not aware.
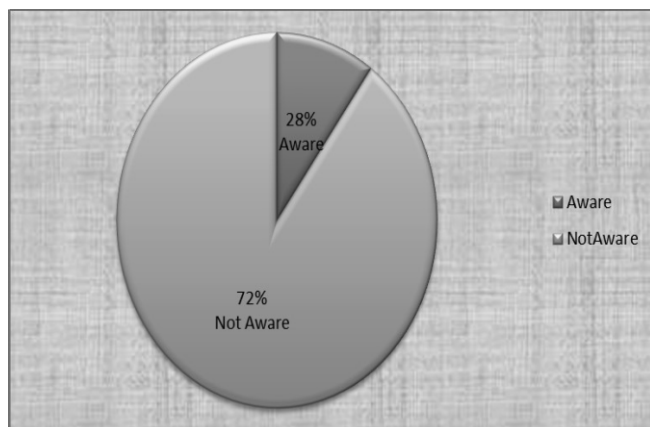

There are a variety of methods and types of spoofing. Here are some introduction and explanation of following types:

IP Spoofing

IP address spoofing is one of the most frequently used spoofing attack methods. IP spoofing is a method of attacking a network in order to gain unauthorized access. The attack is based on the fact that Internet communication between distant computers is routinely handled by routers which find the best route by examining the destination address, but generally ignore the origination address. The origination address is only used by the destination machine when it responds back to the source. In a spoofing attack, the intruder sends messages to a computer indicating that the message has come from a trusted system. To be successful, the intruder must first determine the IP address of a trusted system, and then modify the packet headers to that it appears that the packets are coming from the trusted system. In essence, the attacker is fooling (spoofing) the distant computer into believing that they are a legitimate member of the network. The goal of the attack is to establish a connection that will allow the attacker to gain root access to the host, allowing the creation of a backdoor entry path into the target system.
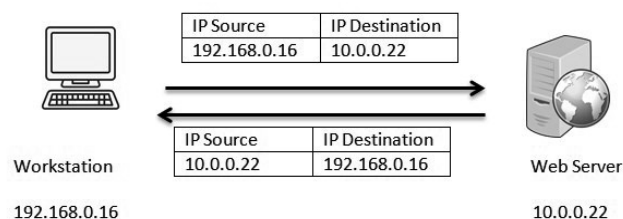
Figure 1: Valid source IP address

Figure 1: Valid source IP address, illustrates a typical interaction between a workstation with a valid source IP address requesting web pages and the web server executing the requests. When the workstation requests a page from the web server the request contains both the workstations IP address (i.e. source IP address 192.168.0.16) and the address of the web server executing the request (i.e. destination IP address 10.0.0.22).The web server returns the web page using the source IP address specified in the request as the destination IP address, 192.168.0.16 and its own IP address as the source IP address, 10.0.0.22.
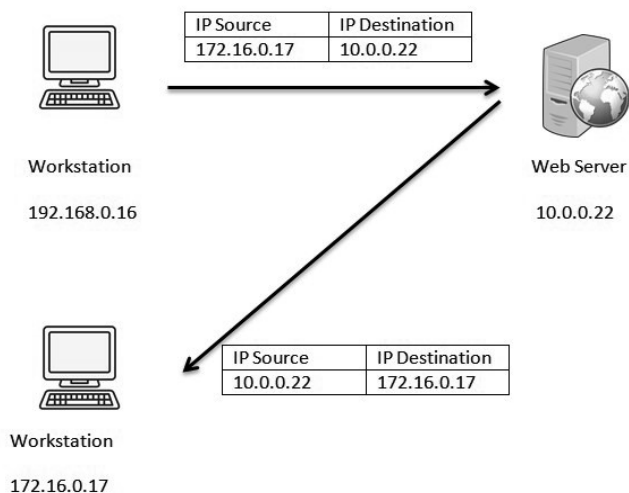
Figure 2: Spoofed source IP address

Figure 2: Spoofed source IP address, illustrates the interaction between a workstation requesting web pages using a spoofed source IP address and the web server executing the requests. If a spoofed source IP address (i.e. 172.16.0.17) is used by the workstation, the web server executing the web page request will attempt to execute the request by sending information to the IP address of what it believes to be the originating system (i.e. the workstation at 172.16.0.17). The system at the spoofed IP address will receive unsolicited connection attempts from the web server that it will simply discard.

One of the major drawbacks with IP Spoofing is that the workstation never gets the responses from web server. This is completely blind attack, much experience and knowledge of what to expect from the target's responses is needed to successfully carry out his attack.These are attacks that relate massive amounts of information being sent to computers over a network in an attempt to crash the full network.
The hacker does not get caught because the origin of the messages cannot be determined due to the false IP address.Some of the most common ways to avoid this type of attack is to disable source-routed packets and to disable all external incoming packets with the same source address as a local host.

E-Mail Spoofing

E-Mail Spoofing, a spoofed email is one that appears to originate from one source but actually has been sent from another source. This can also be termed as E-Mail forging. The main goal of the attacker in this case is to interrupt the victim's e-mail service by sending him a large number of emails.E-mailspoofing can be used for malicious purposes such as spreadingviruses, trawling for sensitive business data and otherindustrial espionage activities. E-mail spoofing is a tactic used in phishing and spam campaigns because people are more likely to open an email assuming that mail has come from trusted source.
If you receive a snail mail letter, you look to the returnaddress in the top left corner as an indicator of where it originated. However, the sender could write any name andaddress there, you have no assurance that the letter really is from that person and address. E-mail messages contain returnaddresses too, but they can likewise be deliberately misleading, or "spoofed." Senders do this for various reasons,like:

• The e-mail is spam and the sender doesn't want to besubjected to anti-spam laws
• The e-mail contains a virus or Trojan and the sender believes you are more likely to open it if it appears to be from someone you know
• The e-mail constitutes a violation of some other law(for example, it is threatening or harassing)
• The e-mail requests information that you might bewilling to give to the person the sender is pretending tobe (for example, a sender might pose as yourcompany's system administrator and ask for yournetwork password), as part of a "social engineering"attack
• The sender is attempting to cause trouble for someoneby pretending to be that person (for example, to makeit look as though a political rival or personal enemysaid something he/she didn't in an e-mail message)

I Case: Reported in October 2013, an e-mail which looked like it was from the Swedish company Fingerprint Cards was sent to a news agency, saying that Samsung offered to purchase the company. The news spread and the stock exchange rate surged by 50%. It was later discovered the e-mail was a fake.

ARP spoofing

In computer networking, ARP (Address Resolution Protocol), a protocol that is used to resolve IP addresses to MAC (Media Access Control) addresses for transmitting data. ARP spoofing is a technique by which an attacker sends falsified (spoofed) Address Resolution Protocol (ARP) messages over a local area network. Generally, the aim is to associate the attacker's MAC address with the IP address of another host, such as the default gateway, causing any traffic meant for that IP address to be sent to the attacker instead. A table called ARP cache is used to maintain relationship between every MAC address and corresponding IP address. ARP spoofing may allow an attacker to intercept data frames on a network, modify the traffic, or stop all traffic. ARP spoofing attacks can also be used to facilitate other types of attacks, including denial-of-service, session hijacking attacks, man in the middle. The attack can only be used on networks that use the Address Resolution Protocol, ARP spoofing attacks can only occur on local area networks that utilize the Address Resolution Protocol. So, ARP spoofing is a type of attack in which a malicious actor sends falsified ARP (Address Resolution Protocol) messages over a local area network. This results in the linking of an attacker's MAC address with the IP address of a legitimate computer or server on the network. Once the attacker's MAC address is connected to an authentic IP address, the attacker will begin receiving any data that is intended for that IP address. ARP spoofing can enable malicious parties to intercept, modify or even stop data in-transit.
The effects of ARP spoofing attacks can have serious implications for enterprises. In their most basic application, ARP spoofing attacks are used to steal sensitive information.
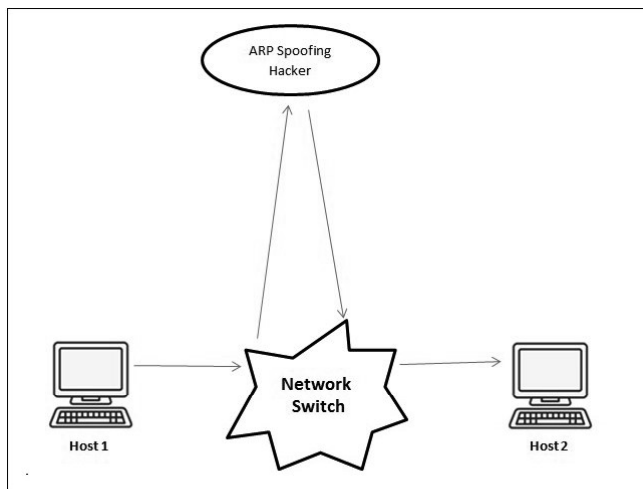
Figure 3

Figure 4

When an incoming packet from host 1 comes on particular local area network the gateway asks ARP program to find a physical host (MAC address) that matches the IP address. The ARP program looks in the ARP cache and finds the address of the destination ARP provides the protocol rules for making this correlation and providing address conversion in both directions. In the local area network ARP spoofing Hacker attempt to hijack the packet which is come from source.

DNS Spoofing

The Domain Name System (DNS) is a system that associates domain names with IP addresses. DNS is a protocol used to map human readable domain names to computer readable Internet Protocol (IP) addresses. DNS is essential to the operation of all IP networks, particularly the Internet. Most internet services rely on DNS to work. DNS Spoofing is one of the more dangerous attacks as it is very difficult to detect as In DNS server spoofing attack, a malicious party modifies the DNS server in order to reroute a specific domain name to a different IP address. In many cases, the new IP address will be for a server that is actually controlled by the attacker and contains files infected with malware. DNS server spoofing attacks are often used to spread computer worms and viruses. Using these techniques, an attacker may insert IP address information that will redirect a customer from a legitimate website or mail server to one under the attacker's control   thereby capturing customer information through common man-in-the-middle mechanisms.

DNS spoofing is another one of the man-in-the-middle attacks that can force victims to navigate to a fake website showing it is real website. In DNS spoofing fake DNS information to a victim in response to their DNS request and, as a result, forcing them to visit a site which is not the real one.

For example, suppose the user requests the IP address of www.gmail.com, which is supposed to be XX.XX.XX.XX. But the attacker will give response to the DNS query before the actual response arrives with a spoofed address of YY.YY.YY.YY. The user's system will make a connection request to YY.YY.YY.YY, thinking that www.gmail.com is located at that IP address. So effectively, the user is routed to a completely different site from the one which he or she originally intended to visit.
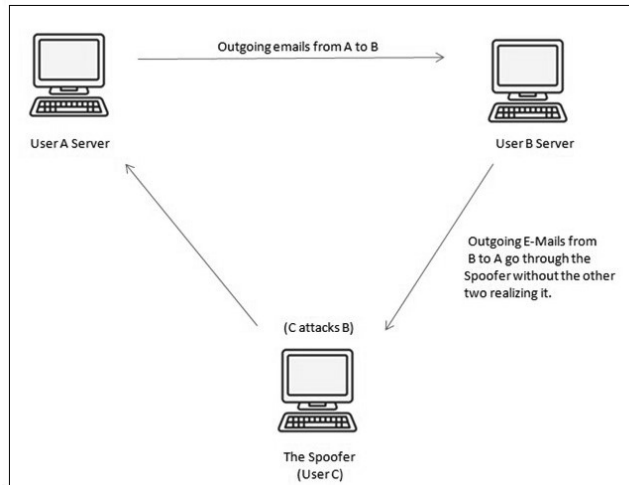
In the above diagram user A's server sending an e-mail to the user B's sever. For example if user A request to the user B to send an amount of $1000 to his account. Meanwhile user C (the spoofer) attack and hijack message from user A without the other two realizing it. User C will send e-mail to the user A to transfer an amount to his account. User C gains access to outgoing e-mails from user B. This is called DNS spoofing.

Web Spoofing

Web spoofing is a means of tricking users to connect to a different Web server than they intended. Web spoofing may be done in a number of ways. It can be done by simply providing a link to a fraudulent Web site that looks legitimate, or involve more complex attacks in which the user's request or Web pages requested by the user are intercepted and altered.

One of the more complex methods of Web spoofing involves an attacker that is able to see and make changes to Web pages that are transmitted to or from another computer (the target machine).These pages can include confidential information such as credit card numbers entered into online commerce forms and passwords that are used to access restricted Web sites. The changes are not made to the actual Web pages on their original servers, but to the copies of those pages that the spoofer returns to the Web client who made the request. So, Web Spoofing is an attack that allows someone to view and modify all web pages sent to a victim's machine. They are able to observe any information that is entered into forms by the victim. This can be of particular danger due to the nature of information entered into forms, as said above addresses, credit cardnumbers, bank account numbers, and the passwords that access these accounts.

Web Spoofing works on both Internet Explorer and Netscape and is not necessarily prevented by secure connections. This is due the way that the SSL protocol uses certificates to authenticate websites. The attacker can observe and modify all web pages and form submissions, even when the browser is indicating that there is a secure

1

connection. The attack can be implemented using JavaScript and Web server plug-ins, and works in two parts. First, the attacker causes a browser window to be created on the victim's machine, with some of the normal status and menu information replaced by identical-looking components supplied by the attacker. Then, the attacker causes all Web pages destined for the victim's machine to be routed through the attacker's server. On the attacker's server, the pages are rewritten in such a way that their appearance does not change at all, but any actions taken by the victim (such as clicking on a link) would be logged by the attacker. In addition, any attempt by the victim to load a new page would cause the newly loaded page to be routed through the attacker's server, so the attack would continue on the new page. The attack is initiated when the victim visits a malicious Web page, or receives a malicious email message.Current browsers do not prevent Web Spoofing, and there seems to be little movement in the direction of addressing this problem. We believe that there can be no secure electronic commerce on the Web until the Web Spoofing vulnerability has been addressed.
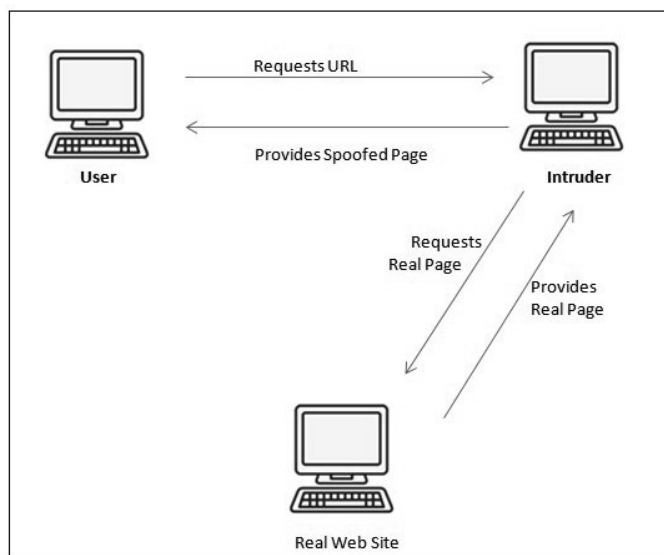

Figure 5

Attacker creates false copy of the site. Attacker steals personal information such as login ID, credit card, bank account, and much more. The false web looks and feels like the real one. Web spoofing increasing at rapid space. According to study Gartner research two million user gave such information to spoofed web sites. About $1.2 billion direct losses to U.S. bank and credit card issuers in 2003 and about $400 million to $1 billion losses from the victims.

Preventions and Mitigation of Spoofing Attack
There are many ways and practices that we can employ to reduce the threat of spoofing attacks:

• **Packet filtering:** Packet filtering is the best method to avoid various spoofing attacks. Packet filters inspect packets as they are transmitted across a network. Packet filters are useful in IP address spoofing attack prevention because they are capable of filtering out and blocking packets with conflicting source address information. In packet filtering the router that connects a network to another network is known as border router. It is one way to prevent threat of IP spoofing by checking packets when they leave and enter a network. If this type of filtering were performed on all border routers, IP address spoofing will greatly reduce.

• **Use cryptographic Methods:** This is one of the methods to detect IP-spoofing. In this method all network traffic to be encrypted or authenticated. While several solutions exist, it will be a while before such measures are deployed. Use cryptographic signatures to exchange authenticated email messages. Authenticated email provides a mechanism for ensuring that messages are from whom they appear to be, as well as ensuring that the message has not been altered in transit. Transport Layer Security (TLS), Secure Shell (SSH), HTTP Secure (HTTPS) and other secure communications protocols bolster spoofing attack prevention efforts by encrypting data before it is sent and authenticating data as it is received.

• **Use spoofing detection software:** There are many programs available that help organizations detect spoofing attacks, particularly ARP spoofing. These programs work by inspecting and certifying data before it is transmitted and blocking data that appears to be spoofed. Spoofing detection software available such as XArp(Advanced ARP spoofing detection).

• **Avoid trust relationships:** Organizations should develop protocols that rely on trust relationships as little as possible. It is significantly easier for attackers to run spoofing attacks when trust relationships are in place because trust relationships only use IP addresses for authentication. In short avoid trust relationship from unknown person because it may be the attacker usually happens in social engineering.

• **Enable router:** Enable encryption sessions on our router so that trusted hosts that are outside your network can securely communicate with our local hosts.

• **Educating users:** Educate your users about your site's policies and procedures in order to prevent them from being "social engineered," or tricked, into disclosing sensitive information (such as passwords).

• **Configure mail delivery domain:** Configure your mail delivery domain to prevent someone from directly connecting to your SMTP port to send spoofed email to other sites.

• **Configuring networking devices:** Configure your routers and switches if they support such configuration, to reject packets originating from outside your local network that claim to originate from within.

• **Access Control List:** Use an access control list to deny private IP addresses on your downstream interface.
IF we consider traffic leaving the 120.200.0.0 network the packets should have the source address examined to verify

that they are truly from the 120.200.0.0 network. Any other source address found in a packet leaving the network is invalid and is most likely an attempt by one of the many viruses, worms, or Dos tools that are in the wild to spoof someone else's network address. Border router can be used to halt this traffic just by implementing a access control list(ACL).

CONCLUSION:

Cybercrime is a complex and ever changing phenomenon. Cybercrime does have a drastic effect on the world in which we live. Cyber criminals are becoming more sophisticated and are targeting consumers as well as public and private organizations. It affects every person no matter where they are from. This paper discussed different type's spoofing attacks. Spoofing attack techniques have been improved dramatically over time, especially in the past few years. Certain precautionary measures should be taken by all of us while using the internet which will assist in challenging this major threat Cyber Crime. With the current implementations of spoofing, the networksecurity community needs to be aware of the magnitude andpotential cost of these types of attacks. People can effectivelymaintain patching and monitoring of logs to minimize thepotential damage.Professionals must remain current with the OperatingSystems that we use in our day to day activities. A steadystream of changes and new challenges is assured as the hackercommunity continues to seek out vulnerabilities andweaknesses in our systems and our networks.

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STATISTICAL ANALYSIS OF GEOCHEMICAL PARAMETERS OF GROUND WATER IN THE ARID REGION (KR 22, KR 25, KR 34 AND BM 114 WATERSHEDS) IN SANGLI DISTRICT OF MAHARASHTRA

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ABSTRACT- Several physical and chemical causes are active in changing the composition of the groundwater percolating through the soil and rocks. The watersheds development is proven technology for harvesting good quality water. Thus, in this investigation to analyze the impact of watershed interventions, 48 water samples each has been studied for pre monsoon and post monsoon condition. The statistical summary of 19 hydro-geochemistry parameters has been presented in this research investigation. The values of skewness for pH, Fe and F are negatively skewed which means that the graph of these parameters will be elongated more on the left side i.e. values are more concentrated towards the higher values. The values of kurtosis for NO3/N, F and Na% are negative which means these values have less variation among themselves as compared to other parameters.

INTRODUCTION:

1.1 Mineralogy and Geochemistry of Basalts in the Study area of Deccan Traps-

The study region is falls in the Deccan traps of the Maharashtra. General setup of study region is made up of Jointed Vesicular Basalt (J.V.B).The Drought Prone Region (DPR) of Maharashtra consists of lava flows belonging to the Deccan Traps. In a triangular region between Pune-Buldhana and Dhule compound pahoehoe flows predominate. In matured weathered profiles there is a low and uniform leaching of Si, Mn, P, Cu, Zn. In very matured weathering profile, Ti, V, Cr, Fe, Ni, Zr, and Nb are essentially immobile and tend to accumulate in soils or weathering products (Eggleton, et al., 1987). Weathering of basalts and lithological composition of basalts, thus produces soluble substances that dissolve in water. The movement of these through the lithosphere, hydrosphere and biosphere determines the dominance of particular ions in groundwater. (Duraiswamiet.al.2012).

1.2 Geohydrology-

Basaltic lava flows belonging to the Deccan Traps are the dominant lithology of the DPR. Pahoeheo lava flows predominate in the northern districts of Nandurbar, Dhule, Jalgaon, Buldhana, Aurangabad, Jalna, NashikAhmednagar and Pune while simple aa flows are present in the southern districts of Satara and Sangli. Summaries of hydro-geological aspects of flows from the Deccan Traps have been published byKulkarni et al., (2000). The vesicular crust (vesicular basalt) is the main water bearing horizon in the compound flows. The interconnection between the vesicles and the degree of deposition of zeolites in the vesicles determines the aquifer parameters. In the study region of the KR22, KR25, KR34 and BM 114 of Sangli district watershed lithology is composed of the vesicular basalts.

Hydro-geologically, dyke segments could be 'carriers' or 'barriers' and as such control groundwater movement locally in the DPR. These dykes meet the drinking water as well as agricultural needs of small and marginal farmers in the DPR of Maharashtra. In the study region of the

Sangli district groundwater occurs in the unconfined conditions i.e near to surface weathered or un-weathered vesicular/ fractured zone. Generally shallow dug well and borewells tap the water from semi unconfined aquifers. In the present study the continuous monitoring and recording of ground water level in the 52 dug well have been carried out in eight study Control and Experimental village. The water analysis for April- May, 2010 (Pre- monsoon) and November 2010 (Post Monsoon) have been used in this study.

1.3 Hydro-geochemistry and Ground Water Characteristics in the Study area

Generally the rainwater contains the Carbon dioxide, which is treated as a powerful agent because of its properties to break up the all mineral when it reaches with ground water. The new compounds formed were CO_3, HCO_3, SO_4, Na, K, Ca and Mg, Soluble silicates and free Sio_2

A number of studies have been proved that, several physical and chemical causes are active in changing the composition of the groundwater percolating through the soil and rocks. Evaporation (Generally it is tend to be 7-8 mm/day in the Deccan trap area), Base exchange, adsorption, oxidation of sulphides, and reduction of sulphates cause changes in their chemical composition. Based on the geochemistry about 49 samples were collected and analyzed using APHA-AWWA-(1975) manual for the dug-wells of the study area for the pre- monsoon season (May 2010) and 49 samples for post monsoon (November 2010), the data was presented in Table No.1 and 2.Following parameters have been considered for analysis.

RESULTS AND DISCUSSION :

2.1 pH:-

From the Table No 1 and 2 it is clear that, the pH value in the study dug wells for pre monsoon season ranges from 7.6 to 8.9. The average, median, mode and standard deviation values of pH for all samples in per monsoon season are 8.3, 8.3, 8.4.and 0.29 respectively. In the post monsoon the pH values have been recorded between 7.1 to 8.8., whereas average, median, mode and standard deviation values of pH for all samples in post monsoon season are 8.1, 8.2, 8.3 and

0.34 respectively. The pH values have been correlated with other parameters reveals that, only co_3 have strong correlation with pH values. Observed values have been compiled WHO, ICMR and BSI standards it is observed that, all the values are within limits. A result indicates that water samples are slightly alkaline in nature.

2.2 Conductivity (Ec):-

Conductivity is the capacity of water to carry an electrical current and varies both with number and types of ions in the solutions, which in turn is related to the concentration of the ionized form and hence contribute to conductance. Rough estimation of dissolved ionic contents of water sample can be made by multiplying specific conductance (in u Siemens/cm) by an empirical factor which may vary from 0.55 to 0.90 depending on the soluble components of water and on the temperature of measurement. The EC values in study region ranging from 400 to 2790 micromhos/cm. The average of EC is 1030 micromhos/cm for the pre monsoon (May) season in the study region whereas the average, median, mode and standard deviation values of Ec are 661, 513, 1440 and 378 micromhos/cm respectively. The Ec values ranging between 301 to 2341micromhos /cm for post monsoon season (November) and average, median, mode and standard deviation values of Ec are 909,778,487 and 490 micromhos/cm.

1.3 Total Dissolved Solids (TDS):-

Total Dissolved Solids (TDS) in water predominantly consists of inorganic salts with minor amounts of organic matter. The Pre Monsoon TDS of the ground water of the study area is vary from 256 to 1780 mg/l and averages 660 mg/l.,whereas the median, mode and standard deviation values for TDS are 513,1440 and 378 mg/l respectively for post monsoon.The Post Monsoon TDS of the ground water of the study area is ranging from 249 to 1689 mg/l and averages 597 mg/l., whereas the median, mode and standard deviation values for TDS are 511, 312 and 336 mg/l respectively for post monsoon (November). The TDS values slightly decline in post monsoon season. Groundwater usually has higher TDS concentration than surface water because of the mineral pick up from the soil and rocks.

2.4 Hardness:-

The values of TDS is slightly high than permissible limits. The hardness of the ground water of the study area is ranging from 96 to 972 mg/l and averages 351.4 mg/l., whereas the median, mode and standard deviation values for TDS are 308, 492 and 190.30 mg/l respectively for pre monsoon (May). The TDS values in post monsoon season (November) are ranging between 79 mg/l to 831 mg/l. whereas the median, mode and standard deviation values for TDS (For post Monsoon) are 316, 632 and 190.04 mg/l respectively These values slightly decline in post monsoon season.Groundwater usually has higher TDS concentration than surface water because of the mineral pick up from the soil and rocks.

2.5 Alkalinity:-

In the present study, the total alkalinity of groundwater for pre monsoon season is ranges from 120 to 560 mg/l and averages 260 mg/l.,whereas it is 124 to 549 mg/l for post monsoon season. The alkalinity of groundwater is due to the salts of weak acids and strong bases.

2.6 Calcium:-

Calcium is one of the most abundant cations in the groundwater samples from the area. The calcium concentration in the study area ranges from 8.0 to 330 mg/l. High calcium can be related to plagioclase and augite weathering in basalts. The average, median, mode and standard deviation values ofCa for per monsoon are 83.6, 75.2, 36.8 and 62.91 respectively. High calcium can be related to plagioclase and augiteweathering in basalts. The ca values in the post monsoon are ranging between 11 to 333 mg/l. Average value of Ca is 87.8 mg/l. The median, mode and SD values are 64, 27 and73.66 mg/l respectively.

2.7 Magnesium (Mg): -

The Magnesium concentrations in the groundwater from the study area for pre monsoon (May) are ranges between 6.8 mg/l to 121.50 mg/l Mg are reported. It averages for 34.6 mg/l. The Magnesium concentrations in the groundwater from the DPR are high and groundwater with upto 488 mg/l Mg is reported. Mg concentration for post monsoon period is 5.8 to 127 mg/l, averages for 35.6 mg/l. Median, mode and standard deviation values are 35, 46 and 18.51 mg/l for the post monsoon season have been recorded.

2.8 Percent Sodium (Na %)

Excess sodium in ground waters is responsible for changing soil properties and reducing soil permeability (Kelley, 1951). In natural ground waters sodium normally combines with carbonates to form alkaline soils or it combines with chlorides to form saline soils, both detrimental to plant growth. Sodium content is usually expressed in terms of percent sodium (%Na) which is a sum of sodium and potassium divided by the sum of all major cations in groundwater. The percent sodium from the present study rages from 0 to 410 meql for pre monsoon. According to Ramakrishna (1998) a maximum of 60% sodium in groundwater is allowed for agricultural practices. In the study a total of 96 samples analyzedfor both pre and post conditions. The observed values of sodium percent for post monsoon (November) is ranging between 13 to 410 meql.Median, mode and standard deviation values of Na % are 50, 32 and 91 meql for post monsoon conditions. The percentage of sodium from groundwater is a function of electrical conductivity.

2.9 Chloride (Cl): -

A high chloride contents may harm metallic pipes and structures as well agriculture production. The Cl is recorded between 32 mg/l to 758 mg/l, averages 151.8 mg/l.

2.10 Sulphate:-

The sulphate concentration in the groundwater ranges from 2mg/l to 590 mg/l. These values average of 96.7 mg/l.Total Hardness affects the quality of ground water quality. The range of hardness in the study samples 256 mg/l to 1780 mg/l, which averages for 351.4 mg /l. the value of hardness, is within limit. The resulted values compiled with the various indices of Drinking water, Irrigation and Bureau of Indian Standard.

2.11 Residual sodium carbonate (RSC):-

RSC values are especially useful when the groundwater contain low salinity levels. RSC is calculated using the formula RSC = (CO_3+HCO_3) (Ca+Mg) where all ionic concentrations are expressed in milli-equivalents per

liter. In the study region, most groundwater of samples shows RSC values between 106.8 to 248.2 meq/l with average of 177.5 meq/l for pre monsoon (May) season. The values of RSC for post monsoon season is ranging between 102.2meq/l to 221.5meq/l, with average of 68 meq/l Depending upon the RSC values the groundwater can be classified into three categories i.e. good (<1.25 meq/l), medium (1.25 to 2.50 meq/l) and poor (>2.5 meq/l). Agriculture experts generally consider Residual Sodium Carbonate (RSC) superior to SAR. Most of the water samples analyzed have higher values than permissible limits.

2.12 Sodium Adsorption Ratio (SAR) :-

The SAR of groundwater samples from the study area range from 0.0 to 8.2meql for pre monsoon season (May) season averages for 2.2 meql and SAR values for post monsoon are 0.4 to 8.2meql averages for 1.7meql. The SAR values are generally correlated to EC values for analyzing irrigation quality of water.The analysis for pre monsoon (May)

reveals that, about 35 samples categorized as good and 13 sample as a medium/ fair.

2.13 Iron (Fe):-

The presence of iron in natural water can be attributed to the dissolution of rocks and minerals, acid mine drainage, landfill lechate etc.In the present study iron is estimated by phenalnantroline colorimetric method. The values of Fe for per monsoon season is ranging between 0.1 to 1.4 with average of 0.7 and Fe values for post monsoon season is 0.1 to 1.2 with average of 0.7. The Fe values for both pre and post season have been compiled with WHO, ICMR and GSDA standards, the values found within limits.

2.14 Salinity:-

Richards (1954) has classified irrigation waters into four groups based on the electrical conductivity values and based on thisclassification scheme the ground water from the study region have been categorized

Table No- 1. Statistical Summary of the GW Quality in the Study area Pre- Monsoon (May 2010)

Parameters	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	Kurtosis
pH	7.60	8.90	8.31	8.30	8.40	0.29	-0.40	0.32
EC	400.00	2790.00	1030.33	801.00	2250.00	585.04	1.30	0.83
TDS	256.00	1780.00	660.86	513.00	1440.00	374.40	1.28	0.77
T/HAR	96.00	972.00	351.36	308.00	492.00	188.34	1.04	1.20
T/ALK	120.00	560.00	260.82	216.00	288.00	123.66	0.97	0.06
Ca	8.00	329.60	83.62	75.20	36.80	62.27	1.74	4.12
Mg	6.80	121.50	34.58	33.05	46.66	19.43	1.77	6.75
Na	0.00	410.00	88.82	50.00	32.00	89.97	2.07	4.75
K	0.00	95.00	7.04	0.70	0.30	22.52	3.74	12.62
Na+K	0.00	410.30	95.84	51.00	290.00	99.09	1.80	2.71
Fe	0.10	0.30	0.21	0.20	0.20	0.06	-0.17	0.34
Cl	32.00	708.00	151.78	106.00	106.00	132.40	2.16	5.54
SO4	2.00	590.00	96.67	46.00	30.00	126.88	2.75	8.04
CO3	0.00	16.11	2.36	0.84	0.00	3.27	2.17	5.77
HCO3	121.62	683.20	296.24	244.57	194.07	159.24	1.09	0.13
NO3/N	0.30	20.00	8.55	8.20	6.50	4.70	0.36	-0.45
F	0.10	1.40	0.74	0.80	0.80	0.31	-0.03	-0.49
SAR	0.00	8.21	2.20	1.37	3.83	2.07	1.58	1.81
Na%	0.00	75.12	32.41	27.47	40.90	18.94	0.61	-0.36

The values of skewness for pH, Fe and F are negatively skewed which means that the graph of these parameters will be elongated more on the left side i.e. values

are more concentrated towards the higher values.The values of kurtosis for NO3/N, F and Na% are negative which means these values have less variations among themselves as compared to other parameters.

Table No- 2. Statistical Summary of the GW Quality in the Study areaPost –Monsoon(November, 2010)

Parameters	Minimum	Maximum	Mean	Median	Mode	SD	Skewness	Kurtosis
pH	7.10	8.80	8.13	8.20	8.30	0.34	-0.90	0.97
EC	301.00	2341.00	908.96	788.00	487.00	485.16	1.52	1.67
TDS	249.00	1689.00	596.84	511.00	312.00	332.33	1.62	2.05
T/HAR	79.00	831.00	354.67	316.00	632.00	188.10	0.96	0.21
T/ALK	124.00	549.00	247.06	204.00	288.00	106.33	1.28	1.26
Ca	11.20	333.00	87.78	64.00	27.20	72.91	1.90	3.70
Mg	5.77	127.00	35.57	34.99	46.66	18.32	2.44	11.91
Na	13.00	410.00	65.71	37.00	32.00	69.80	3.20	12.05
K	0.10	95.00	3.51	0.70	0.10	13.37	6.75	46.55
Na+K	13.10	410.30	71.02	43.00	29.50	75.49	2.82	8.73
Fe	0.10	0.30	0.22	0.20	0.20	0.07	-0.31	-0.10
Cl	29.00	611.00	133.39	94.00	46.00	118.49	2.33	5.90
SO4	4.00	594.00	88.39	59.00	30.00	104.42	3.04	11.37
CO3	0.00	13.11	2.82	1.80	0.00	3.19	1.18	1.17
HCO3	119.20	667.50	274.44	240.42	194.07	136.67	1.47	1.65
NO3/N	0.15	20.00	8.57	7.30	7.30	4.92	0.59	-0.39
F	0.10	1.20	0.67	0.70	0.50	0.29	0.11	-0.61
SAR	0.36	8.21	1.68	1.07	0.69	1.71	2.36	5.27
Na%	8.32	75.12	27.67	24.35	14.58	16.70	1.27	1.13

1. Correlations for various parameters of Groundwater quality in StudyArea-

Correlation coefficient (CC) value of EC shows strong and weak positive correlation with Ca, Mg, Na, K, Na+K, Cl, SO_4, and TDS are 0.58, 0.58, 0.64, 0.53, 0.70, 0.89, 0.64 and 1.00 respectively for pre monsoon conditions (May). In post monsoon (Nov) correlation between Ec and Ca, Mg, Na, K, Na+K, Cl, SO_4, and TDS are 0.68, 0.43, 0.57, 0.39, 0.59, 0.90, 0.69 and 0.99. There is not significant change in values excluding magnesium.This suggests that electrical conductivity depends on total dissolved solids which depend on salts such as NaCl, $CaCl_2$. These positive correlations indicate that the referred elements contribute to the groundwater salinization.The strong and weak positive correlation coefficient values of TDS with Ca, Mg, Na, K, Na+K, Cl, and $SO_4$are 0.58, 0.58, 0.64, 0.53, 0.70, 0.89 and 0.64 have been observed in the pre monsoon water samples (May 2010). The TDSvalues in post monsoon (November) correlated with Ca, Mg, Na, K, Na+K, Cl, and $SO_4$are 0.66, 0.46, 0.60, 0.36, 0.61, 0.89 and 0.99 respectively. CC values for So_4 for Ec, TDS, T/ALK and Na are 0.64, 0.64, 0.51 and 0.86 respectively in Pre Monsoon season. The strong correlation between TDS and Ca, Mg, Cl and So_4have been occur, These values are 0.90, 0.52, 0.6 and 0.55 for the post monsoon season (November). The mineralization would be expected to result from the increasing ionic concentrations due to both evaporation of recharge water and to the interactions effects between the groundwater and the

geological formations. (Hamzaoui-Azaza, 2009) Indeed, a strong positive correlation has been found between Cl and Ec, TDS, T/HAR, Ca, Mg and K these values are 0.89, 0.89, 0.67, 0.53, 0.55 and 0.38 it can also be deduced that for most of the groundwater samples these parameters originate from a common source. In the post monsoon (November) CC for Na against Na+K, SAR and Na% are 0.98, 0.87 and 0.67 respectively.

To correlate the chemical characteristics of the ground water **Pieper's diagram** has been constructed for pre monsoon (May) season (Figure No.1). Hydro chemical faces as described by the Piper (1994) can be used to donate the diagnostic chemical characteristics of water in hydrological system. Hydro-geochemical facies generally reflects the geochemical processes that area operated in the host rock water framework and is a good indicator of the pace and flow of the groundwater in response to the hydraulic gradient and geo-hydrological framework (Durasiswami , 2012). In the piper diagram cations are as percentage of total cations in meq/ lit, plot a single point on left triangle, while anions plot on right triangle. These two points are then projected in the central diamond shaped area. This single point is thus uniquely related to the total ionic distribution. In this method data for major ions (mg/ Lit) is converted into equivalents per million (epm) prior to plotting.
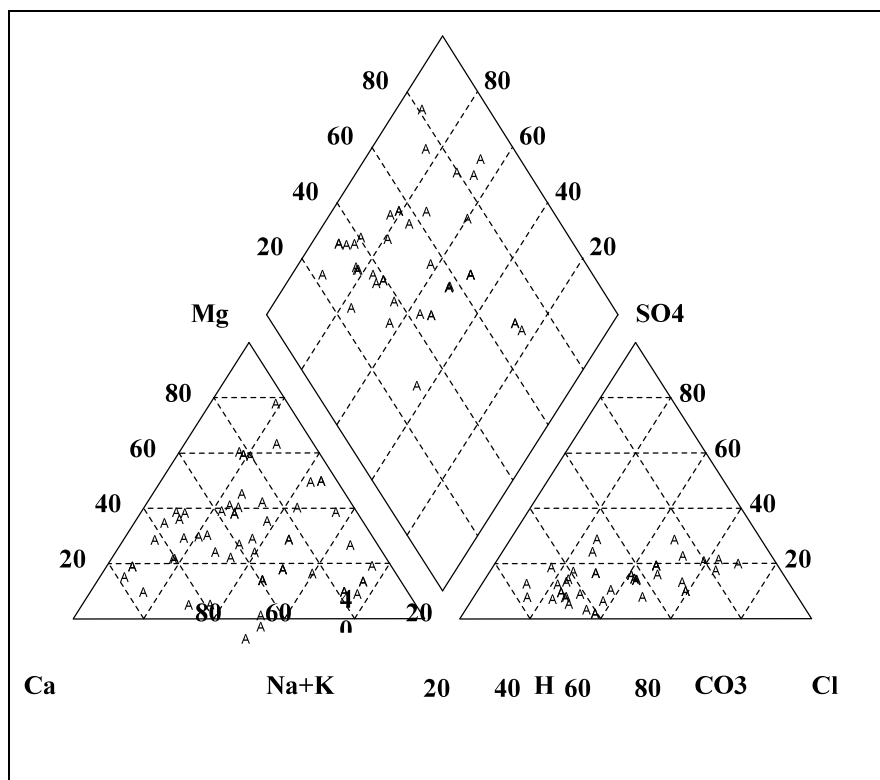
Fig :-1. Piper diagram for the water samples in the KR 25, KR 34, KR 22 and BM 114 watershed

The major cations and anions have been plotted from the per monsoon ground water level have been plotted in order to understand the spatio-temporal variation in hydro-geochemical processes.To construct the Piper diagram (For May 2010 water samples), the relative abundance of cation with the %meq/L of Na^+, K^+, Ca^{2+}, and Mg^{2+} is first plotted on the cation triangle. The relative abundance of Cl^-, SO_4, and HCO_3+CO_3 is then plotted on the anion triangle. The two data points on the cation and anion triangles are then combined into the quadrilateral field that shows the overall chemical property of the water sample. From the analysis it is revealed that, pH values are alkaline in nature. Further it is reveals that, alkaline earth exceeding the alkali metals and weak acids exceeding strong acids Ca+ Mg>Na, K> HCO_3>Cl + So_4(Please see Diagram and Table No for Correlation indices).

A single piper diagram has greater potential to accommodate a larger number of analyses without becoming confusing and is convenient for showing the effects of mixing two waters from different sources. For the year 2010, CC value of NO_3 has been showed strong positive correlation with Ca, and Cl which values are 0.39 and 0.35 respectively.Cl has been showed moderate positive correlation with Ca, Na, and

SO_4 which values are 0.53, 0.40, and 0.37 respectively. The value CC value of Mg have strong correlation with Ec, TDS, T/HAR are 0.58, 0.58 and 0.59.

Overall the Strong values of CC of Mg against Ec, TDS, HAR, The So_4against Ec, TDS, T/ALK, Na, The HCO_3 against T/ALK and So_4, The SAR values against Na, Na+K, So_4have strong correlation and responsible for changing water quality. Generally it is believed to in the experimental village the cropping pattern sequence is changed to cash crops and horticulture leads to overexploitation of surface and subsurface water. These sequences will definite lead to negative changes in characteristics of groundwater.

1.Salinity and Alkali Hazard in the study region-

High EC indicates high salt concentration in irrigation waters that ultimately leads to the formation of saline soils. High salinity interferes with the absorption of water and nutrients by plants from the soils by reversal of osmotic gradients (Saleh ,1999 and Richards 1954) has classified irrigation waters into four groups based on the electrical conductivity values and based on thisclassification the ground waters from the study area have been categorized.

Table –3.Classification of Groundwater of study area for irrigation purpose (Richards, 1954) for pre and post conditions.

Water Class	Salinity Hazard (Pre)			Alkali Hazard (Pre)		
	E.C. (µS/cm)	Number of samples	Percentage	SAR (epm)	Number of samples	Percentage
Excellent	Up to 250	00	00	Up to 10	00	00
Good	250-750	16	33	10-18	35	73
Medium/Fair	750-2250	31	65	18-26	13	27
Poor/Bad	>2250	01	2	>26	00	00
Water Class	Salinity Hazard (Post)			Alkali Hazard (Post)		
	E.C. (µS/cm)	Number of samples	Percentage	SAR (epm)	Number of samples	Percentage
Excellent	Up to 250	00	00	Up to 10	48	100
Good	250-750	22	46	10-18	00	00
Medium/Fair	750-2250	26	54	18-26	00	00
Poor/Bad	>2250	00	00	>26	00	00

Out of total 48 analyzed for per monsoon (May) samples 16 (33%) sample categorized as a good for EC, whereas 31 (65%) sample shown medium/ fair for Ec. In post monsoon 22 (46%) samples categorized as a good and 26 (54%) samples were categorized as medium/fair for Ec. These values have direct correlation with cropping pattern, in the experimental village general cropping pattern in the post condition of project is sugarcane crop since the year 2004. Excessive use of fertilizer and pesticide may lead to higher values of EC.

Sodium generally replaces calcium in soils irrigated by saline groundwaters through the process of Base Exchange.High sodium in the soils reduces the permeability of soils owing to dispersion of clay particles. The effect of sodium on soil is known as sodium hazard or alkali hazard and is described as the Sodium absorption ratio (SAR). The SAR values of 35 (73%) samples is categorized as a good and 13 samples (27%) values have the category of medium or fair. Alkali hazard have been identified with SAR values in Post monsoon (November) , all the 48 samples were categorized as excellent. All these values are within standard limits. A SAR value indicates the water quality is good for irrigation.

1. ***Summary of Water Quality Standards for Drinking***

In the context of development in all the sectors of the

Agriculture, Industry, Power generation, Inland Navigation water resources have prime importance. In last 2-3 decade the dependency on the ground water have been bloomed to meet the demand. The Quality of water is of prime importance in irrigated agriculture and drinking. In India, about 15% of the cultivated land is facing the problem of soil salinity and alkalinity. Uppal, (1962)In India, the problem of rising water table due to canal irrigation dates back to as early as 1902 when a regular rise of water table at the rate of 8 to 34 cm per year was responsible to some extent for the development of soil salinity in canal irrigated tracts of undivided Punjab.

Analysis reveals that, excluding one sample all other sample for pH is found within the range of WHO and ICMR for both pre and post monsoon. The average value of TDS is 660 mg/l in per monsoon which 596 mg/l which are slightly greater than permissible limit in pre conditions. The values of the hardness are slightly more than prescribed limits of WHO and ICMR standards. The desirable limits for these values are 600 mg/l when there is no alternate source. The average value of Chlorine is found 151 mg/l in pre monsoon reduced up to 135 mg/l in post monsoon, it is quite high than the WHO and ICMR value within the desirable limits prescribed by the GSDA. The iron values are recorded are 0.2 mg/l in the pre monsoon season. Hence it is find out that, watershed development is powerful tool to harness the good quality water. Please see Table No.4

Table No- 4 Summary of Water Quality Standards for Drinking –

Parameters	WHO (sapl)*	BSI (sapl)*	ICMR(sapl)*	Requirement (Desirable Limit) GSDA	Permissible limit in the Absence of alternate source	Average values observed. Pre Monsoon	Average values observed. Post Monsoon
pH	<8	7-8.5	7-8.5	6.5 to 8.5	No relaxation	8.3	8.1
TDS mg/1	1000	500	500	600	650	660	596
T/ HAR mg/1	300	300	300	300	600	351	354
T/ALK mg/1	200		200	200	600	260	247
Cl mg/1	70	250	75	250	1000	151	135
Camg/1	250	75	250	75	200	83	87.8
Mgmg/1	30	> 30	50	30	100	34	35.6
Iron mg/1	0.3	0.1	0.3	0.3	1	0.2	0.7
Sulphate mg/1	250	200	150	200	400	96.7	88.1

*Standards acceptable permissible limits
(WHO- World Health Organization, BSI- Bureau of Indian Standard (BIS), Specification IS -10500-91, Revised 2003, ICMR- Indian Council of Medical Research, GSDA- Ground Water Survey and Development Agency)
Source - Central Board for the prevention and control of water pollution, New Delhi and GSDA.

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UTILISING MATHEMATICAL MODELLING IN SECONDARY CURRICULUMFOR CREATING AWARENESS FOR POPULATION STUDY AT GRASS ROOT LEVEL

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ABSTRACT: The rapidly growing population of our nation and its far reaching consequences in economic, social,physical, environmental domains of India is a major cause of concern. Various government projects/programmes have been implemented for the past 65years in fields of maternal &child health ,family planning,primary education, women empowerment etc. But still Government is yet to achieve its target.A major reason for this is lack of awareness, illiteracy, ignorance amongst majority Indians who are poor, uneducated and underprivileged .India is a huge country and any plan of action can be successful only if it is implemented from grassroot level. Universal Education is a global prime target and Mathematics, which is itself a universal subject of education right from primary level, can be used effectively to spread awareness amongst our younger generation regarding the demographic picture of present India.Mathematical models using school mathematics can be used effectively as interesting problems for young India. .Following National Curriculum objectives, in this way Mathematics will be presented in real practical problems which, with various graphs,figures,models will not only be interesting but will be thought provoking and enlightening for our students.These problems will replace imaginary problems and give them an insight regarding our real India and encourage them to find solution in their own way.In this way our future nation builders will be better prepared as future citizens of India.

INTRODUCTION:

India's population passed the one billion mark in 2000 and next year, we celebrate its 70th year as an independent country. Its population is likely to pass China's as the world's largest within 2025. All of this leads quite naturally to the question: how large might the population of the world's largest democracy become? And what will be its consequence?

Population Parameters	Total Count
Current Population of India in 2016	1,341,627,189 (1.34 billion) As of September 5, 2016
Total Male Population in India	692,816,280 (692 million)
Total No of Females in India	648,810,908 (648 million)
Sex Ratio	943 females per 1,000 males
0 to 25 years	50% of India's current population

Table 1 Census report

Currently, there are about 51 births in India in a minute. [10] **[1]**

Every year, India is adding more people than any other nation in the world, and in fact the individual population of some of its states is equal to the total population of many countries.Some of themajor reasons for India's rapidly growing population are poverty, illiteracy, high fertility rate, rapid decline in death rates and immigration from Bangladesh and Nepal. Alarmed by its swelling population, India started taking measures to stem the growth rate quite early. The efforts did produce positive results, however, failed to achieve the ultimate goal and the population of India since getting independence from British Ruler's in 1947 increased almost three times. India has missed almost all its targets to bring the rate of population growth under control and we have arrived at a point of serious introspection.[4]

It must be realized by us, the citizens of India, that only Government policies,programmes etc will not be effective if proper awareness is not there amongst all Indians regarding the danger of population explosion & its future effects in economic, social, political and allround development of our nation. .Due to illiteracy, ignorance of a huge percentage of Indian Community,especially that of rural India,those poor people are still deprived,exploited and poverty stricken.Census of India 2011 gives us the following data…

Age Groups	Population	Total %
All ages	1210854977	100
0-4	112806778	9.316291
5-9	126928126	10.48252
10-14	132709212	10.95996
15-19	120526449	9.95383

Table 2 – Age Distribution

[1]

If we consider the percentage of children population of India we will observe that more than 40% of the population is our younger generation.....our future citizens of India. Any change anywhere in the world will be effective only if it can be implemented at grassroot level.

Future India will be created by them, for them and of them.

Does our future citizens of India have any idea regarding population explosion, itsreasons, its harmful effects on our society and our country? Can they understand how a bulging population can create problems on living conditions, schools, health, jobs, sanitation etc.? Yes, a handful of students do have it in small section of their syllabus but, for the vast majority of school going future nation builders…they are still in the darkness.

Our present population crisis ,its far reaching effects in our life and well-being and that we & only we can bring about a change in India, must be explained &

conveyed to them. Infact, children of today will grow up and develop to be responsible citizens of India... and gearing them up for future is **OUR** responsibility.It is our foremost duty to educate them, train them and build them with proper practical knowledge.

If we see the Millennium Development Goals for World, particularly India, Universal Education for ALL is the first priority.Tamaso ma jyotirgamayo.Education can only lead us from darkness to light. Hence our foremost duty is therefore to enlighten our younger generation and spread awareness through them.

The biggest question that will now arise is how to present this information to the younger generation... and make them interesting as well as informative. While the factsheets must be included in their curriculum,these information must be interesting & practical. They must be able to connect with these topics easily and have practical/hands on experience. This will ensure their involvement in their process of understanding and knowledge and this will eventually lead to self-realisation and their awareness.

2. Methodology

Mathematics is such a basic subject which has tremendous application in all spheres of life. Children all over the world, more so in India, start their education life learning language and mathematics. A widely popular and useful subject which every Indian child learns daily can be the best medium for propagating the basic ideas of population study and its implications.

In 2005 the National Curriculum Framework proposed to introduce Mathematics through a different perspective at school level.It aims at visualizing Mathematics...making it a real world experience. Any boredom with Mathematics must be removed and the child learning the subject must associate to it and find it to be a connection of their own surroundings.

In developed countries like USA, European countries, projects on population counting, censusstudy, using simple techniques has been done by school children. [3]Developing countries like India can adopt activities at school level and generate interest and awarenessregarding population growth& its effect to society .**MATHEMATICAL MODELLING IS THE BEST WAY TO ACHIEVE THIS PURPOSE.[2]**Introducing MATHEMATICAL MODELLING[6] to school children will help them not only to gel with the subject but also guide them to the practical /real life situations of India today. What better way can one have to present **India Today** to our children through interesting diagrams, figures, models of mathematics, which will not only sharpen their maths skills but create a thought process of assessing and evaluating the problem.

The purpose of this project is to introduce a new system of MATHEMATICS curriculum based on Mathematical Models which will be related to demographic parameters of Indian subcontinent. Through simple Mathematic models children will have hands-on experience of real life problems faced by our nation and evaluate them through thought provoking

questionnaire based on their calculations. Basic aim of this research is to help our school children evaluate and analyse practical problems through simple maths tools and guide them to understand and find possible solutions.

Below are given the types of mathematical models which are designed for students of middle school and then gradually to senior school. These models will use **Mathematics** which is well within the scope of secondary school syllabus. Hence the scope for utilisation and implementation of these models in maths classes is well justified**.** By this way Mathematics can be used to the maximum extend for a very important national cause...right from grass root level.

MODEL 1 :A   [9]
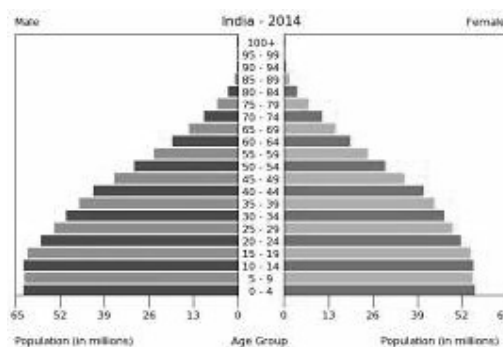
This is the Population Pyramid of India- A graphical display of India's age and sex composition.Denoted by horizontal bars ,it represents the proportion of males & females of each age group. Sum of all such age groups =total population.=100%

Questionnaire-

1) Let us calculate the SR of India for the following age groups:
SR= Sex-Ratio=Ratio of males to females.

a) 0-4yrs == 57 m/54m =105.5 :100. —There are 106 males for every 100 females right from birth till 4yrs.
b) 5-9yrs == 68/62 = 110:100
c) Study the pyramid and find out the S R for age group 10-14 yrs and 15-20yrs.
d) At which age groups do you find SR becoming almost same?
e) Can you calculate the total male,female population and the population of the whole country? Find their respective percentages.
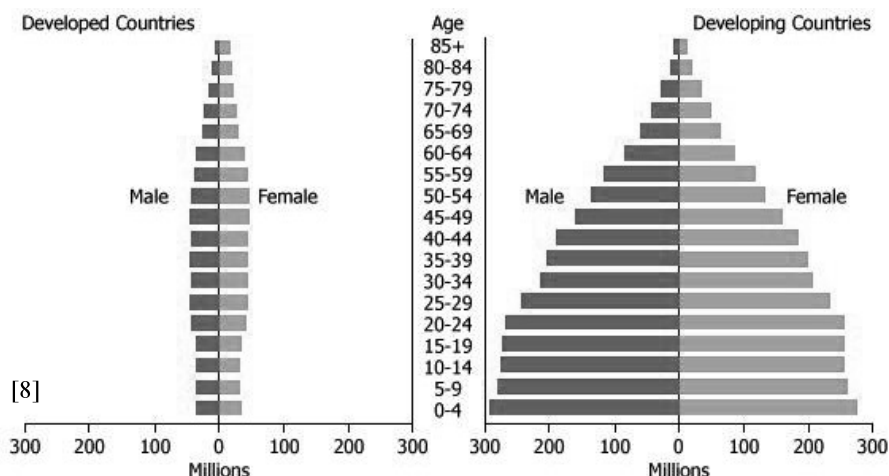f) What conclusion do you arrive at?
g) What may be the probable causes for this sex discrimination right from birth?
h) Why do you think S R equals at later age?
8) Can you think of any ways by which one can improve this ratio?

MODEL B :


Developed Countries | Age | Developing Countries

[8]

Questionnaire-

The above models represent the age structures of two types of nations-developed ,and developing. Observe the two pyramids and answer the following -
a) Which pyramid will represent our country? Which one will represent USA?
b) Calculate the male population of both the types separately and find their ratio.
c) Repeat the same procedure for female population.
d) Can you obtain the total population ratio for both ?
e) Compare the no.of males & females for both nations and find their SR.
f) If you are given the area of India = 3.3million km^2 and that of USA = 9.9 million km^2, , find a relation between the proportions of area with population count of two nations.
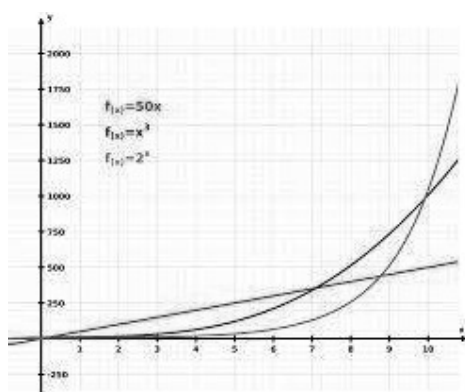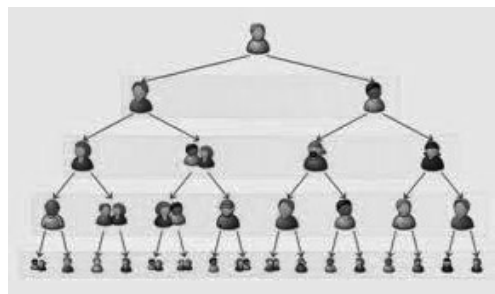g) Arrive at your own conclusion.

MODEL 2
Let us draw...
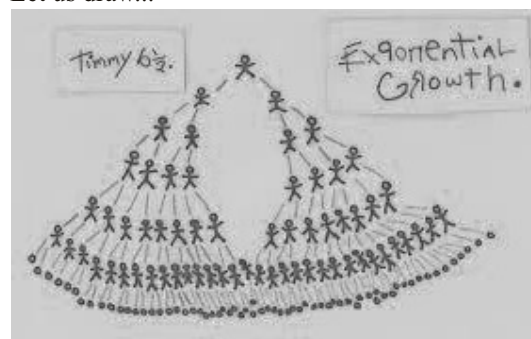
Three functions are given to us....

A) f(x)   = 50 x (**linear fn**)
B) f(x)   = x^3 (**cubic function**)
C) f(x)   = 2^x (**exponential function**)

a) Using red for linear, blue for cubic, and green for exponential, draw the graphs of these functions on a graph paper with X axis = time =1,2,..10 years and Y axis = function

Graph 1 – Function Graph

B) Observing the above graph, after a certain time interval, say 10 yrs, which function do you think overtakes the others? [5]

Well, that is how population grows...

Can we draw the exponential growth curve of India?
Let me help ...First let us solve a few questions..

1) Exponential Growth
Exponential growth is any increase in a quantity P using the formula

$$P(t) = P_0 e^{(kt)}$$

Where Po is the initial quantity, t is time, k is a constant, P(t) is the quantity after time t, and e^x is the exponential function.

Q1) If a city has a population of 10000 people, and if the population grows continuously at an annual rate of 1.7%, what will the population be in 10 years?
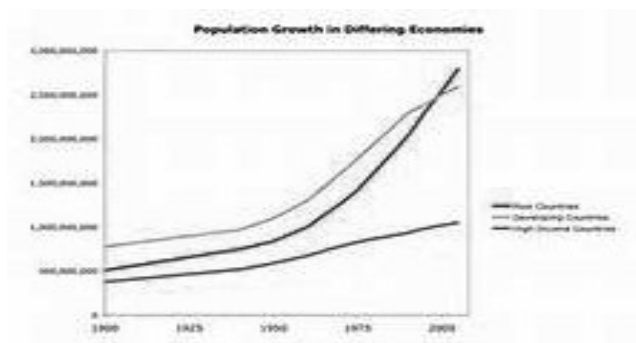We are given Po= 1000 people and k= .017
P(t)= 10000e^(.017t)
When t= 10 years
P(t)= 10000e^(.017*10)= ~11853 people.
Q) Can we now predict population of India after 4yrs,10yrs,...till 2050?
Q) The graph of this growth(exponential) of population can be drawn easily.

Graph 2 – Growth Curve of three Nations

Q) Studying the above given graph for three nations, what do you infer?

CONCLUSION :

These are some of the examples of models that can included in the maths curriculum of Indian school boards. As these models deals with school level arithmetic, algebra and mensuration topics, they are compatible with student knowledge. Numerous such models can be further created which are compatible with curriculum topics.
I propose that sums like these to be included in the relevant maths exercises, replacing the imaginary problems with these real life problems. The future citizens of India can hereby get to see their real India and prepare themselves to change for better.

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APPROXIMATION OF EXACT CONTROL PROBLEM FOR HEAT EQUATION WITH BILINEAR CONTROL BY OPTIMAL CONTROL PROBLEM

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ABSTRACT : In this article we have made an attempt to prove that the exact controllability problem can be approximated by optimal control problem, which then, can be solved numerically. We state the exact controllability problem for PDEs with multiplicative controls and then de_ne the associated optimal control problem. Also, we prove that the solution of an associated optimal control problem converges to the solution of exact control problem.`

INTRODUCTION:

In [3], Lin and others have studied the exact controllability of PDEs with multiplicative controls. In this article, they have proved exact controllability of parabolic systems with particular target states. We do not have general results. In this article we have made an attempt to prove that the exact controllability problem can be approximated by optimal control problem, which then, can be solved numerically. We state the exact controllability problem for PDEs with multiplicative controls and then de_ne the associated optimal control problem. Also, we prove that the solution of an associated optimal control problem converges to the solution of exact control problem. In section 2, we state the exact control problem. In section 3, we de_ne the associated optimal control problem and prove its convergence to exact control problem.

2   Exact control problem

Let us consider parabolic bilinear system evolving on $\Omega \subset \mathbb{R}^n$ described by the equation

$$
\begin{array}{rcll}
w_t &=& \Delta w + uw, & \text{in } Q = \Omega \times (0, T), \\
w(x,t) &=& g(x,t), & \sum = \partial\Omega \times (0, T), \\
w(x,0) &=& w_0(x), & x \in \Omega.
\end{array}
\tag{1}
$$

Definition 1. *System (1) is said to be exact controllable in time $T_1 > 0$ if, for every initial data $w_0 \in L^2(\Omega)$ and desired profile $h \in L^2(\Omega)$, there exists a control $c \in L^\infty(Q)$ such that the solution w of (1) corresponding to c satisfies*

$$
w(x, T) = h(x)
\tag{2}
$$

in Ω, for all $T \geq T_1$.

Assume that the system (1) is exact controllable for given positive target state $z_0 \in L^2(\Omega)$. Then by definition, there exists (w, u) satisfying (1), (2) with $(w, u) \in C([0, T]; H^1(\Omega)) \cap C([0, T]; L^2(\Omega)) \times L^\infty(Q)$.

Let U_{ex} be the set consisting of all exact controls defined by

$$
U_{ex} = \{u \in L^\infty(Q) | \exists (w, u) \text{ satisfying (1) and } w(x, T) = z_0(x)\}.
$$

We now consider the problem: find $\overline{u} \in U_{ex}$ such that

$$
\overline{J}(\overline{u}) = \min_{u \in U_{ex}} \overline{J}(u) \left(= \int_Q u^2 dx dt \right).
\tag{3}
$$

We characterize the optimal solution of (3) using an approach based on a quadratic cost optimal control problem.

3 Bilinear optimal control problem and its convergence to exact control problem

Let $T > 0$ be given. Let us associate with (1) the problem

$$\min_{u \in L^\infty(Q)} J_\epsilon(u), \tag{4}$$

where

$$J_\epsilon(u) = \frac{1}{2} \int_\Omega (w(\cdot, T) - z_0)^2 dx + \frac{\epsilon}{2} \int_Q u^2 dx dt, \ \epsilon > 0. \tag{5}$$

Proposition 1. *Assume that Ω is a bounded domain with C^2 boundary $\partial\Omega$. Then for given $u \in L^\infty(Q)$ and $w_0 \in L^2(\Omega)$, there exists a unique weak solution w of (1), with $w \in L^2([0,T]; H_0^1(\Omega)) \cap C([0,T]; L^2(\Omega))$ and $w_t \in L^2([0,T]; H^{-1}(\Omega))$ satisfying the following estimates*

$$\sup_{0 \le t \le T} \left(\|w\|_{H_0^1(\Omega)} + \|w\|_{L^2(\Omega)} \right) + \|w_t\|_{L^2([0,T]; H^{-1}(\Omega))} \le C \|w_0\|_{L^2(\Omega)}. \tag{6}$$

where C is a constant which depends only on Ω and $T > 0$.

 Proof. For the proof refer to Evans [1].

 Now, we will prove the existence of an optimal control for problem (4) with conditions (1).

Theorem 1. *There exists $u^* \in L^\infty(Q)$ such that $J_\epsilon(u^*) = J^* = \min_{u \in L^\infty(Q)} \{J_\epsilon(Q)\}$.*

 Proof. The set $E = \{J_\epsilon(u) | u \in L^\infty(Q)\}$ is non-empty and bounded below and hence, lower bound J^* exists. Let $\{u^n\} \in L^\infty(Q)$ be the minimizing sequence such that

$$J^* = \lim_{n \to \infty} J_\epsilon(u^n) = \inf_{u \in L^\infty(Q)} J_\epsilon(u).$$

Denote $w^n = w(u^n)$. By Proposition 1, we have

$$\sup_{0 \le t \le T} \left(\|w^n\|_{H_0^1(\Omega)} + \|w^n\|_{L^2(\Omega)} \right) + \|w_t^n\|_{L^2([0,T]; H^{-1}(\Omega))} \le C \|w_0\|_{L^2(\Omega)}.$$

On subsequences, by weak compactness, there exists $w^* \in C([0,T]; H_0^1(\Omega))$ such that

$$w^n \to w^* \text{ weakly in } L^\infty([0,T]; H_0^1(\Omega)),$$
$$w_t^n \to w_t^* \text{ weakly in } L^\infty([0,T]; L^2(\Omega)),$$
$$u^n \to u^* \text{ weakly in } L^2(\Omega).$$

By using compactness results from [4], we have $w^n \to w^*$ in $L^\infty([0,T]; L^2(\Omega))$ and by weak formulation, we have

$$\langle w_t^n, \phi \rangle = - \int_\Omega [\nabla w^n \nabla \phi - u^n w^n \phi] dx$$

for any $\phi \in H_0^1(\Omega)$ and a.e. $0 \le t \le T$. Also, as

$$w^n \to w^* \text{ strongly in } L^2(Q),$$
$$u^n \to u^* \text{ weakly in } L^2(Q),$$

we have

$$w^n u^n \to w^* u^* \text{ weakly in } L^2(Q).$$

Passing to the limit as in the weak formulation of

$$\langle w_t^*, \phi \rangle = -\int_\Omega [\nabla w^* \nabla \phi - u^* w^*] dx$$

Thus $w^* = w(u^*)$ is the solution of system (1) with control u^*. Since

$$
\begin{aligned}
J_\epsilon(u^*) &\le \lim_{n \to \infty} \left(\frac{1}{2} \int_\Omega (w^n(\cdot, T) - z_0)^2 dx + \frac{\epsilon}{2} \int_Q (u^n)^2 dx dt \right) \\
&\le \lim_{n \to \infty} J_\epsilon(u^n) \\
&= \inf_{u \in L^\infty(Q)} J_\epsilon(u).
\end{aligned}
$$

This implies that u^* is an optimal control.

Theorem 2. *For a given optimal control $u \in L^\infty(Q)$ such that $J_\epsilon = \min_{u \in L^\infty(Q)} \{J_\epsilon(Q)\}$ and corresponding solution w of (1), there exists unique weak solution $p \in H_0^1(\Omega)$ to the adjoint problem*

$$
\begin{aligned}
-p_t &= \Delta p + u_\epsilon p, & &\text{in } Q = \Omega \times (0, T), \\
p(x, t) &= 0, & &\textstyle\sum = \partial\Omega \times (0, T), \\
p(x, T) &= (w(x, T) - z_0), & &x \in \Omega.
\end{aligned}
\tag{7}
$$

Moreover, u_ϵ satisfies

$$u_\epsilon = -\frac{1}{\epsilon} pw. \tag{8}$$

   Proof. For the proof of existence and uniqueness of refer to Evans [1].
   We follow the Lagrangian approach (see [2, 5] for more details) to obtain the adjoint system (7) and characterization (8). We have the Lagrangian

$$L(w, u, p) = J_\epsilon(u) - \int_Q p(w_t - \Delta w - uw) dx dt. \tag{9}$$

We obtain the first order conditions of optimality for this problem using the Fréchet derivative of L. We thus obtain the optimality system

$$
\begin{aligned}
w_t &= \Delta w + u_\epsilon w, & &\text{in } Q = \Omega \times (0, T), \\
w(x, t) &= g(x, t), & &\textstyle\sum = \partial\Omega \times (0, T), \\
w(x, 0) &= w_0(x), & &x \in \Omega,
\end{aligned}
\tag{10}
$$

$$
\begin{aligned}
-p_t &= \Delta p + u_\epsilon p, & &\text{in } Q = \Omega \times (0, T), \\
p(x, t) &= 0, & &\textstyle\sum = \partial\Omega \times (0, T), \\
p(x, T) &= (w(x, T) - z_0), & &x \in \Omega,
\end{aligned}
\tag{11}
$$

$$u_\epsilon = -\frac{1}{\epsilon} pw. \tag{12}$$

We next consider the problem (3) with set U_{ex} of exact controls and the set of reachable states $R(T) = \bigcup_{u \in L^\infty(Q)} \{w^u(x, T)\}$ at time T from initial states w_0.

Proposition 2.   *1. The sequence $\{J_\epsilon(u_\epsilon)\}_{\epsilon > 0}$ is decreasing as $\epsilon \to 0$.*

   2. The sequence $\left\{ \int_Q u_\epsilon^2 dx dt \right\}_{\epsilon > 0}$ is increasing as $\epsilon \to 0$.

   Proof.

1. Let $0 < \epsilon_1 < \epsilon_2$. Using the optimality of u_{ϵ_1} for J_{ϵ_1} and of u_{ϵ_2} for J_{ϵ_2}, we have

$$J_{\epsilon_1}(u_{\epsilon_1}) = \frac{1}{2} \int_\Omega \left(w^{u_{\epsilon_1}}(\cdot, T) - z_0 \right)^2 dx + \frac{\epsilon_1}{2} \int_Q u_{\epsilon_1}{}^2 dxdt$$

$$\leq \frac{1}{2} \int_\Omega \left(w^{u_{\epsilon_2}}(\cdot, T) - z_0 \right)^2 dx + \frac{\epsilon_1}{2} \int_Q u_{\epsilon_2}{}^2 dxdt$$

$$\leq \frac{1}{2} \int_\Omega \left(w^{u_{\epsilon_2}}(\cdot, T) - z_0 \right)^2 dx + \frac{\epsilon_2}{2} \int_Q u_{\epsilon_2}{}^2 dxdt$$

$$\leq J_{\epsilon_2}(u_{\epsilon_2}),$$

and thus

$$J_{\epsilon_1}(u_{\epsilon_1}) \leq J_{\epsilon_2}(u_{\epsilon_2}).$$

2. Let $0 < \epsilon_1 < \epsilon_2$. Using the optimality of u_{ϵ_1} for J_{ϵ_1} and of u_{ϵ_2} for J_{ϵ_2}, we have

$$J_{\epsilon_1}(u_{\epsilon_1}) \leq J_{\epsilon_1}(u_{\epsilon_2}),$$
$$J_{\epsilon_2}(u_{\epsilon_2}) \leq J_{\epsilon_2}(u_{\epsilon_1}).$$

Therefore, we get
$$J_{\epsilon_2}(u_{\epsilon_2}) - J_{\epsilon_1}(u_{\epsilon_2}) \leq J_{\epsilon_2}(u_{\epsilon_1}) - J_{\epsilon_1}(u_{\epsilon_1}).$$
and hence, we have $\int_Q u_{\epsilon_2}{}^2 dxdt \leq \int_Q u_{\epsilon_1}{}^2 dxdt.$

Theorem 3. *Let u_ϵ be a solution of (4) and assume that U_{ex} is non-empty, then $u_\epsilon \to u^*$ in $L^\infty(Q)$ and $w^{u_\epsilon} \to w^{u^*}$ in $C([0,T]; H_0^1(\Omega))$. Moreover $u^* \in L^\infty(Q)$ is a solution of (3).*

Proof. As u_ϵ is the optimal solution for (4), we have $\forall \epsilon > 0$, $u \in L^\infty(Q)$, $J_\epsilon(u_\epsilon) \leq J_\epsilon(u)$. Since U_{ex} is nonempty, $\exists v \in L^\infty(Q)$ such that the solution of (1) corresponding to v satisfies

$$w(x, T) = z_0.$$

Therefore, we have $\forall u \in U_{ex}$ and $\forall \epsilon > 0$,

$$\int_Q u_\epsilon^2 dxdt \leq \int_Q u^2 dxdt. \tag{13}$$

Therefore we can extract a subsequence also denoted by $(u_\epsilon)_{\epsilon>0}$ such that $u_\epsilon \to u^*$ in $L^\infty(Q)$ and $w^{u_\epsilon} \to w^{u^*}$ strongly in $C([0,T]; H_0^1(\Omega))$ as $\epsilon \to 0$.

Further

$$\lim_{\epsilon \to 0} \inf \int_Q u_\epsilon^2 dxdt \geq \int_Q (u^*)^2 dxdt$$

and

$$\lim_{\epsilon \to 0} \inf J_\epsilon(u_\epsilon) \geq \frac{1}{2} \int_\Omega \left(w^{u^*} - z_0\right)^2 dx. \tag{14}$$

Also

$$J_\epsilon(u_\epsilon) \leq J_\epsilon(u), \forall u \in L^\infty(Q)$$

implies

$$\lim_{\epsilon \to 0} \sup J_\epsilon(u_\epsilon) \leq \frac{1}{2} \int_\Omega (w^u - z_0)^2 dx$$

and in particular

$$\lim_{\epsilon \to 0} \sup J_\epsilon(u_\epsilon) \leq \frac{1}{2} \int_\Omega (w^v - z_0)^2 dx$$

$$\leq \frac{1}{2} \int_\Omega \left(w^{u^*} - z_0\right)^2 dx$$

$$\leq \lim_{\epsilon \to 0} \inf J_\epsilon(u_\epsilon).$$

Hence

$$\lim_{\epsilon \to 0} J_\epsilon(u_\epsilon) = \lim_{\epsilon \to 0} \frac{1}{2} \int_\Omega \left(w^{u_\epsilon} - z_0\right)^2 dx = \frac{1}{2} \int_\Omega \left(w^{u^*} - z_0\right)^2 dx =$$

$$\frac{1}{2} \int_\Omega (w^v - z_0)^2 dx = 0. \tag{15}$$

Thus

$$\frac{1}{2} \int_\Omega \left(w^{u^*} - z_0\right)^2 dx = \lim_{\epsilon \to 0} \frac{1}{2} \int_\Omega \left(w^{u_\epsilon} - z_0\right)^2 dx = 0.$$

which gives $u^* \in U_{ex}$. Furthermore $J_\epsilon(u_\epsilon) \leq J_\epsilon(u^*)$ and hence (15) gives

$$\int_Q u_\epsilon^2 dx dt \leq \int_Q (u^*)^2 dx dt. \tag{16}$$

From (14) and (16), we obtain

$$\int_Q u_\epsilon^2 dx dt \to \int_Q (u^*)^2 dx dt \text{ as } \epsilon \to 0. \tag{17}$$

Joining this result with weak convergence of $(u_\epsilon)_{\epsilon > 0}$ to u^* in $L^\infty(Q)$ implies that

$$\int_Q (u_\epsilon - u^*)^2 dx dt = 0$$

and hence using (13), we get

$$\int_Q (u^*)^2 dx dt \leq \int_Q u^2 dx dt \ \forall \, u \in U_{ex}.$$

This shows that u^* is a solution of (3).

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POSSIBILITY FOR APPLICATION OF POLLUTANT TRANSPORT MODEL OF RIVER BHIMA

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ABSTRACT : The aim of this article to find the possibilities for application based simulation of mathematical model developed by the Ani et al, 2010. This article is technical and based on the findings of secondary literature. It is analysed that majority of pollutants in the Bhima river carried from itstributarieslike Mula-Mutha rivers passing from the Pune city. Present attempt is to find the feasibility study of mathematical model for application of pollutant transport model for finding the extent of organic waste carries though tributary river. The mathematical model have scope to study further to develop simulation of pollutant transport of Bhima river

INTRODUCTION:

Present study focus on the issues related to Bhima river pollution from the origin to Ujjani reservoir. The Mula-Mutha tributaries of BhimaRiver, are noted as ecologically ruinous rivers in various scientific and government reports. The reports highlighted that there were high concentrations of critical pollution and health parameters in the water bodies against the prescribed norms stated by regulatory agencies like WHO, CPCB, CWC and so on. In the urbanised areas like Pune Municipal Corporation and PimpriChinchwadMunicipal Corporation have consumption of water almost tripled in the last 20 years due to rapidly acceleration of industrialization and urbanization. Presently it is about 1500 MLD as confirmed by authorities of Maharashtra government. About 80% of it is released into the urban natural streams as wastewater reaching the rivers. This huge quantity of waste water drained down to rive Bhima and its tributaries every day in addition to the agricultural runoffs. Water use and wastewater generation has been reported by government agencies in a recently prepared report on Bhima River Pollution Control (Aug. 2010).

Downstream areas on the other hand, are dependent on this water for different use including drinking and irrigation.There are 567 water supply schemes are proving water to almost 768 villages from the Bhima river. The cities like Solapur, Barshi and Kurduwadi also receive water from this river. However, the major and big industrial estates are situated on the banks of upper Bhima river and its tributaries. The industrial estates in Pune, Pimpri-Chinchwad,

Rangangaon, Chakan, Daund, Kurkhumbh and many sugar factories pouring the waste water in the Bhima river. Along with this at pilgrim places like Bhimshankar, Dehu and Alandidue to different pilgrims activities causes the pollution of Bhima river.

METHODS :

Model parameters have been computed on the basis of field data. The normalized parameters have been obtained by referencing their values to the maximum value of each parameter from the earlier study made by Ani et al, 2010. The present models are capable of simulating pollutant concentration in customary situations and useful for understanding the propagation of pollutants along the river, to assess water quality, and also to carry out pollution management. The modelwill display graphical information on theconcentration evolution in time and space. Basedon predicted concentration distribution waterquality professionals will be able to take the bestdecisions to counteract pollution.

DISCUSSION :

To illustrate the propagation of the pollutant discharged by the continuous point source two mathematical models have been developed. The 1D form of the basic equation (1) for WQM is the common basis for both models and it is describing the pollutant concentration (c [mg/L]) change in time (t [s]) along the river length (x [m]), depending on the mass transport and transformation mechanisms.

$$c(x,t) = c_0 + \frac{(c_s - c_0)}{2}\left[erfc\left(\frac{x - V_x t}{\sqrt{4D_x t}}\right) + \exp\left(-\frac{x V_x}{D_x}\right) erfc\left(\frac{x + V_x t}{\sqrt{4D_x t}}\right) \right]$$

In all equations x denotes the distance downstream the pollution source [m], tis the time [s]; M is the mass of released tracer [g]; the C_0[mg/L] is the initial concentration along the river, assuming nonzero initial concentration conditions throughout the river; C_s0 [mg/L] is the initial concentration at the source (xS [m]); and C_s [mg/L] is the concentration at the source during the release (t [s]); Dx is the dispersion coefficient [m2/s]. The convective velocity (Vx [m/s]) and the longitudinal dispersion (Dx [m2/s]) are depending on the water flow (Q [m3/s]) and river channel characteristic parameters (Ani et al, 2010).

The present model will be capable of simulatingpollutant concentration in customary situations anduseful forunderstanding the propagation of pollutants alongthe river, to assess water quality, and also to carry out pollution management. The modelwill display graphical information on theconcentration evolution in time and space. Basedon predicted concentration distribution waterquality professionals will be able to take the bestdecisions to counteract pollution. This knowledgeis needed in normal situations, but especially in thecase of accidental pollutant release, when thestakeholders have to be prepared for fast decisionmaking. Following parameters will be analyse though this model.

(1)   Total Organic Nitrogen
(2)   Total Phosphate

CONCLUSION :

The mathematical model will give the amount of organic nitrogen and phosphate carries from the tributary rivers and which further pollutes the river Bhima in Maharashtra state. From this analysis concentration of pollutants are measured to suggest the further necessary actions

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COMPUTATION OF SPECIFIC YIELD USING SLICHTER'S AND JACOBS'S METHOD TO ASSESS THE WATER YIELDING CAPACITIES OF OPEN WELLS A SCIENTIFIC BASE FOR WATER RESOURCE DEVELOPMENT IN RURAL INDIA.

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ABSTRACT : Computation of specific yield is quite important technique in carrying the assessment of the watershed development activity and its impact on the ground water availability in the treated and untreated watersheds. To analyse the impact of watershed development activity on the groundwater availability the specific yield test have been carried out in the village Tadsar (KR 22) and Renavi (KR 25) watershed. The SYV values have been 2.58% in the village Tadsar and 2.14% in the village Ranavi. These values have been complied with standard values given by GSDA for the geological formations of vasicular jointed basalts (V.J.B.). The Standard values of SYV values for this formation are ranged between 1 to 3%. All the analysed value has been equal to maximum limits of these standard values. It is revealed that watershed development activities have positive impact on groundwater availability.

INTRODUCTION:

Planning commission the year 2001 reported that "It has been experienced that in successful watersheds when the availability of the water increased, peoples changed their cropping pattern from less requiring to more watering requiring cropping sequences. This has resulted in scarcity of the water in the other areas of the watersheds and has affected overall production.Therefore as far as possible; cultivation of the high water extracting crops should be avoided in the watersheds; choice must give to crops solely dependent on rainfall. Besides, efforts should be made to enhance the water use efficiency". On this background impact assessment of the watershed project at village level is needed using innovative technique for better planning of planning and watershed management and allied resources.

Now a days water harvesting techniques have immense importance in rural development. To analyse the impacts of watershed development several techniques had have used to assess impact on ground water levels. Specific yield is the water removed from unit volume of aquifer by pumping or drainage and is expressed as a percentage volume of the aquifer. Specific yield depends upon grain size, shape and distribution of pores and compaction of the formation. The values of specific yield for alluvial aquifers are in the range of 10 to 20% and for uniform sands about 30%.

METHODOLOGY :

Pumping Test for Shallow Dug wells - This methodology is used to assess the performance of the watershed activities on the ground water level. The Specific Capacity formula of slichter has been used for analysing pumping test of the dug-wells in the study region. The slichter formula is as follows.

$$C = 17.25 \text{ A/t log}_{10} \text{ S1/S2.}$$

$$= 2303 \text{ A/t log}_{10} \text{ S1/S2 (In metric system in litre per minute / meter)- (1)}$$

Where C = Specific Capacity, A = Effective cross sectional of the well, t   = Time in minutes since pump stopped, S1 = the total drawdown just before pump stopped, S2 = the residual drawdown at any time since pump stopped (t)

The application of the above formula indicates that, in case of open wells showing quiescent (slow) reservoirs, their exists the some direct relationship between t and log S1/S2. In other words, all the values of t are plotted against the S1/S2 on the semi-log graph sheet (Result and Discussion), with the later on the log scale; the points would generally fall on the straight line. This suggests that there is continuous adjustment between the rate of infiltration and hydraulic head acting at a given time. The loop of the straight time plotted in semi-log graph sheet (Photo plate No.1) would be helpful in determining the values of "t" and "s" which can be substituted in the Jacobs formula, wherein

$$T = \frac{264}{\triangle S} \quad (2)$$

Where, T is coefficient of transmissibility in gallons per day per feet (gpd) and S (read as delta S) is the slope of the time draw dawn graph expressed as the change in drawdown between any two values of the time on the log scale whose ratio is 10 i.e. for one complete log cycle

In metric system, Jacobs formula-

$$T = \frac{2.30 \text{ Qm}^3}{4\,\pi\,S \quad \triangle} \quad (3)$$

Once "T" is calculated, the following formula can also be solved.

$$S = \frac{0.3\,T\,t}{r^2} \quad \text{(Dimensionless)- (4)}$$

Where, S = Storage coefficient, T = Coefficient of Transmissibility in gallons per day per feet, To = intercept of the straight line at zero draw down in days, r = distance (in ft) from the pumped well to observation well.

Where the drawdown measurement taken.

In case of large diameter open dug wells (As in the case of wells in the present area), the "r" factor can be considered to be the effective diameter of the well itself.

$$S = \frac{2.25\,T\,to}{r^2} \quad (\,5\,)$$

In "T" and "S" formula in metric system
Q = rate of discharge in cubic meters per day, = 3.14 , r = in meters, s = in meters, 1 m = 1 kiloliter
The specific yield values (SYV) of geological formation in the zone of water table fluctuation as computed from pumping tests are to be utilized in the recharge estimation. Jacobs and Slicther formulasused to compute the specific yield of the open well in the KR 22, KR- 25 and BM114 watershed. The standard values from different studies and values obtained after field investigation.

RESULTS AND DISCUSSION :

The results are discussed as follows
Test No.1 Specific yield test for Open well - Village Tadsar (Experimental village) Taluka- Kadegaon District- Sangli.
Slither Formula
Capacity C= 2303 X A/t1 X log10 s1/s2
314.59 litres per minutes per meter of drawdown
Delta S= 0.85 m, Discharge Q = C XDD X1440/1000, t = 4.12 minutes, Discharge Q = 611.56 cubic m /day, Transmissibility T = 2.303 XQ / 4 X 3.14 X Delta S (From Graph), Transmissibility T = 131.923 sq.m / Day,Storage Coefficient S =2.25X T X to/ R^2 X 6.96 / 10^{-4}, R= diameter of well, Storage Coefficient S = 0.0258, S X 100 = 2.58,
Specific yield= 2.58%.
The Specific yield of the open well is 2.58% which is consider being good in the hard rock geology of the Deccan trap of Maharashtra.

Test No.2 Specific yield test for Open well - VillageRenavi (Experimental village) Taluka- Khanapur District- Sangli.
Slither Formula
Capacity C= 2303 X A/t1 X log s1/s2
695.74 litres per minutes per meter of drawdown
Delta S= 0.51 m, Discharge Q =C X DD X 1440/1000, t0 = 4.20 minutes, Discharge Q =781.46 cubic m /day, Transmissibility T =2.303 X Q / 4 X 3.14 * Delta S (From Graph), Transmissibility T = 280.957 sq.m / Day, Storage Coefficient S =2.25 X T X to/ R^2 X 6.96 / 10^{-4}, Storage Coefficient S = 0.0214, R= diameter of well, S * 100 = 2.14%
Specific yield of the open well is = 2.14 %.
Both of obtained yieldsis considered to be good in the hard rock geology of Maharashtra.

DISCUSSION-

To analyse the impact of watershed development activity on the groundwater availability the specific yield test have been carried out in the village Tadsar (KR 22) and Renavi (KR 25) watershed. The SYV values have been 2.58% in the village Tadsar and 2.14% in the village Ranavi. These values have been complied with standard values given by GSDA for the geological formations of vasicular jointed basalts (V.J.B.). The Standard values of SYV values for this formation is ranged between 1 to 3% all the analysed value have been equal to maximum limits of these standard values. It is revealed that watershed development activities have positive impact on groundwater availability.The SYV has given in Table No.1.

SVY indicate that, watershed development activities are important in the improvement of ground water level. It is reported that, in India still such type of post evaluation techniques have not been used for assessing the impacts of watershed works. The superficial method of assessment leads to allocation of funds at same watersheds. Computation of SYV is important aspect of watershed management, which give significant base for planning and management of water resource.

REFERENCES :

1. Slichter's and Jacobs's - Computation of Specific yield using Slichter's and Jacobs's method to assess the water yielding capacities of open wells, GSDA, Pune.
2. Planning Commission Report (2001)-Page No.5.
3. Ground water Survey and Development Agency Report (2011)

Table No.1 : Specific Yield Values (SYV) recommended by GEC, 1994 and Field Assessment

SN	Area	SYV %	SN	Area	SYV% / WS
Recommended values by different studies			**Observed values-**		
			Standard Value for Basalts is 1-3 %.		
1	Sandy Alluvial	12 -18			
2	Valley fills	10-14			
3	Silt/Clayey Alluvial area	5-12	Observed values in Field Assessment & GSDA , Pune		
4	Granites	2-4	1	Basalts	**2.58 / KR 22**
5	Basalts	1-3	2	Basalts	**2.14 / KR 25**
6	Laterite	2-4	3	Basalts	**3.45 / BM 114***
7	Weathered, Phyllites, Shales, Schist& Associated Rocks	1-3	4	Basalts	**2.20 / BM 114*+**
8	Sandstone	1-8	*The values taken from the GSDA, Pune Dated 11 July 2011.		
9	Limestone	3			
10	Highly Karstified Limestone	7			

Photo plate No.1

Test No.1 – Open well – Semi Log Graph Paper
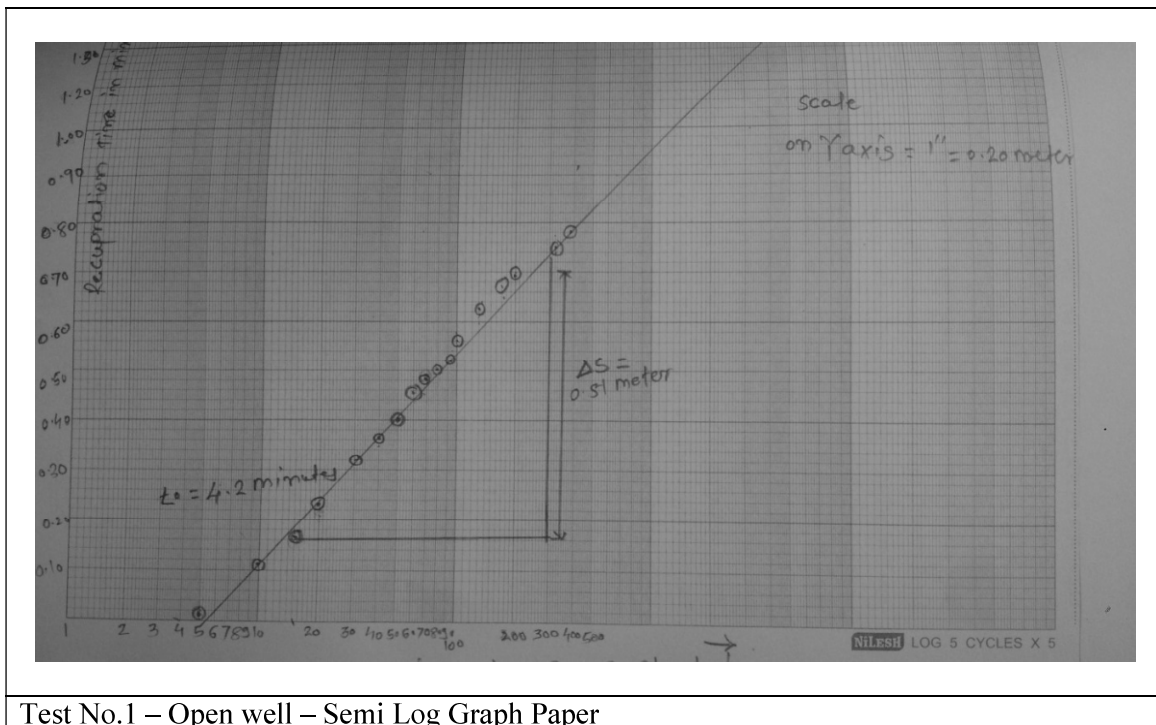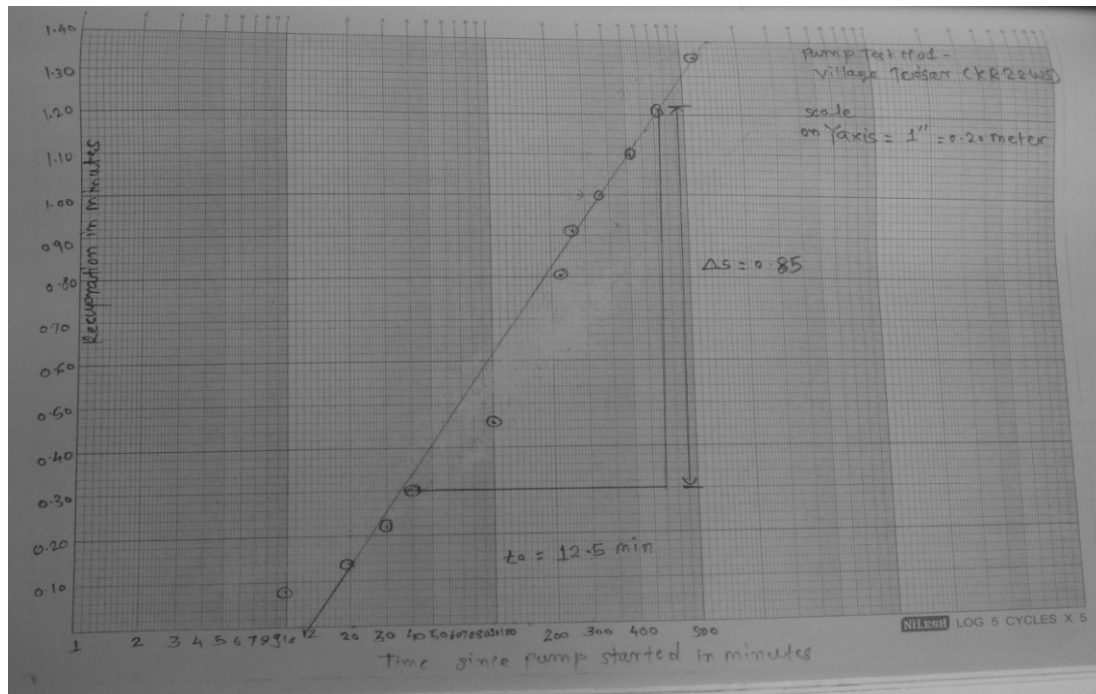
Test No.2 – Open well - Semi Log Graph Paper