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**Founder, IPEM Group of Institutions**

**Dr. B.S. Goel**

(04.08.1937-10.01.2017)

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# From the Editorial Board

**W**e are glad to present the Fourth Edition of the IPEM Group of Institutions, Computer and IT Department Journal "IPEM JOURNAL OF COMPUTER APPLICATION & RESEARCH", December 2019. However, we braved all the odds, and published the issue as always, on time. We followed a rigorous method to select the papers. All the papers we have included in this issue of IPEM JOURNAL OF COMPUTER APPLICATION & RESEARCH are peer reviewed and only those papers which went through this rigor have been given space in this Journal.

This Journal attempts to document and spark a debate on the research focused on technology in the context of emerging technologies. The area could range from Computational Intelligence, Cyber Security Challenges, Image Thresholding Techniques, Cloud based CRM etc. These technologies could be from very sophisticated to very elementary, but in term of impact they would be capable of being commercialized, scaled up and focused on real life challenges.

We sincerely hope that these in-depth research papers, focusing on different technologies, will further stimulate the academic research, and will help in developing an insight into the concerned areas. We are eagerly waiting for your critical response which we shall incorporate in the forthcoming issues. We are greatly indebted to the paper writers who took keen interest and submitted their research papers on time. It is because of the sincere efforts of these people that the IPEM JOURNAL OF COMPUTER APPLICATION & RESEARCH is in your hands today.

We are grateful to our Secretary - Mr. Anupam Goel who provided all the moral and financial support to publish the IPEM JOURNAL OF COMPUTER APPLICATION & RESEARCH.



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# A study on Different Image Thresholding Techniques

Dr. Rajeev Kaushik\*  
Dr. Naveen Kumar Singh\*\*

## ABSTRACT

*In the present communication, we have a comparative study on different image thresholding techniques applied to five images, which depicts the disadvantages and benefits of the different methods. All the images are grey scale images of 256x256 sizes. We have applied different thresholding techniques on these grey scale images of 256x256 sizes. Black pixel ratio (BPR) is chosen as a benchmark to understand the effect of different thresholding techniques, that grey scale image is of good quality whose black pixel ratio (BPR) is minimum. After experiment we can conclude that histogram thresholding is best among others.*

## Introduction

Thresholding is a technique used to segregate the object details from its background [1] and Image segmentation is division of image into different categories which represent specific object or part of objects. In best segmentation the pixels of image having similar grayscale of multivariate value are put together in one category and neighboring pixels having different pixel values are put together in different category. Image analysis process becomes simpler and effective, if image segmentation is done properly. Computer based automatic segmentation algorithms does not provide required results, but manual intervention into these algorithms has produced wonderful required results. Various algorithms are used for image segmentation on behalf of two important properties i.e. intensity values discontinuity and similarity. Thresholding technique is given more importance over other techniques, where computation is of great consideration that's why it is widely accepted for image segmentation [2]. Threshold segmentation techniques can be divided in following categories:

- Local techniques, depending on the local properties of the pixels and their surroundings.

- Global techniques, in which information gathered globally is used to segment an image.
- Split, merge and growing techniques, to obtain better segmentation results idea of homogeneity and geometrical contiguity is used.

A threshold method called an auto-adaptive approach based on multi-resolution analysis (MRA) is used to decrease the complexity of 2-D histogram, which additionally improves the searching precision of multi resolution threshold method. These type of approaches originates from the advanced segmentation effects achieved by 2-D histogram through the spatial correlation of gray level and the flexibility and efficiency of the threshold searching of multi-resolution threshold segmentation method [3]. Global threshold defines the threshold depends only on grey level values which refers the character of pixels whereas in local threshold divides the original image into several sub regions, and different threshold values is chosen for each sub region. [4].

## Literature Survey

Preliminary studies using fuzzy logics have been reported in literature. An ideal segmentation method should have a classification rate of 100% and

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a false detection rate of 0%. Different segmentation techniques for the color images remain a very difficult task [5] for which a different data fusion technique has been tested for image segmentation. A data fusion algorithm accepts two or more ranked lists and merges these lists into a single ranked list with the aim of providing better effectiveness than all systems used for data fusion. The aim of data fusion is to handle data uncertainty, data impreciseness and incomplete information regarding that system [6]. Thresholding is a technique used for processing an image for obtaining a binary image from its gray scale one. Thresholding technique affects various performance criteria like segmentation of the said document into different text objects as well on the correctness of the OCR (optical character recognition) [7]. Also if thresholding is inappropriate, it leads to blotches, streaks, erasures, fractures of character shapes in the document. In NDT (non destructive testing) [8] applications, thresholding technique is considered as initial step for image processing operations like statistics assessment, morphological filtering and measurements. While the document images forms at least one category of images, non destructive testing images can be derived from different modalities along with numerous application goals. Thus it may be even more difficult to predict a single universal thresholding method that applies well to all NDT cases. There are different research papers mentioning the role of thresholding in images. Lee, Chung and Park [9] in their research paper have deeply analyzed and compared different thresholding techniques and also look into some useful criteria of thresholding evaluation. In Histogram shape-based methods curvatures, peaks and valleys of the smooth histograms were studied critically. The thresholding in such type of methods are truly dependent on the shape and properties of the histogram. Segmentation of a given image is mainly composed of the separation or division of the image of same/ alike attributes into various regions. The major attribute in the segmentation of the image in case of black and white image is amplitude of brightness and number of bits for a pixel in case of color image, while sharp edges and the textures are another useful attributes for segmentation [10]. There is not a single standard methodology for image segmentation accepted universally, but there are several adhoc methods which have gain huge

popularity worldwide. The main aim of image segmentation is segregation of the image into a set of different regions having similar properties, such as brightness level, color/ texture of image for discontinuity/ similarity and properties of the pixels in relation to their local neighborhood mentioned in various segmentation methods [11].

## Methodology

In this section, we are going to explain the development and implementation of different algorithms for thresholding techniques, which produces a perfect binarisation of image very easily. The algorithms defined for various thresholding methods are as follows:-

### Algorithm for Mean Thresholding:

Here in this thresholding the average of pixel value is calculated and is used as threshold value. The algorithm is given as under:

1. Sum of pixel value is calculated.
2. Sum of pixels is calculated.
3. Threshold value is calculated as  $t = \text{sum of pixel value} / \text{sum of pixels}$  (using 2 & 3).
4. The obtained threshold value is used to convert a black & white image into binary image.

This threshold value is threshold for whole image by which we can get binary image.

### Algorithm for Histogram thresholding:

In histogram thresholding, there are so many methods of thresholding but we are taking mid - point method for our consideration. Different steps are as under:

1. An initial threshold value 't' is determined.
2. Lower ( $m_1$ ) and above ( $m_2$ ) two different mean values are calculated.
3. The new threshold value is calculated.  $T_n = (m_1 + m_2) / 2$ .
4. If the threshold is stabilized ( $t = T_n$ ), then this would indicate that the new threshold level is this one. Else wise, t would become  $T_n$  and it would also reiterate from step2.

The threshold value calculated above is threshold for whole image by which we can get binary image.

**Algorithm for Variable thresholding:**

In variable thresholding, threshold value is changed from pixel to pixel of an image. The steps for variable thresholding are:

1. Input image is divided into different sub images p1, p2, p3 ... p8.
2. Take p1=I(1:32; 1:256).
3. Sum of pixel values of sub image is calculated.
4. Sum of pixels of sub image is calculated.
5. The threshold value is calculated as,  $t = \text{sum of pixel value} / \text{sum of pixels}$ .
6. This threshold value is used to convert a gray scale sub image into binary sub image.
7. Steps 3 to 6 are repeated for all eight sub images.
8. Single binary image is formed by combining all binary sub images.

The variable thresholding is also named as adaptive thresholding as threshold value is different for different sub images.

**Algorithm for Edge thresholding:**

In edge thresholding method, boundaries of an object are detected. The steps involved are:

1. Gaussian filter is used to smooth the image.  $g(x,y) = G(x,y) * i(x,y)$ .
2. Gradient and magnitude of  $g(x,y)$  is computed.  $M(x,y) = \sqrt{g_x^2(x,y) + g_y^2(x,y)}$ .
3. Direction is computed  $\theta(x,y) = \tan^{-1}(g_y(x,y) / g_x(x,y))$ .
4. Using a particular threshold image is thresholded.

5. Non-maxima pixel in  $\theta(x,y)$  is suppressed.
6. Image is thresholded using two thresholds T1 & T2 to obtain binary images.
7. Edge segments are linked to get complete edges.

The image obtained after edge thresholding shows the boundaries of objects through which objects can be detected.

**Algorithm for P-tile thresholding:**

1. Find the intensity level and set it as threshold value.
2. Grey level of the image is calculated by using histogram value  $H(g)$ .
3. P% should have intensity less than the grey level.
4.  $H(g)$  is examined in the neighborhood of  $g$  to find out the best threshold value.

**Results**

An objective of research work is to compare various thresholding techniques and compare them to find the best method out of them. The images used for comparison by using Mean thresholding, Histogram thresholding, Variable thresholding, Edge thresholding and P-tile thresholding method is bird image, which is grey scale images of size 256x256. The parameter for comparing is Black Pixels Ratio (BPR). The black to white pixels ratio (BWR) is calculated for each image and then the BPR is calculated which is tabulated for comparison. Keeping all the objectives in mind the results of thresholding methods are as under mentioned in figure1 and table 1.

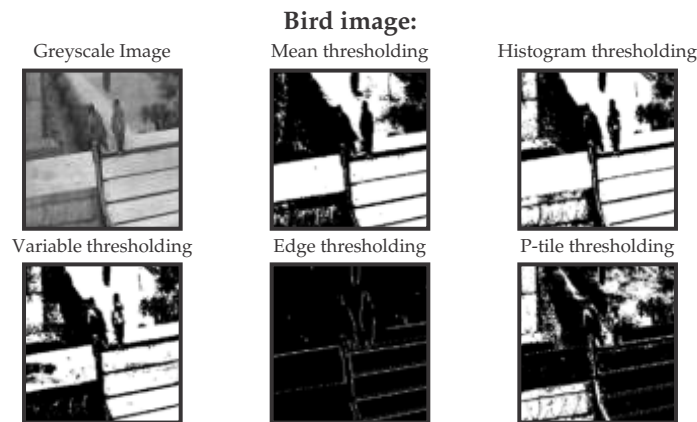


Figure 1. Comparison of bird image



| Thresholding techniques | Black to white pixel ratio | BPR (%AGE) |
|-------------------------|----------------------------|------------|
| Mean thresholding       | 131366:130778              | 50.11      |
| Histogram thresholding  | 24660:237484               | 36.12      |
| Edge thresholding       | 224499:37645               | 97.94      |
| Variable thresholding   | 107002:155142              | 46.14      |
| P-tile thresholding     | 80919:181225               | 73.25      |

**Table 1.** Comparative study of thresholding techniques w.r.t. BPR for bird image

From the comparison, we find that Histogram thresholding is the best thresholding method.

### Conclusion

In this present communication, we surveyed five different thresholding techniques. These different techniques were implemented on a bird Image and the image is grey scale image having size of 256x256. The performance comparison of these techniques is done through black to white pixel ratio. The image after thresholding having minimum number of black pixels is considered as best binary image. We conclude that histogram thresholding is the best thresholding technique because it is having minimum black to white pixel ratio, however the threshold image don't have sharpness.

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# Future Responsibility of IPv6 enabled Internet of Things (IoT)

Dr. Kewal Krishan Sharma\*  
Dr. Naveen Kumar Singh\*\*

## ABSTRACT

A lot of development in computer networking technology and computer related development had put the world in a scenario where without an internet connection everything seems to be useless or unfit. The IPv6 with increased capacity of 4G and 5G has started to take place and IPv6 is replacing all persisting network protocol. Soon all devices will be connected via multiple paths and free from ISP sub-netting. Stable communication will have to face major challenges in such situation, where everything has to be, 24x7 connected with rest of world. This is also demanding the interaction should be done without human supervision what we called it unsurprised Artificial intelligence.

**Keywords:** IPv6,(AI)Artificial Intelligence, Mobile computing, IoT, AS(autonomous system).

## Introduction

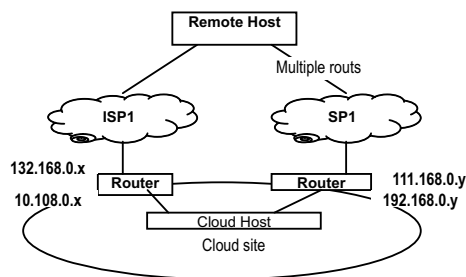
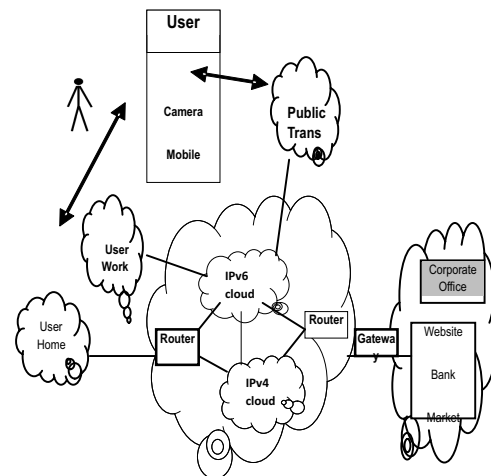


Fig.1 : Multihoming

Multihoming is the method to connect the remote computing device with the help of multiple inter undependable paths. This is helpful to create fault tolerant and load balanced network.

IPv6 is changing the world very rapidly; it will overcome the problem of IPv4 for exhausted of IPv4 address problem. Today world is dual IPv4/IPv6 cloud world and it is dependent on ISP based structure since the shortage of IPv4.



## 2. IPv6 Support Cloud

Combination of Public Cloud as well of private cloud, but soon this will not be remains same there will be total cloud based as compare to individual infra structure. India is 46% ready for IPv6. The devices will get its unique IP address and that may be the ISP independent as shown in Fig.2.

### 1.1 Moving computing enabled devices

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Moving networked computing devices such as mobile, laptops, tables, GPS enabled devices on IPv6 [6] protocol, are increasing dramatically. Mobile computing devices has three parts: Mobile hardware, Mobile communication, and Mobile software. The first part includes communication related matters in ad-hoc and infrastructure networks in term of wireless communication, Mobile phone network communication, and as well as communication properties, protocols, data formats and concrete technologies. The second part is on the hardware, like mobile devices or device components. The third is about the those s/w which are design in such way that they keep on work flawlessly while the device is keep on changing it location from one network to another network.

### Problem & Discussion

There are various concerns which are very important to be discussed and to work on for future issues avoidance. As IPv6 enabled Multihoming based cloud computing is going essential. When such node become on which is using Multihoming, Multihoming will creates more than 1 rout may be 4 to 5 links routs depending on the how much ISP and direct links, he has connected and how much those ISP in multiple ways, are connected to the rest of world.

When the sensors are in numbers with huge information has to be transmit every moment. Combined power of IPv6 and IoT increases the routing table entry and creates an additional routing load on routing devices such as routers and Gateways. Multihoming is also used to increase severity of various attacks like DOS denial of services, spamming and such others [8][9]. These loads can be understood easily, but also be reasons for slow internet performance and often congestion. Mobile/Sensors devices had enhances the effect of Multihoming by two reasons.

1. In IoT based cloud world Mobile computing provides more time to user/devices/sensors to be remaining connected, user can be connected to the network all the time while user is not on the sitting place.
2. IPv6 enabled IoT based Multihoming creates multi paths for a multiple locations.

Device/Sensors create multi paths using Multihoming. Since it is authorized separately for both networks, a malicious program resides in the device which is infected at the previous location. This program will easily scan the new network available. Since such malicious program is sitting in devices/ sensors which is authorized in current network, it can create problem in authorized network.

Since this malicious program has two networks accessibilities, it can easily sideline the securities of both network by combine two networks, behaving as router of two networks. Using multi path mechanism it can makes fool remote machine easily and easily put treble in the security of remote host.

User has mobile data card which provide him a 10 mbps 4G connection 5G (more than 1Gbps). Some application like torrent and other downloader are creating multi routs. The IPv4 model is facing serious challenges, some of them are following are other concern:-

- a). Route Congestion & network overloading
- b). Virus Attack
- c). Broadcast.

Ad-hoc network faces several types of attack such as Location Disclosure, black hole, replay, wormhole, denial of services, routing table poisoning, rushing attack, masquerading, virus and passive listening with traffic analysis. These are direct challenges to IPv6 enabled Multihomed IoT with extended severity may bring down the network to standstill.

To mobile machines/sensors, it is very difficult to judge an unknown network. Whether stay on IPv4 network or shift to IPv6 in new network. These will creates a situation in which, many packets be routed from the both network because both network will be there.

On checking connectivity at various places and monitored response times. A lot of disconnection were noticed and observed slow response times while moving during the transmissions using remote desktop logins, a lot of disconnection faced while entering in new network. Some location showed, connected system behaved abnormally. For example sometime packets forwarded to unknown gateways and then lost without reply or sometime the response time reaches in thousands

milliseconds. Sometime browser stuck-up and it needed to reboot the system to established fresh connection. Sometime server refused to get fresh connection since the early remote login was active which we connected from early location. It has been seen that some unattended connections were still open when we returned to same locations. At overlapping zone device start change IP addresses for both overlapping networks so frequently to work properly, due auto connection condition started to connect one network than other network as the strength increases and decrease.

IoT with IPv6 will be more effective in Mobile computing since IPv6 will provide individual unique IP address to AS device. It will force to use the IPSec, which will reduce the risk of the packet to interrupted and interpreted in the channel.

DHCP configuration of IPv6 greatly helps to produce network easily. These will more easily implementation of Mobility without changing IP in different Networks. Due this device may able to work with it unique IP address rather than network dependent IP. But there should require more effort to implement such thing, need more open network that allow any type of IP to get connected with WAN. Proxy and NAT requirement will not be there, due to this, hopes will be reduced in each packet transmission.

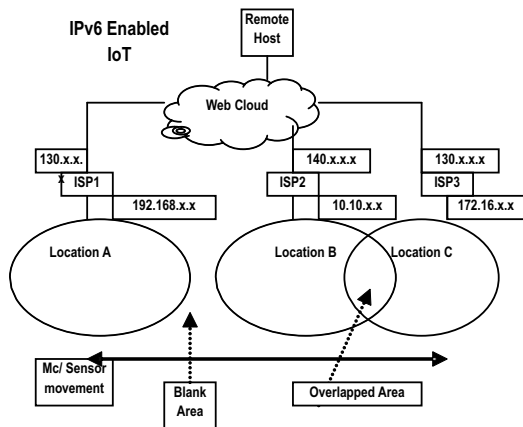


Fig. 3 : User / Device Movement

User who is mobile and keeps on changing locations is major concerns in future since technology is going to provide a implementable solution to all moving sensors in bulk ways. There are two locations A and

B, which is far away, and there in between is middle location C where none of the two network reach well in good strength. A and B overlapped at C place, the network strengths of both continuously varies in area of C, which is good enough in size.

A moving AS start works at location-A user get connected to remote host (RH) via network. The IPv4 IP are used, due shortage of IP, everywhere the NAT is used and user works with address LAN address at different places. As fig.3 depict user get a IP of 192.168.x.x series at location A, while user moved to location B user get the IP address 10.10.x.x and in location C user gets IP series 172.16.x.x, this way, user gets a different IP at all different locations. This creates problem at remote host where user after authentication from location A and remote host authorizes the user on the basis of IP address. Since user does not have real IP, user's router or gateway IP will be authorized at remote host. When user reaches in the no signal area user's all connection remains open for location A. The multi paths are established and it will remain open. When user reaches location B user get new IP and user's router/gateways will used as authorized computer but the remote host will treat it as unauthorized connection and abruptly force to close connection.

While user reach at overlapping area the situation can further worsen since as the laptop keep on changing position, signals strength start changing of both network, as the strength increase of the B location, the DHCP of B location gives it LAN IP of series 10.10.x.x and user get connected that LAN. But soon C strength increase and laptop get IP of series The speed of a rout is effected by the speed of slowest routing point.

Many websites are not yet IPv6 enabled. Windows like OS are using IP Teredo Tunneling Pseudo-Interface as conversion method. This tunnel creates a packet of IPv4 from IPv6 and then again IPv4 to IPv6. This conversion consumed a heavy computing resource. IPv4 router has to route those packets which have less data payload and great addition packet related information.

They will contain IPv6 header inside IPv4 data packet payload. So in actual they are doing data communication in very less efficient way. Lot of time will be consumed in IP conversion at source

and destination node. Due to Multihoming huge computing resources like CPU cycle and RAM memory will be consumed. Multihoming brings packets from various streams, a complex and time consuming process creates additional overhead compare to a single stream, this will be problematic in cloud computing where the simultaneous the multiple connection has been running to satisfy the multiple users all around the world specially in world of AI supported AS.

There will be a situation when a moving device contain virus and start virus Attack, is creating lot of traffic. Mobile Multihoming increases effects of attacks. There will be a great concern how the firewall and other control will be implemented on such open network in future when device will be available without LAN and Firewall. While using Mobile computing the firewall implemented on premises LAN will not allow user to access organization resource when he goes on WAN, by real IP in mobile Computing. Still in IPv4 all real IP are controlled by the ISP, the same may be applied in the IPv6 device with multi homing will face problem when some of the packet is routed through IPv4 network and some packet will routed on IPv6. There may be situation even better rout available on either IPv4 or IPv6 network but the system will not able to use it while entering in to new unknown network. This will create under utilization condition.

Software will produce heaviest load on the networks. Some of them are Skype, Youtube, especially with high definitions videos, Chatting and Messaging when attack is start on a cloud providing the cloud will block the Public IP via which the attack is going on, but it is difficult to block a mobile device.

Now going on move from one network to another network. While moving to new network the LAN ip is also new, in such condition the Public network real IP is also new and the new LAN address is also new. It become difficult to block new real IP since there may lot of other user is doing the work with that real IP. When IPv6 will be in full swim the difficulty will multiply in many folds. Social software such as Facebook, twitter, , WeChat, Whatapps, TV online, News with online videos GPS systems, Security cameras, live video conferencing. The sensors used in IoT to control devices such as fan, lighting, AC,

Cooler, TV, house / Organization will make everything automatic and remote control/managed but also produce a unsubstantial congestion.

## Conclusion

It is assumed that cloud based IoT has to take care of critical and difficult issues in coming time. The users will be connected all the time with help of social cloud chat software, such as Skype, Whatapps and other GPS based software. User will use online TV on.

Multiple users will place website in own laptops/mobile phones and there website will move with them and they will avoid cloud computing and use of cloud based web space, due to money reason and security reasons. Implementation of IPv6 will easily available the freedom to make user's device visible to everybody on the internet at any point of time. This will make a shift in the current protected world of firewalls and security system due to isolation mechanisms.

3.1 Future scope of the IPv6 and IoT with multi path system is going to be massively scalable. The working of all routers is still working on best path basis. They all exchange information keep in mind, the best in term any cost like time/ hops the one best path only, not IPv6 enabled IoT. The routers in internet simply start data sending on best and do not select multiple paths and other hand, major OS do not implement the Multihoming facilities yet. We have seen or noticed that as soon one network come in effective the OS simple turned out weak signal network without bothering, even though that network might had maintaining many connection. This can be seen in mobile phone / move devices such as apple pad, tablets, as WiFi get connected, it switch off mobile data, network of carrier. So even to network are available it complete switch over to strong network as instant as possible, it do not try to use both network. Still a big change is required in all available hardware/ mainly in software. The major work will come when the IPv6 will be implemented fully. There will be numerous and complex issues, when two heterogeneous IPv4 and IPv6 worlds will be there with mobile sensors/devices such as IP enabled camera, GPS, PDA, iPad, transport system and such others devices. The new simple, more effective and secure protocols will require. The

increase dependency on computer and Internet with required availability to access information 24x7 all around the year time span, at all location of the earth, had created a lot of pressure on the computing infrastructure especially on computer inter connected networks. So we see, future Responsibility of IoT is important and lot work had to be done for handling huge future requirement.

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# A Review on Metaheuristic Scheduling Techniques for Cloud Computing

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## ABSTRACT

*In view of the powerful evolution and migration of many network services to such a computational setting, cloud computing has become an increasingly significant research area. The issue that occurs is linked to the management of effectiveness and the use of big quantities of computing resources. This article starts with a short retrospective of traditional scheduling, followed by a thorough analysis of metaheuristic algorithms to solve scheduling issues by putting them within a unified structure. This article, armed with these two techniques, examines the latest literature on metaheuristic cloud planning alternatives. In relation to application using metaheuristics, for the reference of future cloud planning research, some significant problems and open questions are provided.*

**Keywords :** *Cloud computing, metaheuristics scheduling, stochastic scheduling, randomization, virtual machines*

## Introduction

The scheduler's goal[1]–[5] is to find ways to allocate tasks appropriately to limited resources that optimize one or more goals. Modern planning methods are usually thought to be dated back to Johnson's study[6]. Scheduling is now commonly used in various applications, such as the manufacture of printed circuit boards, energy system control, and World Wide Web (WWW) multimedia information object scheduling[3]. Since one of the major applications of contemporary scheduling is the allocation of duties from Internet users to restricted funds on distributed computing systems, these systems have experienced several modifications from the 1980s until now. Several modifications have been made to these schemes. One of the early modifications was the emergence of cluster systems that combine several standalone pcs to operate as a single system[7],[8]. The next shift, grid, was created to combine all accessible heterogeneous resources from geographically dispersed institutions[9] in order to solve the issue of cluster systems being only able to use local

resources. A latest change is the cloud computing system shift[10]–[13] that leverages cluster and grid strengths.

Unfortunately, given the apparently infinite computing resources of the new type of computing systems, there are no polynomial timing algorithms to optimize the distribution of these computing resources because most planning issues are either NP-hard or NP-complete[14]. Taillard[15] presented a simple example to explain the dilemma we face, that is, less than 0.02% of the candidate solutions are between the makespan of the optimal solution and 1.01 times the makepan of the optimal solution. This instance informs us that finding the optimum solution for big issues will be very hard.

Exhaustive algorithm and deterministic algorithm (DA) are two popular techniques for scheduling present computer systems. DAs[16] are much better in practice than traditional exhaustive algorithms because DAs are quicker for scheduling issues. The two primary drawbacks of DAs, however, are that they are not intended for all distributions of

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information, and most DAs are unsuitable for large-scale planning issues.

Metaheuristic algorithms (also called approximate algorithms) use iterative approaches to discover alternatives in a sensible moment, unlike DAs and the exhaustive algorithm. This article not only offers a systematic description of scheduling, but also bridges traditional scheduling with metaheuristic scheduling to provide scientists with guidelines concentrating on traditional scheduling to move to metaheuristic scheduling on cloud computing systems.

Note that this article uses metaheuristic algorithms to distinguish traditional heuristic algorithms from contemporary heuristic algorithms.

The rest of this document is arranged as follows. A short introduction to traditional scheduling starts in Section II. Section III's primary aim is to use a unified metaheuristic structure to combine metaheuristic scheduling algorithms with other algorithms to decrease the effort to learn these algorithms. Section IV provides a short overview of cloud-based metaheuristic scheduling that contains the features of scheduling issues, measurements, and algorithms submitted to fix them. Section V draws conclusions and future trends.

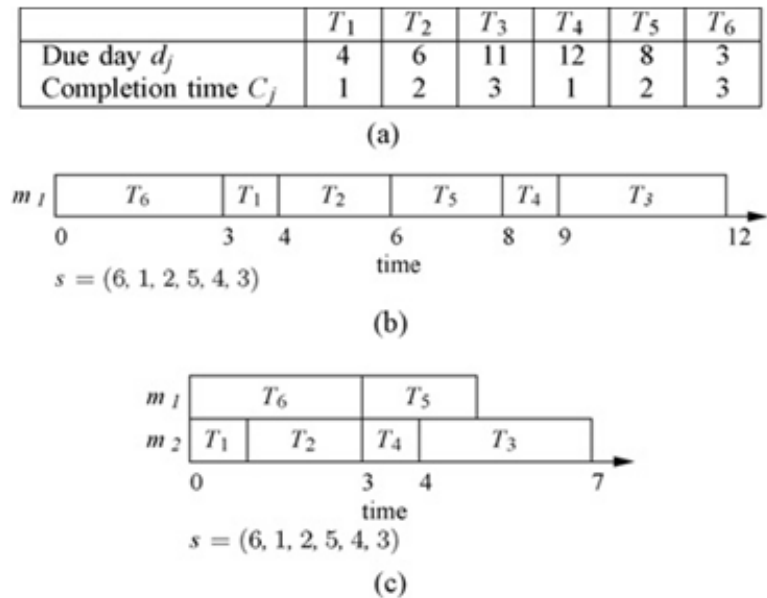


Fig 1 Simple instance showing how to allocate a set of specific duties to a set of computers.

(A) The date and time of completion of each assignment.

(B) Results acquired by assigning a single machine to all duties.

(C) Results acquired by assigning a parallel machine to all functions.

### Traditional Scheduling

The so-called planning issue [3],[21],[22] can generally be regarded as an issue aimed at assigning a set of duties  $T = \{T_1, T_2, \dots, T_n\}$  to the set of devices provided  $M = \{M_1, M_2, \dots, M_m\}$ . Subject to the limitations of optimizing one or more predefined or objective measures or features. The planning issue is referred to as a single processor (single machine) scheduling issue when there is one and only one

machine, i.e.  $m=1$ . The scheduling problem is considered to be a multiprocessor (parallel machine) scheduling problem when there is more than one machine, i.e.  $m \geq 2$ . Objective features makepan, lateness, tardiness, flow time, and their variants are commonly used for measuring the efficiency of scheduling algorithms in scheduling research. Readers are referred to [1] and [22] for the information and other measurement techniques.



## Metaheuristic Scheduling Algorithms

### Unified Metaheuristics Framework

We start with a metaheuristics structure, followed by an introduction to the metaheuristic algorithms inspired by the program of evolution (EP)[26]. Unlike EP, which assumes that a specific mechanism selects the alternatives to be passed on to the next iterations, the framework described extends EP's scope to include a bigger amount of metaheuristic algorithms. The amount of alternatives searched for each iteration can be one or more, and the determination operator is used to break the

restriction by choosing some of the present alternatives to pass them on to subsequent iterations instead of the selection operator.

As Algorithm III-A shows, in this framework, where  $s$  denotes the current solution,  $v$  the candidate solution, and  $f$  the evaluated value of  $s$ , the initial, transition, evaluation, and determination operators are used. Besides these operators, how to encode the solution (represented) is a critical problem for implementing metaheuristic algorithms to scheduling issues.

---

#### Algorithm 1 Metaheuristic Algorithm

---

```

1: Create the initial solution  $s$ 
2: While the termination criterion is not met
3:    $v = \text{Transition}(s)$            T
4:    $f = \text{Evaluation}(v)$          E
5:    $s = \text{Determination}(v, f)$    D
6: End

```

---

In addition, T, E, and D will be used to indicate the transition, assessment, and determination processes of each algorithm outlined in this document, respectively, to simplify the debate that follows.

- 1) **Transition:** The function of this operator is to change the present solution(s) to the next state. The two prevalent transition techniques for combinatorial issues are perturbative and constructive[27]. Naturally, this operator can be very simple or very complicated depending on the design of the metaheuristics.
- 2) **Assessment:** This operator is liable for assessing the importance of the problem's objection feature, such as the makepan of a planning problem. Some metaheuristics do not use a feature of objection to directly assess the alternatives. Instead, other measuring processes are used to determine the value in the room of the choice. Since either in the objective room or in the decision room the value can be assessed, this means that the value may not represent the real quality of the optimization problem solution.
- 3) **Determination:** This operator is responsible for the search guidance. That is, not only the instructions are determined by this operator, but also the intensification or diversification of

the quest, which may in turn affect the convergence velocity.

The instance in Fig. 3 Explains how a metaheuristic planning issue algorithm operates, i.e. how the metaheuristic algorithm utilizes transition, assessment, and determination operators to find alternatives. In this example, the transition operator is a swap operator whose objective is to exchange sub solutions of the same solution or different solutions,

Exchanging solutions subsolutions usually requires a repair mechanism to ensure that after they are exchanged, the solution is legal for the problem. In this instance, the evaluation operator is a fitness function to assess these solutions' fitness values  $f_i$ . As for this example's determination operator, the metaheuristic algorithm will use a predefined mechanism to identify and select solutions that have a better chance of becoming the best solution. Since  $f_1$  is better than the others, as this instance demonstrates, it has a better opportunity of being passed on to the next iteration.

### Metaheuristic Algorithms for Scheduling

- i) **Single-Solution-Based Metaheuristics:** In Algorithm III-B, a well-known iterative greedy

algorithm, hill climbing (HC), is provided to demonstrate the fundamental structure and concept

of metaheuristics. T and E are indicated on line 3 of Algorithm III-B

---

**Algorithm 2 Hill Climbing**

---

- 1: Randomly create the initial solution  $s$
  - 2: **While** the termination criterion is not met
  - 3:  $v = \text{NeighborSelection}(s)$                       **T** → **E**
  - 4: **If**  $v$  is better than  $s$ , then  $s = v$                       **D**
  - 5: **End**
- 

That there are two mechanisms in this procedure: HC transition and assessment. With regard to this instance, the transition mechanism is used to generate neighbors where the assessment process is conducted and the best solution is selected

afterwards. After that, D on line 4 indicates the executed HC determination system that compares the fresh solution (also known as candidate solution) with the present solution and then utilizes the better as the starting point for the next iteration search.

---

**Algorithm 3 Simulated Annealing**

---

- 1: Set the initial temperature according to the annealing schedule
- 2: Randomly create the initial solution  $s$
- 3: **While** the termination criterion is not met
- 4:  $v = \text{NeighborSelection}(s)$                       **T** → **E**
- 5: **If**  $v$  satisfies the probabilistic acceptance criterion  
**D**
- 6:  $s = v$
- 7: Update according to the annealing schedule                      **T**
- 8: **End**

The simulated algorithm (SA) can be used to demonstrate that a straightforward shift (as shown in rows 5 to 7 of Algorithm III-B1) can create a metaheuristic iterative greedy algorithm first introduced by Kirkpatrick et al.[28] and C ernity' et al.[29]. SA's fundamental concept is to sometimes

embrace non-improving alternatives in order to escape local optima during the phase of convergence. A technique frequently used to calculate the likelihood of accepting non-improving alternatives is described as follows to emulate the annealing process:

$$P_a = \exp\left(\frac{-f(v) - f(s)}{\Psi}\right) \quad (1)$$

Where  $f(\bullet)$  indicates the role of the assessment;  $s$  the present solution;  $v$  the fresh solution; and the temperature. As shown in Algorithm III-B1, like the HC, the SA is an iterative algorithm that starts with a random initial solution and searches for the next solution by the neighbors of the current solution; unlike the HC, bad solutions have a small chance of being accepted as SA's next search direction. That's why SA can generally deliver a better outcome than

HC because it can mitigate the early problem3 of nearly all iterative algorithms like local search algorithms, DAs, and stochastic algorithms by adopting poor alternatives from moment to time.

Four distinct strategies— neighborhood interchange, neighbourhood change, ordered search, and random search — were pared in[30] to analyze what kind of mixture can deliver better

outcomes for the flow-shop planning issue than for the others. As Osman and Potts observed[30], the SA with shift neighborhood and random search delivers better outcomes than the other combinations that also outperform Nawaz, Enscore, and Ham's (NEH) algorithm and its variants in terms of average solution quality. A more recent study[17] applied SA to the issue of workshop scheduling where the neighbor selection operator only swaps (transits) subsolutions on the critical path.

In contrast to SA, which occasionally accepts poor alternatives to escape the local optima, Glover submitted the tabu search (TS) to prevent commonly looking for the same alternatives. As shown in Algorithm III-B1 lines 1 and 4, the TS keeps track of

lately visited alternatives in a tabu list to fix this issue. The TS algorithm, like HC and SA, starts with a single solution and then tries to find a neighbor to the current solution as the next solution, with the constraint that the new solution can not be on the tabu list.

If the new solution  $v$  (as shown in line 5 of Algorithm III-B1) is accepted, it will be inserted into the tabu list and will remain in the tabu list until another new solution is replaced. TS' convergence method can then prevent looking for the same alternatives for a while depending on the size of the tabu list, forcing the search algorithm to search for areas that are not in the same optimal local area.

---

**Algorithm 4** Tabu Search

---

```

1: Empty the tabu list
2: Randomly create the initial solution  $s$ 
3: While the termination criterion is not met
4:    $v = \text{NonTabu-NeighborSelection}(s)$            T  $\rightarrow$  E
5:   If  $v$  satisfies the improving conditions       D
6:      $s = v$ 
7:   Update the tabu list based on  $s$              T
8: End

```

---

The easy TS was used in[ 15] to fix the issue of flow-shop scheduling. To decrease the calculation Algorithm 4 Tabu Search 1: Empty the tabu list 2: Randomly generate the original solution  $s$  3: While the termination criterion is not met 4:  $v = \text{NonTabu-Neighbor Selection}(s)$  T E 5: If  $v$  meets the improvement circumstances D 6:  $s = v$  7: Update the tabu list based on TS 8: End Time of TS, a parallel version of TS using the master and slave model has been submitted in TS. The master is accountable for maintaining the tabu list, while the slaves are accountable for discovering better candidate solutions not in the tabu list from the neighbours.

A more latest study introduced a fresh TS search approach for the issue of job-shop scheduling. In this paper, two methods are used to create neighbours: the first method is to swap any two subsolutions (operations) on the same machine if they are on the critical path; the second method is to swap at least one subsolution, not the critical path, because if the adjustment is applied only to subsolutions on the critical path, makepan can not be reduced. In addition, the same study presented an adjustable

tabu list, the size of which can be increased dynamically and reduced to balance the Search strategy intensification and diversification. Methods for neighbor creation, swapping, as well as insertion and removal of blocks were provided .In the same research, it was shown that the suggested algorithm velocity (BF-TS) is quicker than T-TS[15] because BF-TS can decrease the candidate list from  $(n-1)2$  to  $2n$  and the amount of iterations from 4000–50 000 to 100–500 on average while giving the comparable outcome.

**Population-based metaheuristics:** two distinct population-based metaheuristics features can be used to distinguish them from single-solution metaheuristics.

First, there is a distinct amount of instructions (solutions) searched for each iteration. Second, the way in which the searched data (experience) propagates iteration by iteration is distinct, in particular most population-based metaheuristics add other methods to exchange the search data at each iteration.

---

**Algorithm 5 Genetic Algorithm**

---

```

1: Randomly create the initial population s
2: While the termination criterion is not met
3:   f = FitnessFunction(s)           E
4:   v = Selection(s, f)              D
5:   v' = Crossover(v)               T
6:   v'' = Mutation(v0)             T
7:   s = Reproduction(v00)
8: End

```

---

The earliest effort to use ACO to fix the issue of scheduling is the work outlined in [19] where the ant system (AS) is used to fix the issue of the workshop. However, the findings are far from being ideal. A more latest study fine-tuned AS parameter values to enhance the outcome of applying ACO to the issue of

scheduling. The way edge selection probability is calculated has been altered in so that poor alternatives are occasionally accepted, just like the SA, to adjust the search intensification and diversification ratio.

---

**Algorithm 6 Ant Colony Optimization**

---

```

1: Initialize the pheromone values
2: While the termination criterion is not met
3:   v = SolutionConstruction( $\tau$ )      T  $\rightarrow$  E  $\rightarrow$ 
      D
4:    $\tau$  = PheromoneUpdate(v)          T
5:   s = LocalSearch(v)              T  $\rightarrow$  E  $\rightarrow$ 
      D
6: End

```

---

Another well-known SI was submitted called Particle Swarm Optimization (PSO). Algorithm III-B2 provides a PSO outline that uses the best local and global trajectories to guide the search, i.e. the transition of solutions. PSO is generally suitable for ongoing optimization issues by using particle positions and velocities.

Algorithm III-B2 lines 3–6 indicate the speed, position, worldwide best, local best update processes, respectively. At subsequent iterations, all these update mechanisms influence PSO's search instructions.

---

**Algorithm 7 Particle Swarm Optimization**

---

```

1: Initialize the position and velocity of particles
2: While the termination criterion is not met
3:   VelocityUpdate(s)               T
4:   v = PositionUpdate(s)           T
5:   LocalBestUpdate(v)             E  $\rightarrow$  D
6:   GlobalBestUpdate(v)            E  $\rightarrow$  D
7:   s = v
8: End

```

---

## Scheduling on Cloud

Cloud computing environments planning has a comparatively brief history, but for contemporary computing systems it is an significant technology. To sum up, the latest study using metaheuristics focuses on three items: modification of operators, modification of fitness function, and hybrid metaheuristics.

- a. **Operator Modification:** The primary focus is on redesigning transition operators or adding transition operators inspired by or from other scheduling algorithms. Both influence the initial metaheuristic algorithm's search approach. Furthermore, some changes may be necessary to ensure that the solutions created by the new transition operators are legal.
- b. **Modifying the fitness function:** redesigning or adding the fitness function to suit the cloud environment in question is the primary focus. As a result, information transfer costs, communication costs, computation costs, profit, and even power usage (e.g. CO<sub>2</sub> emissions) are added to the fitness function continually. The significance of each goal is no longer the same for some research, that is, the connections between these goals have been redesigned. A nice instance is that costs are no longer separately regarded, but are regarded relative to the price.
- c. **Hybrid metaheuristics:** The basic idea of hybrid metaheuristics is to use other scheduling algorithms or domain knowledge to improve the performance of the original algorithm, i.e. strength of other scheduling algorithms to compensate for the weakness of the original metaheuristic algorithm, as opposed to modifying the transition operators or adding the local search operator. A excellent instance is a mixture of GA and SA where the GA performs the role of discovering the direction of worldwide search, while the SA plays the role of fine-tuning the alternatives discovered by GA.

## Conclusion

It's like placing a robot in a large labyrinth using metaheuristics to fix the planning issue. How quickly the robot discovers the exit depends on its vision (search capability) and intelligence (decision

capability) to a big extent. Intensification and diversification are two of the most significant skills these study works need to consider. As the names indicate, an increased search involves intensively looking for a tiny region to discover the best local optimum solution in that region. A diverse search, on the other hand, implies looking for a bigger region for a better-than-local optimum solution. A bigger region, unfortunately, does not always ensure a better alternative.

Like most study topics, cloud computing planning also fits in with the theory of product life cycle that is supposed to undergo the phases of introduction, development, maturity, saturation, and decrease. Cloud computing scheduling today is somewhere between the phases of implementation and development. Managing the Internet of Things devices and multimedia content and more efficiently saving energy are some of the major study developments on future cloud computing scheduling.

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# Block Chain & Smart Contracts in Indian Telecomsector

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## ABSTRACT

*In this trendy-techno epoch, blockchain with cloud provides way for amalgamation of various cutting-edge technologies. This paper describes technology perspectives that paved way to the design of blockchain database which incorporates technology of distributed ledgers, Machine Learning, Artificial Intelligence, Smart Contracts and a case study – Indian Telecom with Scrub as a Service (SaaS). Also discussing about the usage and implementation of smart contracts in detail. Featuring a rich permissioning system that supports public and private blockchains, it is supplementary to decentralized processes & decentralized file systems, and can function as a building block within blockchain platforms. This paper discusses how Telecom Regulatory Authority of India has displayed on strategies in co-founding combination of ICT technologies and regulations in providing a non-compromising Unsolicited Commercial Communication eco-system.*

**Key words:** UCC, Distributed Ledger Technology DLT, Blockchain, smart contracts, TRAI, National Commercial Communication Preference Registry (NCCPR).

## Introduction

TRAI had launched Telecom Commercial Communications Customer Preference (TCCCP) portal in January, 2011. Since then it has achieved its goal and has a big reach till date. The objective of the portal was to provide a user-friendly, an able and secure service to the citizens of India. It was an offbeat attempt in combining the telecom citizen centric services along with the business services in a single portal. TCCCP professes the procedure of blocking Unsolicited Commercial Communication (UCC) which was a main concern to every single person in the country and proceeding with various other transactions securely.

TCCCP holds a massive database of various transactions and the huge telecom subscriber call preference registry. The transactions with-hold other related data of UCC database such as complaint

details, registered telemarketers, unregistered telemarketers and blacklisted Telemarketers. The portal permits the telemarketers to register and follow the guidelines of a registered telemarketer to carry out their accredited commercial communications. The portal is highly efficient and functions in an efficient way, without unnecessary manual intervention. Provision facilitates TRAI to monitor all the activities happening in the portal. TCCCP also handles subscriber choice in preference of UCC, a seamless complaint handling and accelerating mechanism against the violator. TCCCP is taken to the last mile of the country, provisioning it to every citizen in India. NCCP Registry proudly holds 2.3 million telecom customers.

Aside, all the provisions facilitated to the telecom customers, TCCCP has 7001 Registered Telemarketer, who can operate with the single registration from various regional offices, a hassle free system at their convenience.

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## Findings in the Current System

Various problem areas which are related to effectiveness and efficiency of the current regulatory framework are:

- i. The preference chosen by the consumer goes through a strict process and takes a considerable time before becoming effective.
- ii. The considerable time taken for effectiveness is exploited by the unregistered telemarketer and ends up in becoming a burden to the consumer.
- iii. In spite of strict and adverse actions taken, violators find numerous and innovative ways for making UCC.
- iv. Plenty of complaints were observed where a non-telemarketer was targeted, resulting in disconnection of their numbers.
- v. A platform free mobile application was in demand to meet all the requirements of the consumers and to be readily available for them in just a click away.
- vi. Multiple cases of concern has been reported, where consumer is not aware of how to take back the consent given by him for transactional messages, which were later misused.
- vii. Entities meant for solely sending transactional messages were coaxed to send UCC which was forbidden.
- viii. Numerous entities were not traced to the violator unregistered telemarketer and was forced to halt at middle level of trace.
- ix. With growth in technology, numerous new and innovative methods has emerged for making UCC which were new to consumers and were a big hassle to handle.

## Research & Analysis Strategies

The analysis of how the data could be secured and how various changes at each module has to be implemented were studied and few cases are discussed below:

### Securing Preference Data:

The unregistered telemarketers or any other third party agents may find numerous ways to intentionally leak the subscriber preference information. Or this may even be caused by poor secure measures taken by the registered

telemarketers itself. Therefore, it has become mandatory to device a fool proof secure mechanism for the subscriber preference data (consent data) that is scrubbed. For this, a model called Scrub as a service is modelled. One Time Password authentication or any other encrypted methods can be added for securing this consent data.

### Monitored Direct Sales Agents:

Currently DSA (Direct Sales Agents) empowered by principal entities roll in themselves in the portal as telemarketers, becoming a part of registered telemarketer. Principal entities who entitle these Direct Sales agents has to ensure that these DSA are controlled and do not involve in uncontrolled UCC. Hence the new system takes extra care and precautions to ensure the principal entities have a tight hold on the authorized agents and have a transparent monitoring system at each phase. This includes managing the assignment of headers to their agent and also managing these headers after its life cycle, assuring they are not misused.

### Functionality Distribution:

The system allows the registered telemarketers to carry out various functionalities like, scrubbing numbers against registered preferential data, making calls or delivering the preference messages etc. The new revised regulations bring in more functionalities to be delivered by the telemarketers. This involves breaking down composite functionality into smaller individual groups or combining the individual into a composite group. Thus allowing the telemarketers to decide between the functionalities that only they choose to deliver paving way to new players to add new roles in the ecosystem of UCC.

### Customization of agreements:

This ecosystem is a more adaptive one where the different players may or may not have multiple roles and each role may be different from each player. To accommodate this and allow players play fair, it would not be feasible to enlist fee and procedure in a prescribed manner. Hence the need for customized agreements arise. A flexible system shall help in this regard to build an agile working environment. This is enhanced by developing legal agreements which are customized according to role plays.



## ICT TECHNOLOGIES ADAPTED

As time passes by, number of technologies emerge and shoulder the requirement of newness. One such recent technology of need is Distributed Ledger Technology (DLT) along with cloud computing. The recent challenge in telecom is the robocalls, which are difficult to trace and handle. Thus as the need of the hour calls for the advent cutting edge technologies that can reduce human man hours and also accustoms to the regulations.

The foremost step in the process is that the system detects & prevents misuse of the provided user information to the stakeholders. It can be implemented as a cloud platform where the stakeholder is only granted access for permitted services. The second is to develop a secure mechanism for protecting the data.

### Distributed Ledger Technology

Distributed Ledger Technology (DLT) system records the asset transaction digitally. This allows transactions details to be stored in various places at a single particular time. In UCC ecosystem, DLT allows both permissioned and private DLT networks for smooth functioning of the system. It ensures, that all pre-checks are fulfilled and regulation of smart contracts for all key players are also in effective check.

The system operated by the Service Providers has to be secure in a manner where the transaction are immutable and non-repudiable. The functionalities offered for delivery of Commercial Communication includes various pre-post checks, recording transactions of consent, complaints, preferences, etc. which is secured via DLT

### Cloud Services

Scrubbing is the process where the calling list of telemarketers are compared with the telecom subscribers' preference list generating a DL-Preference (Distributed ledger for Preference) and a DL-Consent (Distributed Ledger for Consent) list. This process of scrubbing is now part of cloud based service along with the management of headers, management of complaint procedures, etc. This infrastructure provides a better scalability for all key players.

### Artificial Intelligence and Machine Learning

Artificial Intelligence (AI) and Machine Learning (ML) techniques would help to match the type and category of content being delivered with the interest area of the customer who has exercised option for preference or has given consent. It would also be helpful to design scope of consent by using them.

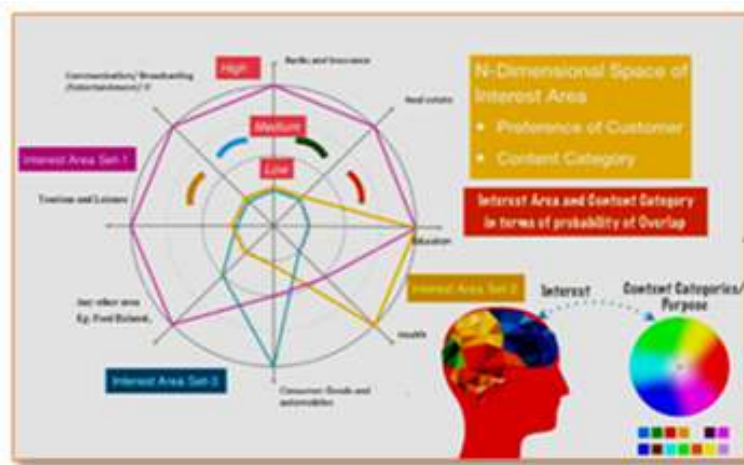


Fig1: Illustration of pattern matching using AI and ML

### Virtual Identities and Scrubbing List

Unsolicited Commercial Communication (UCC) eco system is built to carry out checks while protecting preference and consent data even when different entities independently perform certain functions. This would require access providers to develop trusted environment and enroll participating entities to carryout delegated functions in such environments. Virtual identities, exchanging information will not only expose the real identities but also help in carrying out regulatory checks by delegated entities.

### Smart Contracts

Smart contracts can be encoded into the blocks to carry out instructions about the secured data. The ownership data are kept in the Blockchain to remain trustfully traceable and irreversible. Smart contracts is basically the conversion of an agreement, the terms & conditions into a scripting language. The script executes a group of logical rules that are instantly validated and executed. Smart contract script is loaded into the blockchain network to verify the authenticity of a contract and authorize required steps. The contracts are executed automatically when the transactions are triggered without requirement of any other entity or agent.

### Moving Forward to Smart Contracts

Smart contracts are constructed and accomplished inside a network of blockchain which is distributed, obviously. Blockchain comprises the transactions that take place and this transaction in turn triggers the contract execution.

- The blockchain coders catalogue the smart contract in a scripting language. The argument

behind the contract is written in the programming script and any transaction or event triggers the execution of the script.

- After the contract is written, it is placed in the blockchain and executed through the distributed network. Apparently, any computer which has the evaluation methodology to run the contract can execute and give the same output for the same input regardless of where and which computer it has been executed.
- Number of logical conditions can be written for a single contract and while running it, the user may choose which all to execute.

The contract execution is not centralized like any traditional database or network, it is decentralized and the execution of contract is peer-to-peer. Often, clients are any individual users with internet connection, who have the client on their machine. This is what is termed mining and these machines are termed as nodes in blockchain. Conventionally, anyone can create and put the contract on the blockchain network for any particular type of transaction.

Apparently, there arises need for some kind of machines to run these codes. There are a lot of virtual machines available in the market, these days, the one we discuss in this paper is Ethereum Virtual Machine. Regarding the funding for contract execution, there are various APIs which enables them to execute transactions automatically according to the agreement in the contract. The below figure depicts, scrubbing, where it used as a service for the Service Providers.

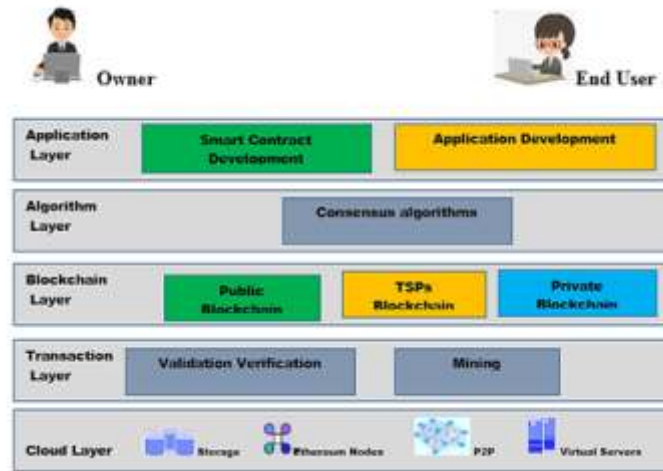


Fig2: From Blockchain to Smart Contracts, Scrub as a Service

### Use Case: Smart Contracts using Ethereum

There are several implementations of smart contracts. In this paper let us see about Ethereum

client, geth. Genesis.json file is used in initialization of the private Ethereum blockchain. This shall be used by the individual Service Providers for private blockchain.

```

{
  "coinbase" : "0x00000000000000000000000000000001",
  "difficulty" : "0x20000",
  "extraData" : "",
  "gasLimit" : "0x4c4b40",
  "nonce" : "0x0000000000000042",
  "mixhash" : "0x0000000000000000000000000000000000000000000000000000000000000000",
  "parentHash" : "0x0000000000000000000000000000000000000000000000000000000000000000",
  "timestamp" : "0x00",
  "alloc": {},
  "config": {
    "chainId": 15,
    "homesteadBlock": 0,
    "eip155Block": 0,
    "eip158Block": 0
  }
}
    
```

Fig3: Working of Genesis Block in Ethereum

The blockchain is initialized and started. The necessary accounts by TSPs are added in the blockchain after its startup. Private Ethereum blockchain requires mining to build the block and then blocks are added. Now, the contract has to be compiled to bytecode and deployed. After this the contract interacts with the public variables and the required functions are called for execution. Thus executing the contract in blockchain

The Service Providers contracts can be encoded into the blocks to carry out instructions about the secured data. These smart contracts will be activated by events that of the Blockchain can read from another source. Blockchain can provide secure proof of the ownership by storing hash value of the digital data in a time stamped transaction. The ownership data are kept in the Blockchain to remain trustfully traceable and irreversible.

## Case Study: Scrub as a Service Model

DLT focuses on implementing scrubbing and providing preference data to all key players in the ecosystem in a calculated secure approach. This paper focuses on delivering a new model as a service in this multi participant environment for identity management. The new model is Scrub as a Service (SaaS) which is focused on authentication with crypto keys or OTP in the two levels.

The main procedures of SaaS creation is a crypto hash function over Ktsppub which is used to generate Iusr. The SaaS provider then registers Ktsppub and Iusr with the created signature Sig Kppri(Kusrpub; Iusr) in the SaaS blockchain. The registration is sent to all players in blockchain nodes and saved at the SaaS blockchain. This model may be useful to improve gap between time when preference was opted by customer and time it came into force, and it may also be helpful to improve time speed of complaint resolution.

## WHY DLT

### Transparency and Privacy:

Many parties share the copy of the ledger. Every record can be verified by them. Thus a shared ledger has a high degree of transparency. This enables a participant who has the right access privileges to ascertain if the contents of a database have not been swindled with. Records with a cryptographic signature that is unique to each participant are added. In this way the entity can examine the ledger to determine whether the right participant has added the right record in accordance with the right rules.

### Permissioned DLT Networks:

Permissioned DLT Networks are often divided into fully private DLT Networks. The permissioned private DLT networks build an inherent trust with the users. Consent must be given by a governing body or entity to be a part of that DLT network. This inherently reduces the amount of computational power needed for that DLT network. This also increases the speed of the DLT network. In case of permissioned DLT networks, following is done:

- Participants are pre-approved
- Identities are known

- Only member of consortium are able to validate transactions.

From the UCC regulatory framework perspective, a permissioned private consortium DLT network seems to be the most appropriate regulatory technology (RegTech) for all its stakeholders. For TSPs, using this type of DLT-powered RegTech solution for UCC regulation, will lead to lower amenability cost. In addition, apart from governance of DLT network(s) by entities operating it, the observer nodes of this DLT network would be made available with TRAI or any agency authorized by TRAI for supervision and audit purposes.

### Automation, Flat architecture, Speed, sharing of data, shared cost:

DLT has the capability to provide several benefits for the following:

- Processes of registration of entities like telemarketers
- Content providers and identities like SMS headers
- Calling line identities for voice calls.

These benefits are likely to emerge in commercial communication space. The need for sharing data and processes safely with multiple participants, in particular for registration of entities and consent taking process, where firms are still depended on paper-based records. The distributed nature of DLT based records, can intensify the speed of making latest updated data available for scrubbing, for complaint handling, and for reconciliation to multiple involved parties. It also minimizes cost, thus making it most reliable option for adopting it as a regulatory technology for control and management of commercial communications.

### Adaptability of DLT to meet evolving requirements:

In a commercial communication space, nature of content of communication, preferences of customers are constantly changing and may require regular updating of business rules which are to be monitored. DLT's can be designed to integrate intelligent and programmable contracts and business rules along with bookkeeping functions. The functionality can be combined with the

machine learning algorithms to give it the flexibility and speed that is required to regulate the compliances for commercial communications ecosystem. Further, the creation of DLT systems as shared infrastructure will allow TSPs to ensure the regulatory compliance of UCC norms along with optimizing the capital and operational expenditures. DLT is therefore, advantageous in terms of efficiency and effectiveness.

When combined, these properties of DLT can resolve challenges of UCC regulatory checks and its compliance in a cost effective manner that were previously very expensive or challenging. For the above discussed reasons, DLT definitely has exciting potential to support the needs of TSPs, Telemarketers, and users for commercial communications with better control, management and cost effectiveness over UCC.

### Benefits of Implementation

- i. Implementation of new regulatory framework with a latest technology like blockchain would benefit all stakeholders.
- ii. Enhance business opportunities for them by providing better ways and means to reach out to target customers according to their interest areas.
- iii. Enhance chances for them to strike the deal as they would be dealing with targeted customer base and communicating them in accordance to recipient's interest areas and their preferred timings and modes of communication.
- iv. Enable in keeping client data safe and secured while sharing it with other entities and carrying out activities or functions required to ensure regulatory compliances for UCC.
- v. Protect their brand as it would be capable in displaying their identity after authentication and would also enable them to display their brand name by using calling name functionality.
- vi. Lower risks as it would avoid chances of non-compliances by their DSAs or authorized agents. Thus they would be better equipped using technology driven solutions.
- vii. Options to connect directly with the entities that are actually carrying out regulatory functions. Also providing resources from access providers

to deliver communications and avoid unnecessary mediators.

### Road Ahead

The new framework prescribed through these regulations is user friendly. It is automated using latest technological advancements to curb the annoyance of Unsolicited Commercial Communications. In this paper we have discussed that the use of advanced technology not only smoothes various processes but is also drastically cost effective. These regulations also permit access providers to authorize DLT network operators to establish the infrastructure, operate and maintain the same. This will further reduce the financial burden on access providers. Such type of infrastructures may also be utilized in shared mode among access providers which would further reduce implementation and operational cost.

Technology solutions further unbundles the functions required to be performed for regulatory compliances. This is an opportunity for various stakeholders to consolidate their infrastructure resource requirements and share resources among themselves to bring down the cost of compliance. These entities will have a business model, considering large number of commercial communication messages flowing through telecom networks. It is perceived that cost of compliance to implement these regulations, which will automate the process and sharing of various functions with participating entities, if calculated on per message basis would be microscopic, while it will give flexibility to consumers to exercise various options relating to receipt of numerous commercial communications, manage their consent effectively and also reduce the regulatory burden of the telecom service provider.

### Conclusion

The paper discusses about usage of Blockchain in TRAI ICT. Moving forward in this digital arena, it will ensure two things—non-repudiative and confidentiality. Block chain promises solutions for the future. The users can control all their data and transactions, in many areas. They can trust that transactions will be executed as per the protocol

commands eliminating the need for a trusted third party. The Block chain concept can influence users to find a solution for storing and managing data in a distributed manner on a P2P network. This technology can be a new part of the surrounding ecosystem of tools with various other technologies. It can play a crucial role in security for user authentication, restricting access based on a user's need, recording data access histories and proper use of encryption on data. The use of smart contracts, further improves claim processes, making it simpler and faster. The blockchain is fed by specific sources on which it relies to validate the agreed upon terms and conditions. It improves user experience and leads to a secure owner and user relationship in ICT.

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# Cyber Security Challenges and its Emerging Trends on Latest Technologies

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## ABSTRACT

*Cybersecurity plays an awfully necessary role within the development of data technology also to web services and additionally plays a significant role inside the sphere of information technology. Securing the data has become one among the largest challenges within the gift day. Whenever we predict cybersecurity the primary factor that involves our mind is 'cyber crimes' that ar increasing vastly day by day. varied Governments and firms are taking several measures to forestall these cybercrimes. Besides varied measures, cybersecurity continues to be a huge concern to several. This paper primarily focuses on challenges by cybersecurity on the most recent rising technologies, this paper additionally in the main focuses on the most recent regarding the cybersecurity techniques, ethics, and also the trends dynamic the face of cybersecurity. Paper attention is typically drawn on "Cyber Security" after we hear regarding "Cyber Crimes". Our 1st thought on "National Cyber Security" thus starts on however sensible is our infrastructure for handling "Cyber Crimes"*

*The scope of Cyber Security extends not solely to the protection of IT systems inside the enterprise however additionally to the broader digital networks upon that they bank together with Net itself and significant infrastructures. Cybersecurity plays a vital role in the progressive development of data technology, in addition to web services. Enhancing cybersecurity and protective important data infrastructures are essential to every nation's security and economic successfulness. creating the net safer (and protective web users) has become integral to the event of the latest services also as governmental policy. Deterring law-breaking is AN integral part of national cybersecurity and significant data infrastructure protection strategy.*

*Our Nation's important infrastructures are composed of public and personal establishments within the sectors of public health, emergency services, government, defense industrial base, data and telecommunications, energy, transportation, banking, and finance. Republic of India's reliance on technology additionally reflects from the fact that India is shifting gears by stepping into aspects of e-governance. Republic of India has already brought sectors like tax, passports visas below the realm of e-governance. Sectors like police and judiciary are to follow. The travel sector is additionally heavily dependent on this. Most of the Indian banks have gone on complete mechanization. This has additionally brought in ideas of e-commerce and e-banking. The stock markets have additionally not remained immune.*

*The information flow and security of data and cybercrimes and attacks on data is drained varied ways in which and ways like by employing a full service web security suite, employing a sturdy passwords, keep the computer code updated, By managing the social media settings, By strengthening the house network, and talking with children's regarding the net and certify that they are doing not use it for else things, additionally to stay up so far on major security breaches, By taking measures to assist defend yourself against fraud, keeping a watch on the youngsters and additionally apprehend the long run procedures that what to try to to if you become a victim of it.*

*Keywords: cybersecurity, cybercrime, cyberethics, cloud computing, robot apps.*

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### Introduction

Nowadays folks were causing and receiving any variety of knowledge in a very bulk and it should be an e-mail or the other file like audio, video, images, and the other information's by merely on one click of a however to but did they ever been thought or assume that however firmly or safely his data-id being transmitted or sent to the opposite person safely with none leak or any security of data shared? The answer or resolution to the present drawback lies solely in cybersecurity.

Today the web is that the quickest growing infrastructure in the standard of living. In today's technical surroundings several latest technologies square measure dynamically the face of the folks. however, because of these rising technologies, we tend to square measure unable to safeguard our info terribly} very effective approach and therefore these days' cybercrimes square measure increasing day by day. these days quite fifty % of total business transactions square measure done on-line and it's increasing day-by-day. therefore, this field needed a prime quality of security for secure, clear and higher transactions.

Hence cybersecurity has become the most recent issue within the current surroundings of technology. The scope of cybersecurity isn't simply restricted to securing the information and data within the IT trade however conjointly in varied alternative fields like the Internet, internet banking, knowledge sharing, etc.

Even the most recent technologies like cloud computing, mobile computing, E-commerce, internet banking, Fog computing, etc. conjointly would like a high level of security. Since these technologies hold some necessary info concerning an individual their security has become a requirement issue. Enhancing cybersecurity and protective important info infrastructures square measure essential to every nation's security and economic well-being. creating the web safer (and protective web users) has become integral to the event of recent services likewise as governmental policy. The fight against crime wants a comprehensive and safer approach. provided that technical measures alone cannot forestall any crime, it's important that enforcement agencies square

measure allowed to analyze and prosecute crime effectively. these days several nations and governments square measure imposing strict laws on cyber securities to forestall the loss of some necessary info. each individual should even be trained on this cybersecurity and save themselves from these increasing cyber crimes

After all there's several cybersecurity challenges and trends in coming future just like the Ransomware evolution that is that the scourge of cybersecurity, IT, knowledge professionals, and executives, And when this the second challenge in cybersecurity is that the computing growth within which robots may be able to facilitate defend against incoming cyberattacks, and when this 2 the second most challenge or threat is that the IoT (internet of things) threats within which the matter is that every one of the links makes customers extremely prone to cyberattacks. In fact, one study discovered that seventy % of IoT devices have serious security vulnerabilities, and when this another one is Blockchain revolution and also the last however not the smallest amount one is Serverless Apps Vulnerability within which the serverless apps will invite cyber-attacks and client info is especially in danger once users access your application off-server or domestically –on their device.

By this and plenty of alternative challenges Cybercriminals square measure attending to produce jobs for security professionals over the future few years. and that they square measure attending to hump at an interesting rate. however, sadly there looks to be without stopping to hackers United Nations agency need to access your business and client knowledge then use that info to their malicious ends.

### Cyber Crime

Cybercrime could be a larger threat and it is increasing day by day than before, currently, virtually each folks square measure connected to the net via laptops, smartphones, IoT devices and tablets, and lots of additional and is one in every of the foremost profitable ways in which to form cash within the criminal world. There also is a good sort of cybercrimes, which might be broadly speaking placed into the 2 categories: one class is-off crimes, like putting in an epidemic which will steal your data; and in-progress crimes in current state of



affairs like cyberbullying, extortion, distributing erotica or organizing terrorist attacks in an exceedingly immense quantity and is increasing day-by-day.

Also, crime, like alternative crimes, is that the work of criminals however it's practiced by those criminals World Health Organization have economical technological skills and use the net to attain their target or goal. Cybercriminals use their numerous talent set to access bank accounts, steal identities, blackmail, fraud, stalk, and harassment or use compromised computers as a part of a complicated botnet to stage DDoS attacks on giant establishments

Recognizing a crime depends on the crime being committed in recent times. Malware sneakily downloaded to your laptop would possibly slow it down and prompt or force it to present your error messages. Phishing attacks, meanwhile, typically involve receiving emails from unknown sources making an attempt to trick you into leaving behind your passwords or personal information like mobile details, identification details, and varied alternative necessary details. Key loggers leave their signs, like strange icons, or duplicating your messages or emails. On the opposite hand, you'll ne'er suspect your laptop has been enthralled to a botnet.

Resolving crime could be a job for the police, national cybersecurity departments, and business cybersecurity companies. On a private level, however, you'll be able to place associate finish to crime by removing the foremost common ways of committing these sorts of crimes: malware. Comprised of viruses, and ransomware, and conjointly by victimization many precautions like to not transfer something from unknown sources, to not click on links embedded in emails from folks you don't apprehend, and conjointly ne'er ever provide out your parole or personal information to somebody or unknown sites and emails, conjointly to not forget to use a strong antivirus to scan systems and removing dangerous files not solely keeps user safe, however it conjointly keeps cyber-criminals from creating cash, that is often their primary motivation.

Protecting against crime is long, however forever worthwhile. active safe browsing, like avoiding

strange downloads and untrusted sites, could be a common-sense answer to crime. Being careful with login details and private info can even keep a step earlier than cybercriminals. however, the simplest issue will do to get protected is to use a strong antivirus.

### **Cyber Security**

Privacy, precautions and security of the information is and can continuously be one in every of the highest security measures that any organization takes care of. we tend to square measure presently living within the world of technical individuals wherever all the {data} or data is maintained in an exceedingly digital kind primarily in today's time. Also, social networking sites square measure providing an area wherever users feel safe as they move with friends and lots of different peoples and family. within the case of home users, cybercriminals would still target social media platforms to steal personal knowledge and data. however not solely social networking however conjointly throughout the bank transactions someone should take all the specified security measures and precautions by that info} or information stay safe and secure shortly.

Cybersecurity is vital as a result of the govt., military, corporate, financial, medical organizations, and lots of others get to gather, process, and store unprecedented amounts of information on computers and varied different devices. a major portion of that knowledge that's being got collected and keep when the process will be in sort of sensitive info, whether or not that be belongings, money knowledge, personal info, or different forms of knowledge that unauthorized access or exposure may have negative consequences. Organizations transmit sensitive knowledge across networks and to different devices within the course of doing business, and cybersecurity describes the discipline dedicated to protective that info, knowledge and also the systems won't to method or store it. because the volume and class of cyber-attacks or cybercrimes grow, firms and organizations, particularly those who square measure tasked with safeguarding info with reference to national security, health, or money records, ought to take steps to shield their sensitive business and private info. As early as March 2013, the nation's prime intelligence officers cautioned that cyber-attacks and digital spying square measure the highest threat to national security.

(Sunit Belapure Nina Godbole) aforesaid that for an efficient and betterment of Cybersecurity, a corporation has to coordinate its efforts throughout its entire system and to unravel and appearance at the challenges that comes beneath the cybersecurity like: network security, application security, end security, knowledge security, identity management, info and infrastructure security, cloud security, mobile security, Disaster recovery/business continuity designing, end-user education.

Apart from these on top of challenges, the foremost tough challenge in cybersecurity is that the ever-evolving nature of security risks themselves. historically, organizations and also the government have centered most of their cybersecurity resources on perimeter security to shield solely their most vital system parts and defend against identified threats. Today, this approach is meager, because the threats advance and alter additional quickly than organizations will continue with. As a result of this, consultative organizations promote additional proactive and accommodative approaches to cybersecurity. Similarly, the National Institute of Standards and Technology (NIST) issued tips in its risk assessment framework that suggest a shift towards continuous watching and time period assessments, a data-focused approach to security as hostile to the normal perimeter-based model.

The National Cyber Security Alliance, through SafeOnline.org, recommends a top-down approach to cybersecurity during which company management leads the charge in prioritizing cybersecurity management across all business practices. NCSA advises that firms should be ready to “respond to the inevitable cyber incident, restore traditional operations, and make sure that company assets and also the company’s name square measure protected.” NCSA’s tips for conducting cyber risk assessments target 3 key areas: distinguishing your organization’s “crown jewels,” or your most dear info requiring protection; distinguishing the threats and risks facing that info, and outlining the injury your organization would incur ought to that knowledge be lost or lawfully exposed. Cyber risk assessments ought to conjointly think about any rules that impact the means your company collects, stores, and secures knowledge, like PCI-DSS,

HIPAA, SOX, FISMA, and others. Following a cyber-risk assessment, develop and implement an idea to mitigate cyber risk, shield the “crown jewels” made public in your assessment, and effectively observe and reply to security incidents. This set up ought to comprehend each the processes and technologies needed to create a mature cybersecurity program. In associate degree ever-evolving field, cybersecurity best practices should evolve to accommodate the progressively subtle attacks applied by attackers. Combining sound cybersecurity measures with an informed and security-minded worker base provides the simplest defense against cybercriminals trying to achieve access to your company’s sensitive knowledge. whereas it should appear to be a frightening task, begin little and target your most sensitive knowledge, scaling your efforts as your cyber program matures.

| Incidents             | Jan - June 2012 | Jan - June 2013 | % (Inc.)/(Dec.) |
|-----------------------|-----------------|-----------------|-----------------|
| Fraud                 | 2439            | 2490            | 2               |
| Intrusion             | 2203            | 1726            | (22)            |
| Spam                  | 291             | 614             | 111             |
| Malicious Code        | 353             | 442             | 25              |
| Cyber Harassment      | 173             | 233             | 35              |
| Content Related       | 10              | 42              | 320             |
|                       |                 |                 |                 |
| Intrusion Attempts    | 55              | 24              | (56)            |
| Denial of Services    | 12              | 10              | (17)            |
| Vulnerability Reports | 45              | 11              | (76)            |
| Total                 | 5581            | 5592            |                 |

The higher than Comparison of Cyber Security Incidents reported to Cyber999 in Malaysia from January–June 2012 and 2013 exhibits the cybersecurity threats. As crime is increasing even the protection measures are increasing. per the survey of U.S. continuity.

- 98% of corporations area unit maintaining or increasing their cybersecurity resources and of these, 0.5 area unit increasing resources dedicated to on-line attacks this year
- The majority of corporations area unit getting ready for once, not if, cyber-attacks occur
- Only the tierce area unit utterly assured within the security of their info and even less assured regarding the protection measures of their business partners.

### **Trends That Changing Cyber Security**

Mentioned Below square measure a number of the trends that square measure having a large impact on Cyber Security.

#### **Web Servers**

Nowadays internet servers square measure particularly one among the most effective platforms for cybercriminals to steal the info and knowledge. The threat of attacks on internet applications to extract or to steal or to distribute malicious code via legitimate the net servers they've compromised. So, we want bigger stress on protective internet applications and internet servers. thence one should always use a safer browser particularly throughout vital transactions and sharing or accessing data to not fall as a prey for these crimes.

#### **Cloud computing and services**

Nowadays the in the main all organizations whether or not of low grade or top-ranking corporations all square measure slowly in parallel to time square measure adopting cloud services. In alternative words, the total world is slowly moving towards the clouds. As a result of this latest trend presents a giant challenge for cybersecurity, as traffic will go around ancient points of examination.

(James Lyne) as same that also, because the variety of applications within the cloud is growing or developing, policy controls for internet applications and cloud services will evolve to forestall the loss of

valuable info. Cloud services square measure still developing their models however there's still heaps of problems that were arising associated with their security problems, Cloud might also give vast opportunities however it ought to be noted that because the cloud evolves thus as it's security considerations are increasing.

#### **Targeted attacks and APT's**

An APT (Advanced Persistent Threat) may be a prolonged associated targeted cyberattack within which a persona non grata gains access to the network and remains undiscovered for a particular amount. APT attacks in the main sectors like national defense, producing and therefore the money business.

The intention of an associate APT attack is sometimes to observe network activity and steal the information instead of to cause injury to the network or a company. The goal of most APT attacks is to realize and maintain current access to the targeted network instead of to urge in and out as quickly as potential.

#### **Mobile Networks**

In today's time, we can hook up with anyone deed anyplace in any a part of the globe with the assistance of a tool known as transportable through totally different networks. except for that mobile network security may be a massive concern and a raising issue. lately, firewalls and alternative security measures are getting porous as folks square measure victimization devices like tablets, phones, PCs, etc. all of that once more need further securities that require to be put in aside from those gifts within the applications used. we tend to should always admit the safety problems with these mobile networks. additional mobile networks square measure extremely liable to these cybercrimes heaps of care should be taken just in case of their security problems and for sleek information exchanges within the future.

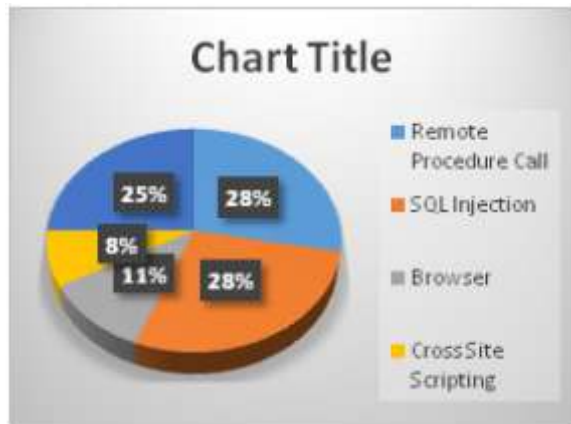
#### **IPv6: New net Protocol**

Internet protocol version six (IPv6) is that the most up-to-date version of the web protocol (IP) and additionally exchanges IPv4 (the older version), that has been a backbone of our networks generally and therefore the net at massive protective IPv6 isn't

simply an issue of porting IPv4 capabilities. whereas scientific discipline v6 may be a wholesale replacement in creating additional IP addresses offered, there square measure some basic changes to the protocol which require to be thought-about in security policy. thence it's continually higher to modify to IPv6 as before long as potential to scale back the risks concerning crime.

### Code secret writing

Encryption is that the only thanks to accomplishing information security and conjointly it's the method of encryption messages (or information) in such an approach that hackers cannot browse it... In an associate secret writing theme, the message or info is encrypted victimization associate secret writing rule, turning it into associate indecipherable cipher text. this is often typically finished the utilization of associate secret writing key, that specifies, however, the message is to be encoded. secret writing at a starting level protects information privacy and integrity. however additional use of secret writing brings additional challenges in cybersecurity. secret writing is additionally wont to defend information in transit, as an example, information being transferred via networks (e.g. net and e-commerce), mobiles, wireless microphones, wireless intercoms, etc. Hence by encrypting the code one can know if there is any leakage of information.



Hence the above are some of the trends changing the face of cyber security in the world. The top network threats are mentioned in above figure.

### Role of Social Media in Cyber Security

As time is passing day by day and new generation and technology are coming, so people are also becoming more social in an increasingly connected world. So, companies must find new ways to protect personal information and data from outside cyberattacks and threats. Social media also plays a huge role in cybersecurity and will contribute a lot to personal cyber threats. Since social media or social networking sites are almost used by most of them every day it has become a huge platform for cybercriminals for hacking private information and stealing valuable data.

In a world where we're quick to give up our personal information without knowing the information of the concerned organizations, companies have to ensure they're just as quick in identifying the threats, responding in real-time, and avoiding a breach of any kind. Since these days people are easily attracted by these social media the hackers use them as a bait to get the information and The data they needed just like the personal info and therefore the bank details thus individuals should take applicable measures and precautions particularly in managing social media to stop the loss of their info. the power of people to share info with Associate in Nursing audience of millions is at the center of the actual challenge that social media presents to businesses. additionally, to giving anyone the facility to pass around commercially sensitive info, social media conjointly offers identical power to unfold false info, which might be simply being as damaging. The speedy unfold of false info through social media is among the rising risks known within the international Risks 2013 report within which one thousand consultants from varied industries, government, and academe have taken half in it.

Though social media may be used for cybercrimes these firms cannot afford to prevent victimization social media because it plays a very important role within the substance and selling of an organization. Instead, they need to have solutions that may inform them of the threat to mend it before any real harm is completed. However, firms ought to perceive this and acknowledge the importance of analyzing the data particularly in social conversations and supply applicable security solutions to remain far away from risks. One should handle social media by

victimization bound policies and therefore the right technologies.

### **Cybersecurity Techniques**

The various cybersecurity techniques area unit as listed:

#### **Computer access management and Arcanum security**

The goal of access management is to attenuate the chance of unauthorized access to physical and logical systems. Access management could be an elementary part of security compliance programs that ensures security technology and access management policies area unit in situ to shield and therefore the construct of user name and Arcanum has been an elementary approach of protective our information. this could be one amongst the primary measures of cybersecurity.

#### **Data Authentication**

Data authentication is that the method of confirming the origin and integrity of knowledge. The term is usually associated with communication, electronic messaging and integration. knowledge authentication has 2 elements: authenticating that you are obtaining knowledge from the proper entity and supportive of the integrity of that knowledge.

The documents that we tend to receive from the receiver through varied mediums should always be genuine before downloading that and it ought to be checked if it's originated from a trustworthy and reliable supply which they're not altered. Authenticating of those documents is sometimes done by the antivirus computer code gift within the devices. so a decent antivirus computer code is additionally essential to shield the devices from viruses.

#### **Malware Scanners**

Malware scan is that the method of deep scanning the pc to stop malware infection and harmful viruses. it's accomplished victimization Associate in Nursing antimalware computer code. This method involves multiple tools and techniques to spot malware. Viruses, worms, and Trojan horses area unit samples of malicious computer code that area unit typically sorted and mentioned as malware.

#### **Firewalls**

A firewall could be a sort of cybersecurity tool that's accustomed to filter traffic on a network. Firewalls may be accustomed to separate network nodes from external traffic sources, internal traffic sources, or maybe specific applications. All messages getting into or departure the web withstand the firewall gift, that examines every message and blocks people who don't meet the required security criteria. thus firewalls play a very important role in sleuthing malware. Firewalls may be computer code, hardware, or cloud-based, with every sort of firewall having its distinctive execs and cons. A firewall is additionally accustomed to blocking malicious traffic requests and knowledge packets whereas permitting legitimate traffic through.

#### **Anti-virus computer code**

Antivirus computer code could be a Trojan horse that detects, prevents, and takes action to disarm or take away malicious computer code programs, like viruses and worms. Most Associates in Nursingtivirus programs embrace an auto-update feature that permits the program to transfer profiles of latest viruses so it will check for the new viruses as presently as they're discovered. Antivirus computer code could be a should and basic necessity for each system. Antivirus Scan specific files or directories for any malware or known malicious patterns, permit you to schedule scans to mechanically run you, permit you to initiate a scan of a selected file or your entire pc, or of a CD or flash drive at any time, take away Associate in Nursing malicious code detected –sometimes you'll be notified of an infection and asked if you would like to wash the file, different programs can mechanically try this behind the scenes and show you the 'health' of your pc

#### **Encryption**

Encryption is that the method of coding a message or info in such the way that solely approved parties will access it and people WHO aren't approved cannot conjointly coding could be a method whereby, victimization PKI and therefore the SSL/TLS protocol, communication is encoded in such the way that solely a licensed party will rewrite it.

### Authorization

Authorization could be a security mechanism accustomed to confirm user/client privileges or access levels associated with system resources, together with pc programs, files, services, knowledge and application options. Authorization is often preceded by authentication for using biometric identification. System directors (SA) area unit generally allotted permission levels covering all system and user resources and through authorization, a system verifies Associate in Nursing genuine user's access rules and either grant or refuses resource access.

### Defense exhaustive

Defense exhaustive (DiD) is an Associate in Nursing approach to cybersecurity within which a series of defensive mechanisms area unit bedded to shield valuable knowledge and knowledge. If one mechanism fails, Associate in Nursing other steps up like a shot to thwart an attack. This multi-layered approach with intentional redundancies will increase the protection of a system as a full and addresses many alternative attack vectors. Defense exhaustive is usually mentioned because the "castle approach" as a result of it mirrors the bedded defenses of a medieval castle. Before you'll be able to penetrate a castle you're moon-faced with the trench, ramparts, draw-bridge, towers, and battlements then on.

The digital world has revolutionized however we tend to live, work and play. However, it is a digital world that's a perpetually receptive attack, and since there square measure numerous potential attackers, we want to confirm we've got the correct security in situ to stop systems and networks from being compromised. sadly, there's no single methodology that may with success shield against every single style of attack. this is often wherever a defense comprehensive design comes into play.

### Application Security

Application security is that the general applies of adding options or practicality to package to stop a variety of various threats. These embody denial of service attacks and alternative cyberattacks, and information breaches or information thieving things. differing types of application security like firewalls, antivirus programs, secret writing

programs, and alternative devices will facilitate to make sure that unauthorized access is prevented. Application security is one amongst many levels of security that firms use to shield systems. Others embody package security, network security, and end-point or mobile security. All of those sorts of security area units geared toward protective purchasers and users of the package from hacking and malicious intent.

### Cyber Ethics

- As a result, "Cyberethics" is to the code of responsible behavior on the internet. even as we have a tendency to square measure educated to act responsibly in lifestyle with lessons like "Don't take what does not belong to you" and "Do not let hurt others," we have a tendency to act responsibly in the cyber world moreover conjointly we say that Cyberethics is nothing however the code of the internet. once active these cyber ethics there square measure smart probabilities of victimization the net properly and safely. The below-listed square measure some of them: Use the Internet to communicate and interact with other people to be get connected, Email and instant messaging of information and data make it easy to stay in touch with friends and family members, communicate with colleagues, and share ideas and information with people across town or halfway around the world from anywhere.
- But don't be a bully or misbehave on the Internet with anyone either related or with away peoples around the world. Do not call people names, lie about them, send embarrassing pictures, videos of them, or do anything else to try to hurt them.
- The Internet is considered as the world's largest library and with the bulk of information on any topic in any subject area, so using this information correctly and legally is always essential.
- Do not operate other accounts using their passwords because it is illegal and can cause harm.
- Never try to send any kind of malware to other's systems and make them corrupt for hacking or to steal the information of their own.
- Never share your personal information with anyone as there is a good chance of others

misusing it by stealing your information and data also it may be related to bank account details and social media information of their account and finally you would end up in a trouble.

- When you're online never pretend to the other person, and never try to create fake accounts on someone else as it would land you as well as the other person into trouble.
- Always adhere to copyrighted information and download games or videos only if they are permissible and available with security. And When a child encounters cyber bullying that they should:
  - Tell a trusted adult, and keep telling them until they take action.
  - Avoid opening, read or respond to messages from cyberbullies.
  - Always keep messages from bullies. They may be needed to take corrective action

So the above points are a few cyber ethics one must follow while using the internet. We are always thought proper rules from our very early stages the same here we apply in cyberspace.

### Conclusion

Computer security could be a huge topic that's turning into additional vital as a result of the planet is turning into extremely interconnected, with

networks getting used to hold out important transactions. Cybercrime is continuing to diverge down completely different methods with every New Year that passes then will the protection of the data. The upcoming latest and disruptive technologies, along with the new upcoming cyber tools and threats that come to the way in light each day, are challenging organizations with not only how they are working on to secure their infrastructure, but how they require new platforms and intelligence to do so. There is no perfect solution for cybercrimes but we should try our level best to minimize them to have a safe and secure future in cyberspace.

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# Computational Intelligence – A Detailed Study of the Prominent Paradigms (With Biological and Application Relevance)

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Mukul Bhatt\*\*

## ABSTRACT

*“Computational Intelligence (CI), commonly recalled now-a-days as the most empowering advancement in the genre of AI or Artificial Intelligence can be denoted as an important and prominent part of AI.”*

*In simple terms, Computational Intelligence (CI) as a technological expression can be explained as the intelligence/prominence or the ability of any computer device for learning a pre-determined task with the help of a given observational data or experimental recordings. With the brief research of CI as an advancement in AI genre, the paper represents a specific and detailed study of the major and the most prominent paradigms through which CI works as a successive technology. The paper reflects the basics starting with the Introduction to CI (as many sources till today, have no specified or refined data, even of the accurate definition of CI), continuing with brief description of each major CI paradigm explained along with biological and application relevance of each CI paradigm. The vision of this paper is to highlight the major CI paradigms in detail with their individual biological relevance they are inspired upon; along with the modern and recent times applications being used through the nature inspired algorithms.*

**KEYWORDS:** Computational Intelligence, Soft Computing, Neural Networks, Evolutionary Computation, Swarm Intelligence, Artificial Immune Systems, Fuzzy Systems.

## Introduction

According to a certain technological fact, “Technology since the beginning upholds its growth with revelation, and on the other aspects; revelation completely depends upon the enhancement of technology”. This has certainly become the case with CI now-a-days. The most common question that particularly arises is “What exactly Computational Intelligence (CI) is?” And, how much difference is there in between Artificial Intelligence (AI) and Computational Intelligence (CI) as both share a similar involving relationship leading towards strong advancements in the aspects of technological evolution.

Clearing it down through a simple and clear definition, Computational Intelligence (CI) can be

explained as the intelligence or the ability of any computer device for learning a pre-determined task with the help of a given observational data or experimental recordings. Specifically, CI focuses on some major adaptive mechanisms or techniques with which computers reflect intelligent behaviour in different complex and constantly changing situations. According to [1], Good science produces theories that are explored through experimentation and the experiments depend upon the theories for direction. The discipline of Computational Intelligence (CI) is a new one with some strong and deep ancient roots.

For the world reaching out to a technological milestone with each passing day, CI is relatively a new area of improving technology with the goal of

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achieving perfection at a glance and bringing change in the current scenario for good. Most relevantly, the sole purpose and the scientific aim of computational intelligence has always been to properly acknowledge all the principles that carry out and succeed in creating intelligence possible in more specifically artificial systems. There are also numerous complexities which can't be solved or could be procedured with the traditional intelligence approaches like mathematical modelling. The reason for which is, as they might be incapable to solve the large complex problems which requires more accurate and advanced approach of processing and handling problems in a precise and exact manner. As, with the reference to [2], many real-life problems cannot be translated into binary language (unique values of 0 and 1) for computers to process it. Computational Intelligence (CI) therefore provides solutions for such problems. The P used are close to the human's way of reasoning, i.e. it uses inexact and incomplete knowledge, and it is able to produce control actions in an adaptive way. CI therefore uses a combination of five main complementary techniques. These Complementary techniques may be denoted as Computational Intelligence Paradigms.

### Computational Intelligence (CI) Paradigms –

Computational Intelligence with the scientific vision of establishing intelligence amongst natural and artificial systems provides accurate and optimum solutions for complex real world problems. All the major paradigms included in accomplishing the purpose of generating Computational intelligence are nearly close to human's methods of reasoning as it comprises of shuffled bits of informational patterns, inexact knowledge with the capacity of producing actions under control in a procedural and adaptive way.

Therefore, Computational Intelligence is the integrated combination of 5 major complimentary paradigms which are represented as follows:

1. Neural Networks (NN)
2. Evolutionary Computation (EC)
3. Swarm Intelligence (SI)
4. Artificial Immune Systems (AIS)
5. Fuzzy Systems (FS)

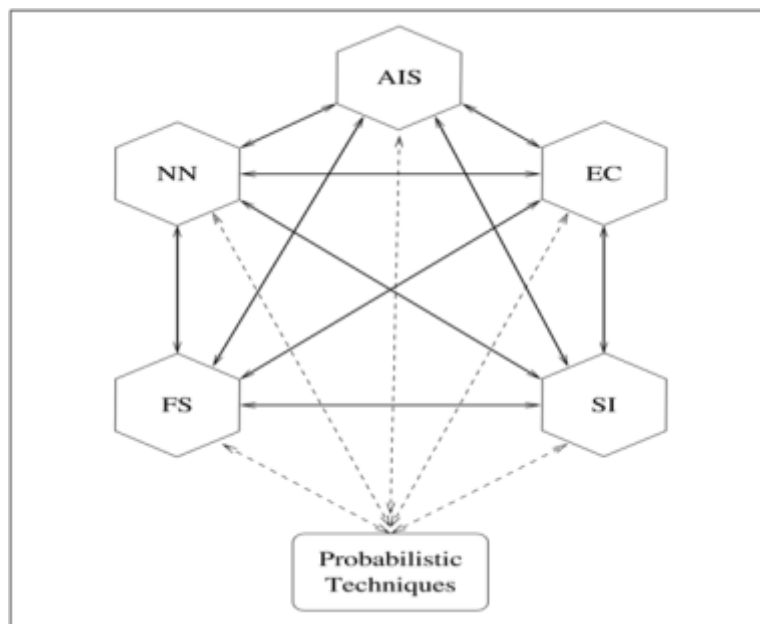


Fig 1 - Major CI Paradigms

The figure represented above showcases the main vision of the paper as in addition to the major paradigms of Computational Intelligence (CI), probabilistic techniques are often taken into utilization purposes with Computational Intelligence paradigms. And, with the reference to [3], Computational Intelligence paradigms are based on “Soft computing” methods, a term coined by Lotfi Zadeh, is a different grouping of paradigms, which usually refers to the collective set of CI paradigms and probabilistic methods. The arrows indicate that techniques from different paradigms can be combined to form hybrid systems. Moreover, each of the CI paradigms has its origins in biological systems. NNs model biological neural systems, EC models natural evolution (including genetic and behavioural evolution), SI models the social behaviour of organisms living in swarms or colonies, AIS models the human immune system, and FS originated from studies of how organisms interact with their environment.

### **Neural Networks (NNs) –**

Living in the scenario of day-by-day advancements & recognitions in AI, Neural Networks (NNs) is one certain issue to be strongly identified. Upon its source, NNs are recognised as certain prominent techniques amongst the many utilised in AI branches such as machine learning. According to [4], as the “neural” part of their name suggests, they are brain-inspired systems which are intended to replicate the way that we humans learn. Neural Networks consists of input and output layers, as well as (in most cases) a hidden layer consisting of units that transform the input into something that the output layer can use. They are excellent tools for finding patterns which are far too complex or numerous for a human programmer to extract and teach the machine to recognize.

### **Biological Basis: Neural Networks (NNs)**

Since the last several decades, Neural Networks (NNs) prominently established itself amongst the major tools of Artificial Intelligence (AI). And, the only reason of which is the experts that deal with CI research and development work of Neural Networks (NNs) totally based upon its biological basis and evolution.

With the reference to [3], the basic building blocks of biological neural systems are nerve cells, referred to

as neurons which consists of a cell body, dendrites and an axon. A neuron functions either by inhibiting or exciting a signal only when the cell “fires”. An artificial neuron (AN) is a model of a biological neuron (BN). Each Artificial Neuron receives signals from the environment, or other ANs, gathers these signals, and when fired, transmits a signal to all connected ANs. An artificial neural network (NN) is a layered network of ANs. An NN may consist of an input layer, hidden layers and an output layer. ANs in one layer are connected, fully or partially, to the ANs in the next layer. Feedback connections to previous layers are also possible.

### **Application Basis: Neural Networks (NNs)**

On application basis, Neural Networks (NNs) can be utilised within a plethora of areas. As, according to [2], neural networks can be classified into five groups which are as follows:

1. Data analysis
2. Data classification
3. Associative memory
4. Clustering generation of patterns
5. Control

And, with the proper classification and development; various kinds of neural networks have been arranged for usage purposes in multiple sources of applications. As, with the inclusion of the numerous, following are some of the applications that are widely used now-a-days in various fortes like Information Technology, Medical science and in music and gaming industries:

1. Disease diagnosis
2. Data mining
3. Music composition
4. Speech synthesis and recognition
5. Image processing
6. Pattern recognition
7. Game strategies planning, and many more.

### **Evolutionary Computation (EC) –**

A sub-field of Artificial Intelligence (AI) closely associated with Computational Intelligence (CI), Evolutionary Computation involves numerous of combinational optimization problems, queries and constant optimization engaged in problem-solving natural or artificial systems with the implicational use of computational models and patterns with evolutionary procedures and processes (taken as the major design elements).

The main and foremost objective of this paradigm is to mimic or copy the processes or the various procedures from natural evolution processes (which reflects the key idea “Survival” or the concept of showcasing “only the fittest survives, the rest [mainly weak] die”). Also, completely based upon the techniques and process of Natural selection (which was first and foremost introduced by Charles Robert Darwin), evolutionary computational methodologies comprises the concept of capitalizing (on the certain strength of natural evolution); for introducing new artificial evolutionary computational methodologies to solve a large and branched variety of complex problems.

#### **Biological Basis: Evolutionary Computation (EC)**

Evolutionary Computation is generally based upon the theory of biological evolution (Natural selection, inheritance basis on the genes to name a few). It mimics the concept of natural or biological processes and then intakes a certain group of problem-solving strategies to be applied to numerous problems or complexities. Moreover, the complexities or problems to be solved, belong to such a plethora of practical industrial applications.

With reference to [3], in natural evolution, survival is achieved through reproduction. Offspring, reproduced from two parents (sometimes more than two), contain genetic material of both (or all) parents – hopefully the best characteristics of each parent. Those individuals that inherit bad characteristics are weak and lose the battle to survive. This is nicely illustrated in some bird species where one hatchling manages to get more food, gets stronger, and at the end kicks out all its siblings from the nest to die. Most relevantly, evolutionary algorithms on the same side, use a population of individuals, where an individual is referred to as a chromosome and the survival strength of an individual is measured using a fitness function which reflects the objectives and constraints of the problem to be solved.

#### **Application Basis: Evolutionary Computation (EC)**

Evolutionary computational techniques (based upon the biological evolution processes) in the modern era establishes its place in numerous of the classified applications i.e. from industrial applications like analytics, algorithms (based over predictions), etc. to scientific research applications like the one named as “Protein folding”. Specifically, on its implementation over the real-world problems;

evolutionary computation techniques have numerous applications that can be understood by the following data:

1. Combinational optimization
2. Data mining
3. Time series approximation
4. Fault diagnosis
5. Data clustering
6. Data Classification
7. Scheduling of data, and many more.

#### **Swarm Intelligence (SI) –**

“The reality of nature reflects the importance of even simplest of creatures, of how through simple rules and norms; the small creatures display an astonishing amount of creativity and efficiency by solving complex problems.” Swarm Intelligence, relatively recognised as Collective Intelligence is an important division of Computational Intelligence (CI) which deals with the discussion, research, and developments made through by the complete study and observation of collective behaviour and responses emerging out within or from self-organising societies and groups of natural agents.

Swarm intelligence collectively represents a trait that can be observed throughout the nature and its constituents. But in the recent times, numerous of biologists, researchers or natural scientists have begun its utilisation with the vision and motto of transforming numerous of fields (including data mining, robotics, medicine, etc.). As, reference to [3], Swarm intelligence (SI) originated from the study of colonies, or swarms of social organisms. Studies of the social behaviour of organisms (individuals) in swarms prompted the design of very efficient optimization and clustering algorithms. For example, simulation studies of the graceful, but unpredictable, choreography of bird flocks led to the design of the particle swarm optimization algorithm, and studies of the foraging behaviour of ants resulted in ant colony optimization algorithms.

#### **Biological Basis: Swarm Intelligence (SI)**

The inspiration behind such powerful paradigm Swarm Intelligence (SI) comes from nature itself i.e. especially from the biological systems. As per examples, we can find real life natural examples of Swarm Intelligence (SI) including varieties from colonies of ants, flocking of birds, bacterial growth, etc.

With the reference to [5], all these examples rely on mechanisms known to occur in social insects by a process called stigmergy. However, if social insects remain the original source of inspiration for artificial swarm intelligent systems it is important to notice that other biological systems share similar collective properties such as colonies of bacteria or amoeba, fish schools, bird flocks, sheep herds or even crowds of human beings. Behind this “organization without an organizer” are several hidden mechanisms which enable insect societies, whose members only deal with partial and noisy information about their environment, to cope with uncertain situations and to find solutions to complex problems.

#### **Application Basis: Swarm Intelligence (SI)**

On application basis, Swarm Intelligence (SI) since the last few decades have made researchers to look upon and produce new advancements with a number of developed algorithms and meta-heuristics like that of the following:

1. Ant-colony optimization
2. Particle-swarm optimization

The following algorithms represented above are now-a-days being involved by getting adopted at a speedy pace. Moreover, some other applications based upon one of the above algorithms i.e. Ant-colony optimization include the following:

1. Routing optimization (applied in telecommunications networks)
2. Graph colouring technique
3. Scheduling
4. Quadratic Assignment Problem Solving (QAPS)

Most recently, new algorithms are being developed timely such as the Clustering & Structural Optimization Algorithms completely based upon the brief observational reports made on the nest building process of ants and bees. Also, according to [3], studies of ant colonies have contributed in abundance to the set of intelligent algorithms. The modelling of pheromone depositing by ants in their search for the shortest paths to food sources resulted in the development of shortest path optimization algorithms.

#### **Artificial Immune Systems (AIS)–**

One of the most naturally inspired knowledge discovery methods, Artificial Immune Systems (AIS) is basically a system which works by inheriting

and utilising some aspects of the biological immune systems. Artificial Immune Systems (AIS) takes the engineering of biological Immune Systems (BIS) for accomplishing the process of combining and keeping the algorithms and techniques all together to achieve systemic goals and solve complex problems.

Specifically, Artificial Immune Systems (AIS) exemplifies and showcases the aspect of learning or acknowledging by observing and studying the environment. In this, once a specific agent residing in the environment is introduced to be encountered; the immune response system is activated for generating a plethora of actions that helps to recognise accurately about the agent being a “friend” or in contrast a “foe”. The whole purpose of the process is centred-around future encounters (with friends being ignored as no threat and foes resulting to an extreme reaction only leading to physical harm). Similarly, Artificial Immune System (AIS) is designed with the same principal basis they are being inspired from.

#### **Biological Basis: Artificial Immune Systems (AIS)**

The general vision of Artificial Immune Systems (AIS) started by the 1980s with an idea of its development. Numerous researchers found the inspiration from the complex immune system of humans to recall it as a good and informational model for the development and production of results (applied on machine learning and artificial intelligence technologies) based on some complex real-life problems.

According to [3], the natural immune system (NIS) has an amazing pattern matching ability, used to distinguish between foreign cells entering the body (referred to as non-self, or antigen) and the cells belonging to the body (referred to as self). As the NIS encounters antigen, the adaptive nature of the NIS is exhibited, with the NIS memorizing the structure of these antigen for faster future response the antigen. An artificial immune system (AIS) models some of the aspects of a NIS, and is mainly applied to solve pattern recognition problems, to perform classification tasks, and to cluster data.

#### **Application Basis: Artificial Immune Systems (AIS)**

Artificial Immune Systems (AIS), based and developed on the principles of natural biological

systems have been providing powerful, highly distributed and robust data & information processing features for the immense purpose of complex problem solving issues. At present times, there are numerous algorithms being developed in the progressive Artificial Immune Systems (AIS) field. The specific algorithms taken into important considerations for problem solving purposes are as follows:

1. Negative Selection Theory (NST)
2. Immune Networks Theory (INT)
3. Clonal Selection Theory (CST)
4. Danger Theory (DT)
5. Dendritic Cell Algorithm (DCA)

The following theories & algorithm showcased above are widely utilised for precisely solving a vast majority of complex real world problems applied in a broad range of categories and applications. And, with the reference to [3], one of the main application areas of AISs is in anomaly detection, such as fraud detection, and computer virus detection.

Furthermore, the vast variety of applications (based upon the algorithms and theories) indulged in various domain areas like that of anomaly detection are listed as follows:

1. Pattern recognition
2. Network Intrusion Detection (NID)
3. Optimization
4. Clustering
5. Classification

#### **Fuzzy Systems (FS)–**

One of the major paradigms included under Computational Intelligence (CI) is Fuzzy Systems (FS). Technically, Fuzzy Systems technique involves its indulgence to be applied around a broad range of technical and informational domains with the purpose of being used for approximate reasoning capabilities (like that of human beings).

With the reference to [3], traditional set theory requires elements to be either part of a set or not. Similarly, binary-valued logic requires the values of parameters to be either 0 or 1, with similar constraints on the outcome of an inferencing process. Human reasoning is, however, almost always not this exact. Our observations and reasoning usually include a measure of uncertainty. For example, humans are capable of understanding

the sentence: “Some Computer Science students can program in most languages”. But how can a computer represent and reason with this fact? Fuzzy sets and fuzzy logic allow what is referred to as approximate reasoning. With fuzzy sets, an element belongs to a set to a certain degree of certainty. Fuzzy logic allows reasoning with these uncertain facts to infer new facts, with a degree of certainty associated with each fact. In a sense, fuzzy sets and logic allow the modelling of common sense.

#### **Biological Basis: Fuzzy Systems (FS)**

The vision along with the idea about Fuzzy Logic (FL) firstly popped up into Dr. Lotfi Zadeh’s mind who was by that time was working in the University of California around 1960s at Berkeley.

More specifically, other than the usual Boolean logic (“1” or “0”), fuzzy logic is inspiringly based upon human like reasoning capabilities which impacts by reflecting better reality and accuracy through the employing degrees of truth. Fuzzy Systems (FS) seems to develop algorithms based on research and observations closely on the way of “how a human brain works”. And, with the proper aggregation of data, a number of partial truths are formed which similarly are aggregated further for transforming them into higher degree of truths. Fuzzy systems offers an essentiality by using the similar unusual ways of reasoning and logics created, organised and reacted by a human brain depending upon numerous of situations. This paradigms participates crucially in the development and advancement of Artificial General Advancement (AGA), i.e. the reflection of generalised version of Reasoning within human beings and problem solving capabilities/techniques adapted and organised in a software so as if that software faces an unfamiliar or complex task, situation or problem, then the system must have the ability to find and generate a solution.

#### **Application Basis: Fuzzy Systems (FS)**

According to [2], Fuzzy Systems based on application basis, tends to apply to a wide range of domains such as the following:

1. Control
2. Image processing
3. Decision making

But it is also well introduced in the field of household appliances with washing machines, microwave ovens, etc. We can face it too when using a video

camera, where it helps stabilizing the image while holding the camera unsteadily. Other areas such as medical diagnostics, foreign exchange trading and business strategy selection are apart from this principle's numbers of applications.[2]

## CONCLUSION

Prominently, through the research and analysis; we can conclude that Computational Intelligence's (CIs) development work was and originated and inspired by observed and imitated aspects of intelligence and behavioral responses of natural or biotic components like human beings.

In each of the Paradigm of Computational Intelligence, the main agenda and prominence of work is accomplished by gathering, processing and then transforming or interpreting data obtained from various biotic/natural sources (included humans, animals, insects, microorganisms, etc.) for achieving exactness and accuracy. Because of their major biological relevance, CI paradigms are quickly applied in a plethora of fields belonging to

engineering, science, data analysis, forecasting, biomedicines and others due to their ability to solve complex real-life problems.

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# Challenges in Academics, Opportunities with Blockchain

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## ABSTRACT

This article is focused on three important things:

- (1) Applications for education developed using blockchain technology.
- (2) Remarkable outcomes of education by using blockchain technology
- (3) Challenges of adopting blockchain technology in education.

“Smart classrooms aren’t too far off, and blockchain technology may become an integral part of schools all over the globe in a few years. But how will this system help administrators and students?”

--Dataconomy

## Introduction

The blockchain won-over with lots of fame for its cybersecurity capabilities, so those industries focus primarily on security seriously began to use it. Blockchain technology empowers the sacrosanct data in an encrypted and procured manner that further cannot be altered. This emerging technology made known in 2008 as transactions of Bitcoin

cryptocurrency. Although, blockchain technology in education is still in primitive juncture, yet many researchers formulate the challenges like what kind of application of education been developed in blockchain technology, what are the benefits blockchain consort to education and what are the future challenges of blockchain in education. This challenges are answers by the preeminent benefits of blockchain as given below:

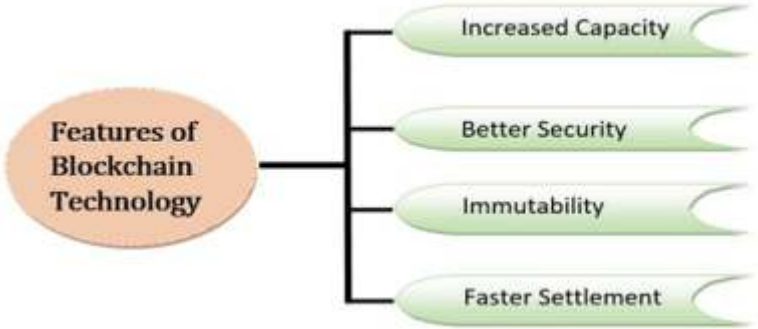


Figure 1: Benefits of Blockchain

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While compare with other sectors like healthcare, finance etc., education is not a long way for data ruptures as it experienced a lot data ruptures in 2017. These data ruptures are steering student records and abduct information to create forge identities or depleted by hackers. Therefore, authentication, endorsement, verification and security are the predominant factors in education sector. Bulwarking records through blockchain technology make these activities fruitless for data ruptures.

### How Does Blockchain Technology Work

Precept technologies to create blockchain are:

- A distributed network with shared ledger
- Private key cryptography
- Network transactions, record keeping and security

To secure digital relationship, these technologies work together in the following manner: If two individuals transact over network and both are having private key and public key to create a secure digital reference. This secure identity is totally based on the combination of both cryptographic keys which results to be digital signature. When these cryptographic keys are in distributed networks, some digital interaction emanates. Digital signature is in a block with a timestamp and other information then get transmits to all the nodes in the same network. Transaction verification is done by the blockchain protocol called proof of work with miners that encourages to solve mathematical problems. This protocol administers concords the transaction and nodes in the network for verification before get committed. Once the transactions get verified, it gets stored in blockchain. Cryptography principally used for two main reasons in blockchain:

1. To secure sender's identity in transaction
2. Ensure that no intrusion to the past records

Compare to the cryptographic keys, public key cryptography preferred to be most appropriate for the technology than private key cryptography. This asymmetric cryptography authenticates the integrity of all transactions and that's why consider the main element of blockchain. Further compare with traditional world wide web which uses client server architecture, where all information stores in

server at single place so that it is easy to modify and update, blockchain architecture uses distributed networks where each nodes handles all updates. Each nodes ensures the integrity of all transactional records that results its validation with security. In blockchain, transactions are organised into P2P network that composed of various computers. The blockchain structure exemplify with the block lists in database form. Two main data structures: pointers and linked lists are used. Out of which, pointers specify the location of another node and linked list mentions block lists.

Architecture of blockchain has three categories:

1. Public blockchain
2. Private blockchain
3. Consortium blockchain

Public blockchain represents both data and its access to anyone whosoever is participating. It means all the information is public in public blockchain to anyone and can have agreement process. Private blockchain generally handles by the particular user who is authenticated.

Consortium blockchain follows all the procedures ruled by authenticated users.

Most significant components of blockchain are: node, miners, chain, consensus protocol, transaction and block. Node can be any user or computer, miners specify nodes that perform verification of blocks, chain is block sequence, rules and agreements are consensus protocol for blockchain operations, transaction refers records or information for processing and block defines the distributed data structure that spread to all nodes.

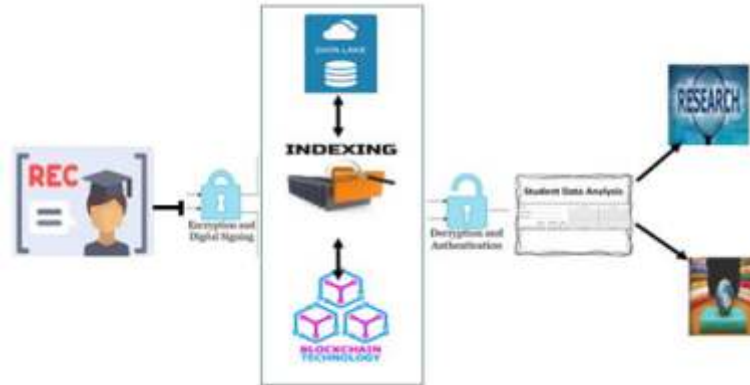
### Blockchain Methodology in education sector

Blockchain methodology subsists with a distributed database where each database exemplifies a "block". This block conjoins to blockchain with reference to preceding block in a sequential fashion. The latest block gets replicated athwart to the network in the way that each node has same blockchain. Every participator in the transaction has a blockchain copy which validate the transactions. This blockchain methodology evacuated the concept of



centralization, third party trust for validation of transaction and so on. Blockchain has transforma-

tional plausibility for any areas including education sectors.



**Figure 2:** Blockchains for Secure Digitized Student Record

European universities research affirms that the combination of blockchain and education Based on the analysis of a series of studies conducted in various European universities, the report confirms that the relationship of the “blockchain” with education is in an evolving phase to encourage the development of advanced technologies. The influence of immutability of blockchain refers that record/ data will remain always i.e. blockchain technology has ability to guarantee the durability of the records even if education sector collapsed because the records in blockchain can be verified anytime with a single click.

There is no single point of failure (SPOF) in blockchain which ensures better security even though most of the student records are vulnerable to get steal or hack. Blockchain ensures better security by some agreed upon protocols before ant transactions. Once transaction get approved, it is encrypted and linked to the preceding transactions. This means that information is athwart

over network of computers rather than on a single server which makes it difficult for hackers to ransack any information.

Through blockchain technology, process get streamlined and automated as record handling is performed only by a single node which get shared to others based on node authentication to reduce jumbleness. When all users have to access the same

record then it would be easier to trust and make process quicker.

Whenever records are exchanged in blockchain, then from every stop there would require a trailing concept to track the origin and verify the authentication of the source of data so that it can be prevented from various kind of frauds or extortion. Through this traceability feature of blockchain make it more transparent in terms of sharing information or creating versions of data for shared nodes. Consequently, data is more secured in blockchain and remain consistent throughout the process to ensure transparency. Any modification in a particular record make alter all subsequent record which is the biggest challenge yet to be solved in blockchain technology.

All the remarkable benefits of blockchain technology ensures to be low in cost because of no third party involvement, immutable data. This is the main reason that blockchain technology is in the mainstream of financial sectors.

## Conclusion

Blockchain technology in education is still neoteric and need to be explore more to unanswered questions. The scope of possibilities is quite endless. But to harness this powerful technology, we need to ensure the scalability of blockchain because the size heightened profoundly. In future, it would be burdensome to setup nodes so that it completes the

state of blockchain features. Formation of blockchain technology totally entrust on energy, as for example bitcoin that depends on miners for block validation. Other than this, algorithms for solving

cryptographic puzzle consumes lots of computation. So evolution of blockchain technology named Holochain technology that bestows Go programming language and other applications can be written in either LISP or JavaScript.

| S. No. | Blockchain  | Holochain  |
|--------|---|--|
| 1      | Ideal for systems that require global consensus   | Suitable for systems that can work without the need for a global agreement.  |
| 2      | Scalable and adaptable  | Better scalability, adaptability, efficiency, and extendability than blockchain  |
| 3      | Key components: <ul style="list-style-type: none"> <li>• A distributed network with shared ledger</li> <li>• Private key cryptography</li> <li>• Network transactions, record keeping and security</li> </ul> | Key components: <ul style="list-style-type: none"> <li>• Hashchains</li> <li>• Cryptographic signing</li> <li>• Distributed Hash Table(DHT)</li> </ul> |

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# GeoGebra: An Interactive Tool of Mathematics Teaching-Learning

Viditi Rastogi\*

## ABSTRACT

*This paper focuses on main obstacles in Mathematics Teaching-Learning. To overcome the mentioned obstacles in Mathematics Teaching-Learning, this paper recommend the use of an ICT tool named as GEOGEBRA software in Mathematics Teaching-Learning. GeoGebra Software can be used at any level of Mathematics Education from Primary to Higher. The importance of GEOGEBRA software is also presented in the paper.*

## Introduction

GeoGebra is an interactive and dynamic Mathematical Software which provides the various applications of Geometry, Algebra, Statistics and Calculus. It bridges the gaps between different branches of Mathematics especially; Geometry, Algebra, Statistics and Calculus. This software can be used from Primary Level Mathematics to University Level Mathematics. It can also be used for Science Teaching- Learning to some extent.

GeoGebra Software helps the students to gain better understanding of Mathematics. This software also provides opportunities of conducting Mathematical Experiments and drawing inferences for both teachers and students.

## Major Barriers in Mathematics Teaching-Learning Process:

1. The Abstract nature of Mathematics is main barrier in Mathematics Teaching-Learning Process. Due to abstract nature of Mathematics students fail in visualizing/imaging many of the Mathematical Concepts.
2. It is difficult to represent many of the Mathematical Concepts on a single piece of

paper and without having such representations students face difficulty in understanding those Mathematical Concepts.

3. Also, the Mathematical Representations on piece of paper are not movable, so the students fail to generalize the Mathematical Rules/Theorems/Relationships during their studies.

Above barriers can be overcome with the use of by the use of GeoGebra Software as Geogebra Software has the following features:

1. This software is helpful in representing any difficult Mathematical Concept in a moment by following some simple steps.
2. This software can represent a single Mathematical Concept in various different forms; i.e. it can provide different representations of a single Mathematical Concept.
3. In this Software Mathematical Representations/Objects are movable; i.e. any object (like point, line, graph etc) can be moved from one place to another easily.
4. The values can be changed easily and the changed representations/result can be obtained within seconds without manual calculations.

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5. Difficult Geometrical Constructions are also possible with the help of construction tools on interactive screen.
6. The best part is all representations/constructions can be pasted on word file for further usage or documentation. Also the generated files can be saved on Geogebra Software for revision, to reflect or future usages.

The GeoGebra software provides several different views of a Mathematical Object/ Concept/ Function –

- Algebra View,
- Graphics View,
- Spreadsheet View,
- Graphics View 2,
- Computer Algebra View and
- Construction Protocol.

All above views can be used to represent a single Mathematical Object/ Concept/ Function simultaneously, i.e. a single Mathematical Object/ Concept/ Function can be viewed in different forms at a time. These various views bridge the gaps between different branches of Mathematics especially; Geometry, Algebra, Statistics and Calculus.

### Conclusion:

In this way, it can be concluded that GeoGebra software can be used as an effective tool of Mathematics Teaching-Learning and it can make the mathematics teaching-learning process more interesting and interactive. There are many mathematical software are available but Geo-Gebra has its unique place among them due to its usability and easy accessibility. Also it connects the all important branches of Mathematics, so it proves its importance in Mathematics Teaching-Learning.

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# Free & Open Source Software (FOSS) in Website Designing

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## ABSTRACT

People want website to be fast, user-friendly, secure & free to use. Web sites have become a critical part of business, and the tools to create and deploy Web sites are becoming more flexible and easier to use. This paper talks about the role of FOSS in Website Designing. FOSS proves to be a boon for website developers in the way that they are secure, robust and free to use & modify. The open source tools available in the market facilitate the tool -box of a website developer. The use of FOSS increases the productivity, provide a secure Environment & also save a website developer of getting screwed under the copyright act. This paper talks about the technologies which FOSS world currently offers to the website developers and also the revolution which is awaiting to flourish the market. It also incorporates a study of the recent developments & the way market is becoming more dependent on FOSS. For example, PHP is the basic element of the most famous social networking website today, the Facebook. Also, GMAIL is entirely based on the open source language, Python.

*Keywords:* Free & Open Source Software, Website Designing, Open Source, GNU Public License

## Introduction

Today, websites have become an integral part of our life. We cannot imagine a world without them. It hardly matters, what your purpose is, websites offer everything. People want websites to be very user friendly, secure, reliable & free to use. This is the reason why, free & open source software is preferred over proprietary software.

Free & Open Source Software (FOSS) is software that is accompanied by such a license that it allows its users to completely modify & publish it. It is available free of cost, both for personal & commercial use. Also, its source code is available free of cost for download. Users not liking few features of the software can modify the code to change those features. For example, if users are willing to interchange the positions of the widgets on left & on right, then they can easily do it by modifying the code.

FOSS offers following advantages to its users:

**Reliability:** Broadly, we can take it to mean the absence of defects which cause incorrect operation, data loss or sudden failures, perhaps what many people would mean when they use the term 'bug'. Since, most of the open source softwares are maintained by a community, there are very few chances of bug in them.

**Audita lity:** Closed-source software forces its users to trust the vendor when claims are made for qualities such as security, freedom from backdoors, adherence to standards and flexibility in the face of future changes. If the source code is not available those claims remain simply claims. By publishing the source code, authors make it possible for users of the software to have confidence that there is a basis for those claims. At present the industry does not insist on third party inspection or certification, but it's possible that as open source models become more popular then expectations of audits will rise.

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**Cost:** This is one of the major advantages of using open source software. For some companies, especially the start-ups, cost factor is a major concern. Spending on proprietary software, when more efficient & secure open source software is available free of cost, makes no sense. For example, OpenOffice.org by Oracle is a substitute for Microsoft Office. Believe it or not, OpenOffice.org has far better features than what Microsoft Office offers.

**Freedom:** Users of open source software get full freedom to modify it as per the convenience. This freedom increases the usability of the software for various organisations involved in software development. With proprietary software, a customer is bound to use the product in its original form, while in the case of FOSS he can modify the product as per his liking & convenience. In the case, user is a lay man, he can post his suggestions in the support forums. A good technical suggestion will definitely find space in the next upgrade.

**Support:** Open source software is usually developed & maintained by communities. That is why there is no upper limit on the number of people providing support for the software. Proprietary software would be supported by the no. of personnel as hired by the developer organisation. On the other hand, open source communities are open to Human Resource. Any person, skilled in a particular technology can be a part of the support community.

### Free & Open Source Software in Website Designing

Various open source technologies help website developers to create reliable, secure & robust websites. Besides, providing a low cost solution, these technologies provide website developers, freedom to modify the coding, as per the convenience. Some of the open source technologies available for website development are as follows:

**PHP:** HyperText Pre-processor – PHP is a widely-used general-purpose scripting language that is especially suited for Web development and can be embedded into HTML. PHP provides far secure application than its counterpart ASP.NET. PHP is

widely used today in the website designing world. World's leading social networking website Facebook is also coded in PHP.

**Python** – Python is another open source server side scripting language. World's leading search engine Google is the largest promoter of Python. Gmail is entirely coded in Python. Also many other applications of Google are coded in Python.

**Apache HTTP Server** – Apache Server is an open source web server which is widely recognized all over the www. In 2009 it became the first web server software to surpass the 100 million website milestone. It provides far better access to files than its closed-source counterpart – IIS

**Content Management Systems** – Content Management Systems are another mile stones in the field of Open Source Technologies. They help website developers create interactive websites quickly & efficiently, without applying much effort in coding. Some of the famous content management systems are:

**Drupal** - Drupal is a free software package that allows anyone to easily publish, manage and organize a wide variety of content on a website. Hundreds of thousands of people and organizations are using Drupal to power an endless variety of sites.

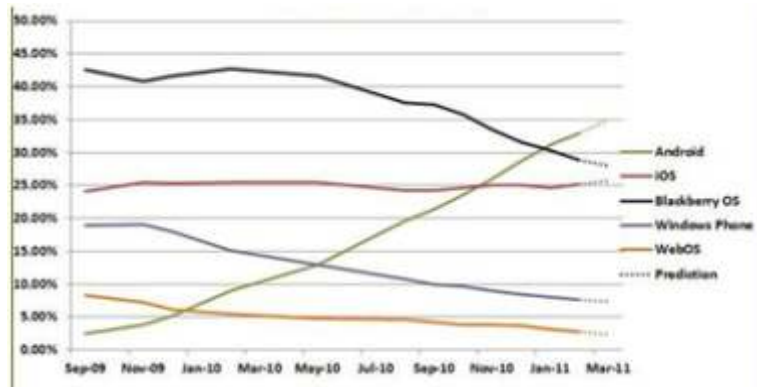
**Joomla** - Joomla is an award-winning content management system (CMS), which enables you to build Web sites and powerful online applications. Many aspects, including its ease -of-use and extensibility, have made Joomla the most popular Web site software available. Best of all, Joomla is an open source solution that is freely available to everyone.

**Wordpress** – Wordpress is the most popular open source blogging platform available on the internet today. It is widely used by people for publishing their blogs over www.

**Android** - Android is a software stack for mobile devices that includes an operating system, middleware and

key applications. It is an open source technology recently launched by Google. Following graph

shows the analysis of mobile operating systems market from Sep '09 to Mar '11.

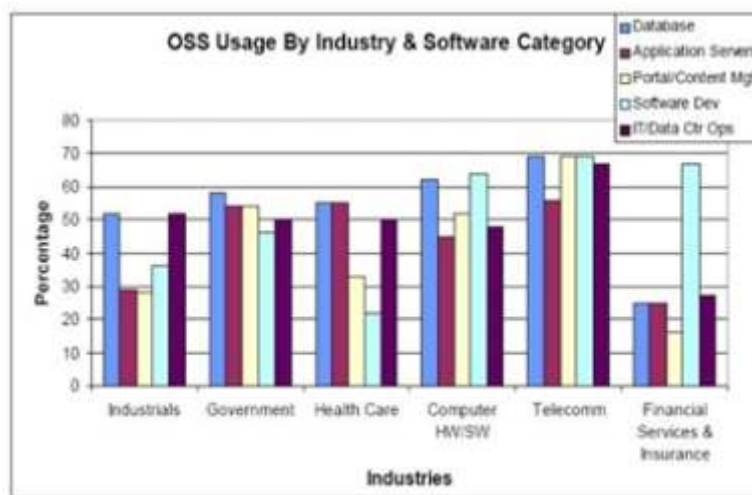


It is clearly depicted from the Graph that the usage of Android OS has increased over the time, while all other OS available in the market have witnessed downfall in their sales.

technologies at a very rapid pace. Companies making their technologies open source are getting success earlier than their counterparts working entirely on closed-source technologies. Following graph shows the market share of open source technologies in various sectors

**Research Analysis**

The usage of open source technologies has increased over time. People are adopting open source

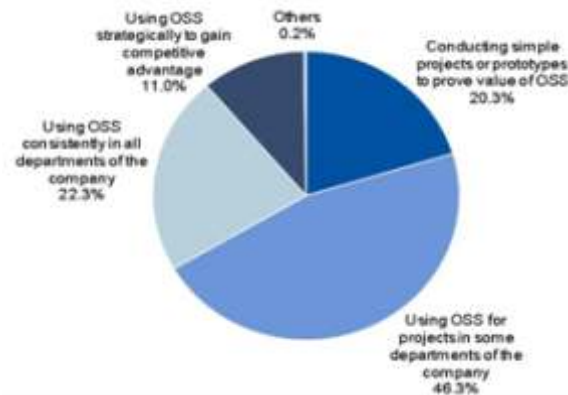


It clearly depicts the domination of Open Source Technologies in the market, especially in the field of Telecom & Financial Services software development. Industries have already adopted

Open Source Technologies to a good level, thus proving its credibility.

Following pie-chart shows the level of adoption of Open Source Technologies in organizations::





Maximum organizations implement Open Source Technologies in few of their departments. Overall, FOSS plays an important role in organizations. They prove to be vital for all sectors.

### Conclusion

Above analysis clearly proves that Open Source Technologies play an important role in IT industry today & also their market share is continuously increasing. Few industries are on their way to solely depend on FOSS. Sooner or later, all the software companies will feel the need to make their software open source & free of cost, to stay in the competitive world. Also, companies presently working in the field of FOSS are growing rapidly than their counterparts who are working on the closed-source softwares.

### Future Scope

The acceptance of Open Source Technologies in routined tasks is certain. Organisations will migrate to the model of Open Source Technologies for sustainable development. The world would see revolution in the IT Industry once the big cats of IT

Industry adopt this model. This will provide good opportunity to start up organisations to compete with already established ones, thus increasing their chances of success. Overall, Open Source Technologies field will witness huge adoption in the near future. One significant development in the open source technologies can be the development of a Content Management System (CMS) for social networking websites.

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# Cloud based CRM: Benefits and Security Challenges

Aditya Dayal Tyagi\*

## ABSTRACT

*Security undoubtedly plays the main role of cloud CRM deployment, since the agile firms utilized cloud services in the provider infrastructures to perform acute CRM operations. In this paper we emphasis on the cloud CRM themes, benefits, security threads the most concern. Some aspects of security discussed concern on deployment the cloud CRM like: Access customers' database and control, secure data transfer over the cloud, trust among the enterprise and cloud service provider, confidentiality, integrity, availability triad, and security hazard, future studies and practice are presented at the end.*

**Keywords:** Cloud computing; CRM; Security; Cloud Security

### Introduction:

A Customer Relationship Management (CRM) system is a piece of marketing technology used to manage, analyze and quickly respond to interactions with current or future clients or customers.

With a good-quality CRM system in place, you can easily keep all the information about every party that your business is interacting with up-to-date and accessible by everyone within your team. CRM systems also allow you to solve specific problems within the customer or client relationship cycle, focus on customer retention, and drive sales growth. Cloud Computing:

Cloud computing is the delivery of various hardware and software services over the internet, through a network of remote servers. These remote servers are busy storing, managing, and processing data that enables users to expand or upgrade their existing infrastructure.

The capabilities and breadth of the cloud are enormous. The IT industry broke it into three categories to help better define use cases.

- (i) Software as a Service (SaaS): Software is owned, delivered and managed remotely by one or more providers. To start, Software-as-a-Service, or SaaS, is a popular way of accessing and paying for software. Instead of installing software on your own servers, SaaS companies enable you to rent software that's hosted, this is typically the case for a monthly or yearly subscription fee. More and more CRM, marketing, and finance related tools use SaaS business intelligence and technology, and even Adobe's Creative Suite has adopted the model.
- (ii) Infrastructure as a Service (IaaS): Compute resources, complemented by storage and networking capabilities are owned and hosted by providers and available to customers on-demand.
- (iii) Platform as a Service (PaaS): The broad collection of application infrastructure (middleware) services. These services include

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application platform, integration, business process management and database services.

### Cloud Based CRM System:

CRM systems date back to the mid-80s and 90s, where they originated as Contact Management Systems (CMS) – a type of software designed to store and retrieve contact information.

As the focus in businesses shifted from simply storing lists of contacts to managing and improving relationships with those contacts, contact management evolved to customer relationship management.

There are two main types of CRM system available to businesses:

- (i) On-premise CRM software is a type of CRM system which is hosted on a company's own server. It requires the purchase of hardware, software and software licenses to install, and regular updates must be carried out by an on-site IT team to keep the system secure and up-to-date. It's highly customisable, but expensive and time-consuming to maintain.
- (ii) Cloud-based CRM systems, on the other hand, store all of the data they contain on a remote server ("in the cloud") operated by the hosting company. The company providing the CRM system handles software installation and updates, as well as things like backups, hardware maintenance and security.

The first cloud-based CRM system, Force.com, was introduced in 2007 by Salesforce. Since then, cloud-based CRM systems have become increasingly widespread due to their flexibility and convenience. If you have a legacy on-premise CRM system and are considering switching to the cloud, or are looking to install a new CRM system and weighing up the benefits of on-premise versus cloud, here are the seven biggest benefits of using a cloud-based CRM system.

- (1) Accessible at any time, from anywhere: Cloud-based CRM systems can be accessed at any time, from anywhere and using any device, thanks to the fact that the server is based in the cloud and not in a particular office or location. This makes them

much more compatible with modern ways of working, in which so much of our work is done on-the-go or from a location other than the office. It also means that international teams based in different countries and different time zones can access the CRM system whenever and however they need to. All of the data is stored centrally, and will update in real-time to reflect the most recent changes.

A cloud-based CRM allows employees from multiple departments to easily manage their customer relationships in one central location. Team members on the go can use their mobile to access the system. And employees working from home don't have to delay following up on a crucial lead until they're back in the office.

- (2) Affordable – especially for small businesses: On-premise CRM systems come with a lot of associated costs. There's the initial purchase of hardware and software, plus the ongoing costs of upgrades and maintenance (known as "hidden" costs) – all of which can be particularly difficult for a smaller business to afford.

This makes a cloud-based CRM a great option for businesses without a large on-site IT team, with a smaller budget, or with limited resources.

The main cost associated with a cloud-based CRM is a subscription fee, which is usually paid monthly. Most subscriptions vary in cost depending on how many users need to access the system, but some providers will charge a flat rate. A cloud-based CRM vendor will also take care of the maintenance and upgrades to the system, which saves businesses from having to pay those associated costs.

- (3) Quick and painless to deploy: Investing in a new piece of marketing technology can often be a long, drawn-out process of weighing the various pros and cons of different solutions, painstakingly building a business case, bringing all of the relevant parties on board, and then finally getting the seal of approval from the higher-ups.

After all of that, you want to get up and running with the new piece of software as quickly as possible particularly if it will give you the edge over your competition.

Cloud-based CRM systems are fast and easy to get set up with, even for larger enterprises. There's no need to disrupt your existing infrastructure or spend time installing complex hardware; all you need is an active internet connection and a login, or in some cases an app.

Training employees on the new software will of course take time, but cloud-based CRM systems tend to prioritize ease of use and accessibility, as they're designed for any business to install out-of-the-box and adapt to its particular needs. Plus, you'll have saved all that time with a quick and painless install.

(4) Easy to upgrade:

As I mentioned earlier on, an on-premise CRM system requires a dedicated IT team working on-site to carry out security upgrades and other fixes, which can be inconvenient, expensive and time-consuming.

A cloud-based CRM, by contrast, can be updated or upgraded simply by downloading the update in question from the cloud.

(5) Easy to scale up – or down:

If the scope of a company's operations grows or – for whatever reason – shrinks significantly, a CRM system that fitted the bill perfectly before might suddenly be much too small, or unnecessarily large. Rather than chafing against the restrictions of a too-small CRM system, or paying extra for additional capacity, businesses can scale their CRM system up or down to suit their needs.

While an on-premise CRM system is limited by the hardware that a business can purchase and install on-site, the only thing that a cloud-based CRM system needs is enough capacity in the cloud to accommodate a growth in data input.

Typically, all it takes is a call to the CRM vendor to make an expansion happen – or if needed, adjust the scale of operations downward.

(6) Capable of integrating data from other sources: Cloud-based CRM systems are very useful in their ability to integrate information from other sources, whether that is customer information on other systems, or discussions and activity on social media.

A business might want to integrate customer service information into their CRM system in order to prevent gaps in understanding when dealing with a customer across multiple touch points. Another business might find it valuable to integrate ERP (enterprise resource planning) data, which encompasses day-to-day business activities like accounting or project management, within their CRM system.

With all of these different types of martech increasingly moving to the cloud, it's possible to use dedicated cloud integration tools to make them share data, allowing customer relationship management to benefit from information across the business.

Social CRM is the term used to refer to the integration of social media channels into CRM systems, allowing a business to build relationships with their customers on whatever channels they happen to be present on. Many of the available social CRM systems are cloud-based, and while it's not a requirement, the real-time updates and round-the-clock functionality of cloud-based CRM marry up well with social media.

(7) Reliable

If the on-premise hardware that houses your CRM system goes down, it can cause massive disruption to the day-to-day running of the business, and even result in the loss of crucial data. One major advantage of cloud-based CRM systems is that data is automatically backed up to the cloud, making it easy to retrieve and restore in the event of a system failure.

System failures themselves are also significantly less likely (though not impossible, of course) with a cloud-based CRM, as CRM providers will generally implement back-up servers to make sure their client businesses can keep things running.

### **Data Integration Challenges with Cloud-Based CRM:**

Adoption of cloud computing and SaaS applications continues to increase as advances in technology address concerns with security, privacy and customization limitations.

- The global SaaS market is projected to grow from \$49B in 2015 to \$67B in 2018, attaining a CAGR of 8.14% (Roundup of Cloud Computing Forecasts and Market Estimates, Forbes, Sept 27, 2015)
- 64% of Small & Medium Businesses (SMBs) are already using cloud-based apps, with average adoption being 3 apps

The CRM industry is at the forefront of cloud adoption, with over 50% of current worldwide CRM software spend in the cloud. Gartner predicts that 62% of CRM software will be delivered through the cloud by 2018. Within the CRM market space, Salesforce is the clear leader, with over 18% of the market share.

By now, the benefits of cloud computing are well publicized – cost savings through reduced infrastructure spend, decreased reliance on IT, increased flexibility and scalability with elastic resource allocation, and improved accessibility. For CRM applications, a cloud-based environment like Salesforce expands on these benefits to include:

- **Enhanced Productivity:** Users can access the CRM system through a variety of devices, anywhere with an internet connection. This accessibility allows employees the ability to access customer information in the field, in real-time. Workflow and collaboration capabilities also dramatically improve productivity, by streamlining communication and expediting approval processes.
- **Informed Decisions:** All account, opportunity and contact information is stored in a central location, presenting a clear customer profile. This information is also easily converted to reports, dashboards and sales forecasting to improve decision making across the enterprise.

### CRM Data Challenges in the Cloud

Even as cloud adoption and popularity continues to rise, challenges exist with data quality and integration in a hybrid environment. "More than 64% of companies struggle with connecting, synchronizing, and relating data, applications and processes. This leads to cloud adoption challenges.

Data quality often takes a back seat to more urgent matters, but the importance and value of complete, accurate data should not be downplayed. Successful companies are learning to leverage internal and external data as strategic assets that drive intelligent business decisions. However, this approach requires a well-defined strategy for maintaining and collecting data to maximize quality and optimize value. Poor data quality can impact your customers' perception of your business, your employees' abilities to efficiently complete tasks, and can lead to lost revenue opportunities or the inability for executives to make important business decisions.

This data management strategy extends to all enterprise platforms, including CRM systems, which house a wealth of valuable customer and transitional information. To get the most from a CRM platform like Salesforce, it's essential to integrate data sources from key applications such as ERP, accounts payable, and marketing automation systems.

Data integration is a challenge for many organizations, and a cloud-based environment adds a set of unique challenges. In order to effectively integrate data across cloud and on-premise sources, it's critical to implement a set of best practices for data quality, data integration, and CRM-instance consolidation, along with a set of tools that help automate many integration steps.

We've found that there are essential elements to any cloud-based data integration initiative:

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We've found that there are essential elements to any cloud-based data integration initiative:

### Conclusion and Future Work:

In this paper, researcher presented a broad discussion of cloud CRM challenges from security perspective. Researcher explained the cloud CRM and security challenges and worldwide web security. Cloud CRM has a fast step of development in the agile companies whether deploy public cloud, private cloud, hybrid cloud and community cloud. The cloud CRM is related to IT architecture and infrastructure and customized CRM area. This study explored that are five security variables could be affected on cloud CRM deployment; these variables were analyzed to perceive how the security dimension is critical for cloud CRM implementation.

The results showed that the figured security dimensions have capabilities to fulfill of the pre-requirements of cloud CRM deployment, furthermore; the CIA issue becomes the most noticeable variable among the figured variables. Nowadays, security is a core problem of cloud CRM, the challenges of keeping information and applying CIA pyramid become on the top priority; the most reason behind un-secure information is the architecture, infrastructure of the cloud CRM provider [32]. The cloud CRM security in Arab region needs to consider technical and strategically thinking, including but not limit to encryption scheme, resource provisioning, service level agreement, and accountability. Some organizations in Arab region don't believe utilize cloud CRM services for the reason that insecurity cloud world. This paper observed as a conceptual view paper; literature review supports our conceptual model of this study. A survey to validate and test the conceptual model needs initiative to add value of cloud CRM contexts.

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# A Research Study on 5G Mobile Technology

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## ABSTRACT

*In this research paper, an attempt to review the existing generations of mobile technology in terms of their features, performance, advantages and disadvantages has been made. We will also discuss the evolution and development of different generations of mobile technology along with their importance and advantages of each generation. In this paper, comparison of 5G will also be done with all other generations from 1G to 4G including their important characteristics, advantages and disadvantages. Then later in this paper, requirement of 5G technology, 5G networks and 5G Mobile Network Architecture will be discussed. In the end all the features of 5G technology, its advantages over other generations and applications will be included and some future scope (beyond 5g) will be proposed.*

## Introduction

5G represents fifth era of portable innovation. It has many propelled highlights potential enough to take care of huge numbers of the issues of our unremarkable life. 5g will furnish us with high transmission capacity. This innovation makes seed be more prominent than 100 mbps and 1 gbps when at full portability and low versatility separately, this expansion in speed is brought about by the utilization of CDMA, BDMA and millimeter remote. 5G will be the most dominant and cutting edge innovation later on. 5G innovation highlights high information rates than the past forms, tremendous data transfer capacity and the best nature of administration. The main thing which is required is to make it moderate with the goal that regular man can likewise utilize the highlights and offers of the 5G innovation. 5G will be vastly improved than the 4G innovation.

As per some exploration papers on 5G innovation, the highlights 5G would have are as per the following:

- High information rates and inclusion at cell edge.
- Less utilization of battery.
- 1Gbps information rate.
- Better security.
- WWW – World Wide Wireless Web
- IPv6 (Internet Protocol Version6)
- Wireless world with no zone issues and restricted access.

## Review of past age frameworks –

### 1G (1970-1980)

It gave information transfer speed upto 2kbps. Innovation utilized was simple cell innovation. Versatile communication was the main administration given in 1G. It supplanted 0G innovation. The main cell framework on the planet was made by Nippon Telephone and Telegraph (NTT). US propelled the principal Advance cell phone framework (AMPS), Push to talk (PTT) and improved cell phone frameworks (IMTS).

### 2G (1990-2004)

It gave information data transmission upto 64 kbps. This age utilized Digital Cellular Technology. 2G

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gave administrations like - Short Message Services (SMS), Digital voice Higher limit packetized information, Email. TDMA (Time Division Multiple Access) and CDMA (Code Division Multiple Access) are the two kinds of balance utilized in 2G. recurrence band of 2G territories from 850MHz-1900 MHz 2G incorporates 2G, 2.5G, 2.75G.

### 3G (2004-2010)

It furnishes us with information data transfer capacity upto 2Mbps. Innovation utilized by this age is EDGE, CDMA 2000. In this innovation clearness is expanded because of the utilization of Wide Band Wireless Network. Bundle Switching innovation is utilized for sending the information. Administrations gave are voice calls, information administrations, Global meandering, High-speed internet providers, video calling, mixed media administrations.

### 4G (2010-2015)

It gives information data transmission of upto 1Gbps. Innovation utilized by 4G is WiMax LTE WiFi. 4G gives us numerous offices like downloading speed upto 100 mbps, MultiMedia Newspapers, sending information quicker than the past ages. It is additionally being created to give HD spilling, Global Roaming, wear-capable gadgets, Multimedia Messaging Service (MMS), Video calling, Digital Video Broadcasting (DVB).

### Fifth Generation (5G)

It gives information transmission capacity higher than 1Gbps. Innovation utilized by this age is WWW (World Wide Wireless Web), consistent blend of broadband and bound together IP. The client never experienced such high esteemed innovation the 5G. 5G innovation will have the most progressive highlights. Recurrence band for this innovation ranges from 3GHz-300GHz.

### Literature Review

Farris [1] et.al. said that, The Internet of Things (IoT) biological system is advancing towards the organization of incorporated conditions, wherein heterogeneous gadgets pool their abilities together to coordinate wide-running client and administration necessities. As a result, answers for proficient and synergistic participation among items procure incredible significance. Along this line, this paper centers around the selection of the promising

MIFaaS (Mobile-IoT-Federation-as-a-Service) worldview to help delay-delicate applications for top of the line IoT gadgets in next-to-come fifth era (5G) situations. MIFaaS cultivates the provisioning of IoT administrations and applications with low-idleness prerequisites by utilizing participation among private/open billows of IoT objects at the edge of the system.

Bego Blanco [2] et.al. talks about current institutionalization circumstance of 5G and the job arrange softwarization plays so as to address the difficulties the new age of versatile systems must face. This paper studies ongoing documentation from the fundamental partners to select the utilization cases, situations and rising vertical divisions that will be empowered by 5G advancements, and to recognize future abnormal state administration necessities. Driven by those administration necessities 5G frameworks will bolster various radio access innovation situations, meet start to finish client experienced prerequisites and give capacity of adaptable system sending and proficient tasks.

Rupendra NathMitra [3] et.al. examined, all new 5G expected to be operational by 2020. This time, it is accordingly critical to know the heading of research and advancements empowering 5G innovation. This paper gives a comprehensive and exhaustive investigation of ongoing formative undertakings toward 5G. It features striking highlights, i.e., adaptability, openness, and cloudbased administration contributions; those will guarantee the cutting edge portable correspondence innovation as the overwhelming convention for worldwide correspondence.

Erik Dahlman [4] et al. investigated subtleties of the new 5G radio-get to innovation to be created by 3GPP. It starts with a discourse of some key structure rules that should be followed so as to guarantee an elite, adaptable, and future verification air interface. It at that point delves more into the subtleties on the key 5G innovation segments including however not restricted to duplex game plan, 5G waveform, monstrous MIMO, multi-site network, adaptable framework plane, and access/backhaul coordination.

### 3.5G– Advantages and Diadvantages

fifth era innovation offers a wide scope of highlights, which are valuable for all gathering of individuals including, understudies, experts (specialists, engineers, educators, overseeing bodies, authoritative bodies, and so forth.) and notwithstanding for a typical man.

### Inconveniences of 5G Technology

However, 5G innovation is inquired about and conceptualized to take care of all radio sign issues

and hardship of versatile world, but since of some security reason and absence of mechanical headway in the greater part of the geographic districts, it has following inadequacies –

- Technology is still under procedure and research on its practicality is going on.
- The speed, this innovation is asserting appears to be hard to accomplish (in future, it may be) as a result of the uncouth mechanical help in many pieces of the world.



### Important Advantages

- High goals and bi-directional enormous data transmission molding.
- Technology to assemble all systems on one stage.
- More powerful and productive.
- Technology to encourage supporter supervision instruments for the speedy activity.
- Most likely, will give an immense telecom information (in Gigabit), which will bolster in excess of 60,000 associations.
- Easily reasonable with the past ages.
- Technological sound to help heterogeneous administrations (counting private system).

- Possible to give uniform, continuous, and steady availability over the world.

### 4.5G - Challenges

Difficulties are the inborn piece of the new improvement; along these lines, similar to all innovations, 5G has additionally huge difficulties to manage. As we see past for example improvement of radio innovation, we discover extremely quick development. Beginning from 1G to 5G, the voyage is just of around 40 years of age (Considering 1G in 1980s and 5G in 2020s). Nonetheless, in this adventure, the basic difficulties that we watched are absence of foundation, investigate technique, and cost.



In any case, there are many nations utilizing 2G and 3G innovations and don't think even about 4G, in such a condition, the most critical inquiries in everybody's psyche are –

- How far will 5G be feasible?
- Will it be the innovation of a portion of the created nations or creating nations will likewise get advantage of this?
- To comprehend these inquiries, the difficulties of 5G are arranged into the accompanying two headings –
- Technological Challenges

- Common Challenges

**4.1.Common Challenges**

Numerous Services – Unlike other radio sign administrations, 5G would have an enormous errand to offer administrations to heterogeneous systems, innovations, and gadgets working in various geographic districts. In this way, the test is of institutionalization to give dynamic, widespread, client driven, and information rich remote administrations to satisfy the elevated standard of individuals.



### Conclusion

In this paper we talked about the current versatile remote advancements and the future portable advances. Basically centered around highlights, Data rates, transfer speed and innovation utilized. 5G will be presented before this current decade's over. We expect that this paper will help other individuals from various fields taking a shot at the future portable advancements. 5G will give high unwavering quality, high and splendid pinnacle future. 5G will be an unheard of dimension of portable innovations. Innovations will be designed to consolidate with 5G innovation to meet the future needs.

### Future Scope

5G portable remote innovation will be another transformation in the realm of versatile correspondence innovation. Diverse remote innovations will be gotten to by the 5G cell phones. 5G cell telephones will give high goals to the client. 5G innovation will offer best usage of cell correspondence in future. With the assistance of 5G innovation we would almost certainly control wherever of the world from any piece of the world,

watch HD quality films without buffering. A lot more advancements will develop which will be installed in 5G cell phones. Fate of Nano-center will be unprecedented as it will join with fake insightful (AI). Client will almost certainly work his robot by utilizing his portable. Message will be naturally composed whatever your cerebrum thinks.

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# Unveiling the concept of Data Mining and Data warehouse

Nidhi Gupta\*

## ABSTRACT

Nowadays we know that in every field we require data whether we talk about education field, medical, accounting or many more. To do operations in any field we require data but only getting the data is not the solution. We have to require the relevant data from the data we have. This paper shows the importance of data warehousing and data mining nowadays. This paper also shows how the desired information is being retrieved from the pool of data with the help of data mining. Both technical and non technical users can use this information for better decision making. Practically, those organizations which has large amount of data can use data warehousing and data mining.

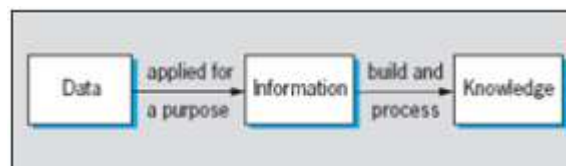
**Keywords-** Data Mining; Data Warehousing

## Data, Information and Knowledge

**Data:** Data can be understood as figures, facts or description regarding any material or matter. Numbers and texts can also be considered as data. Computers take data as an input which is further processed and converted to a meaningful information as per human requirement. Data that is gathered from real life scenarios is present in different formats and a computer has a capability to process this data. And information gives rise to knowledge.

**Information:** The instances of data can be provided by having relationship or association among two or more similar or distinct data. Computer is used to process data into information.

**Knowledge:** Knowledge can be justified as useful patterns or relationship between historical and future information. For example, historical sales information with information about customers can provide knowledge of customer's buying behaviors.



## Data warehouse

Data warehouse also better-known as an enterprise data warehouse is a relational database tool. With the help of it, data is intelligently changed into information and this information helps the users in better decision making. It is a system used for reporting and data analysis, and is considered a core component of business intelligence. As we know a lot of data is being generated on a daily basis and this data with the historical data creates a large pool of data. Now this pool of data not only contains relevant data but also some irrelevant data. This huge collection of data is stored in the form of a database. This huge collection in turn hampers the database application by slowing down its processing speed and also its performance in searching user-oriented results.

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The technique of data warehouse digs out relevant and desired data from the large amount of data stored in the underlying databases and integrates this desired data into one. So, Data warehouses play a core role in decision support systems. They store enormous exhaustive and summarized historical data for decision makers to engender queries, make reports and perform analysis and sum up results.

Datawarehouse has the following characteristics:

- subject oriented:
- Integrated:
- time variant:
- non volatile:

### Data Warehouse

#### State of the art and future challenges

- 1) Subject oriented Compared with application oriented characteristic of traditional DB. Data Warehouse focuses on data analysis, data is stored in accordance with subject, so its data subject oriented. Subject is the standard for classification of data at higher level, each subject corresponds with a macro analysis area.
- 2) Integrated. The data in data warehouse is extracted from decentralized data, and then goes through system processing, collection and reorganization. Inconsistency of source data must be eliminated to ensure that data in the data warehouse is consistent.
- 3) Time-related For the purpose of decision, data in data warehouse need to have time attribute. Data warehouse is a time-variant collection of data, it requires that time limit for storage of data in data warehouse can meet the requirements of decision making.
- 4) Non volatile. Data in operational DB usually need to be updated according to actual requirements. Data in data warehouse is mainly used for decision analysis, data operation is mainly data query, and modification and deletion operations are rare, once data enter into data warehouse, they will be maintained for a long time, and only periodic loading and refreshing are needed.



### Data Mining

The enormous usage of computers has provided a huge amount of data for one's disposal. Because of the spiraling amount of data, experts have been facing challenges in extracting useful and meaningful information from it. This has led to data mining.

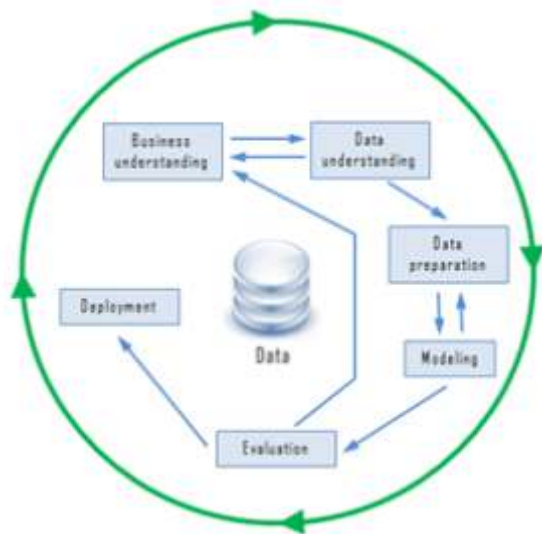
Data mining is a non trivial process of extraction of information which is hidden, previously unknown and is potentially useful, from large databases. Data mining can also be explained as finding the correlations in a large relational database based on the different depth of angles we analyze it. It is a powerful tool with high potential that helps the organizations or companies to increase their sales and gain more profit from the information about the dealings of their customers.

Data mining provides us with the useful information that queries and reports are not able to provide us efficiently. The information that is extracted by the data mining etiquette is not explicitly available in the database, whereas database application only projects the information that is available in the info bank with a restricted manipulation capacity. So data mining is best described as knowledge unearthing in databases.

The data mining process consists of 5 steps, namely:

- 1) Problem analysis: In this step, we must select and analyze a complicated problem and whose resolution will provide competitive advantages to the company. It's an essential step, since it helps you to know what you want extract exactly as a knowledge from data stored in the data warehouse.

- 2) Data analysis: this phase is used to evaluate data quality, detect inadequacies and analyze distributions and combinations. In practice, this step is executed in parallel with the first one, in order to determine the right solution.
- 3) Data preparation: Once available data sources are identified, they need to be cleaned in order to eliminate any noise (aberrant or missing values), and transformed by using some techniques such as constructive induction.
- 4) Modeling: during this step, modeling techniques should be selected to create one or more models. Then, these models should be tested for checking their validity.
- 5) Evaluation: the created models should be interpreted and evaluated to verify if they meet business needs.
- 6) Deployment.



The main techniques used in data mining are:

**Classification:** is a concept that deals with the generalization of data according to different instances. The major role of classification is to precisely project the target class for each caselet in the data. Several major kinds of classification algorithms in data mining are Decision tree, k-nearest neighbor classifier, Naive Bayes,

Apriori and AdaBoost. Classification consists of examining the features of a newly presented object and assigning to it a predefined class. The classification task is characterized by the well-

defined classes, and a training set consisting of reclassified examples.

**Estimation:** deals with continuously valued outcomes. Given some input data, we use estimation to come up with a value for some unknown continuous variables such as income, height or credit card balance.

**Prediction:** It's a statement about the way things will happen in the future, often but not always based on experience or knowledge. Prediction may be a statement in which some outcome is expected.

**Association Rules:** is a rule which implies certain association relationships among a set of objects (such as "occur together" or "one implies the other") in a database.

**Clustering:** Can be considered the most important unsupervised learning problem; so, as every other problem of this kind, it deals with finding a structure in a collection of unlabeled data.

## Conclusion

In this paper, the author studies technologies of Data Ware System. Since there are many technologies about DW and DW is very powerful, these technologies also requires to be more in-depth researched, its analytic tools are mainly OLAP and Data Mining. Data mining technology based on data warehouse is the emphasis in future research.

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# A Review Paper on Smart Home

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## ABSTRACT

*Web of Things (IoT) conceptualizes the possibility of remotely associating and observing certifiable articles (things) through the Internet [1]. With regards to our home, this idea can be apropos consolidated to make it more intelligent, more secure and robotized. This IoT task centers around structure a brilliant remote home security framework which sends cautions to the proprietor by utilizing Internet in the event of any trespass and raises an alert alternatively. Plus, the equivalent can likewise be used for home mechanization by utilizing a similar arrangement of sensors. The influence gotten by prefering this framework over the comparable sorts of existing frameworks is that the cautions and the status sent by the wifi associated microcontroller oversaw framework can be gotten by the client on his telephone from any separation regardless of whether his cell phone is associated with the web. The microcontroller utilized in the flow model is the TI-CC3200 Launch cushion board which accompanies an installed small scale controller and a locally available Wi-Fi shield utilizing which all the electrical apparatuses inside the home can be controlled and oversaw.*

## Introduction

For a long time Home Automation was a sci-fi subject until first indications of clever controlling showed up in the 1898 when Nikola Tesla revealed the primary remote control that was sending radio waves to control a little vessel. In any case, nothing was extremely significant until the twentieth century when there was a blast in local machine with the motor controlled vacuum cleaner in 1901 and the electric fueled vacuum 6 years after the fact. In the following 20 years there was the upset in home apparatus with coolers, garments dryers, clothes washers, irons and toasters, however must be managed as an extravagance on account of the high cost.

Designers were playing with home mechanization with in the 1930's however not just in 1966 when Jim Sutherland built up the principal Home Automation System called "Reverberation IV", which could control temperature, deal with a shopping rundown or turn the apparatuses on and off. Another tryout

came in 1969 when the Honeywell Kitchen Computer showed up, an apparatus who could make plans, yet never had business accomplishment because of the enormous cost. At the point when the chip showed up in 1971, the cost of gadgets began to fall rapidly and the innovation become accessible to everybody.

The Smart House term was first begat by the American Association of House Builder in 1984. In the mid 1990's there was another concentration in consolidating gerontology with innovation in gerontechnology, to improve the lives of older. Before the century's over local machine, PCs and mechanical technology were joined in numerous items attempting to make them increasingly shrewd. Another term was ordinarily used to depict that – Domotics – however notwithstanding the endeavors to make this innovation available it was as yet to costly and was left for the rich

In 1998 an exhibition called Integer Millennium House was opened in Watford introducing how

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**Controlling** – as much the same number of you believe that remote control is basic for a savvy house, you are most likely off-base. While you gain the benefit to control a framework, that frameworks misfortunes that benefit to control itself leaving to you the ability to decide, which isn't keen any longer. Try not to misunderstand me, your home should give you an approach to control it, yet this shouldn't be essential. You should take a gander at controlling your home as a crisis reinforcement plan, in the event that anything turns out badly, and not as an everyday propensity.

**Proficiency** – well, it wouldn't be quite a bit of a savvy in the event that it tends to be more proficient than a customary house. Most importantly a keen house ought to give low vitality utilization rates. In this way the center programming ought to have a vitality procedure supervisor so as to persistently screen and examine information from within and outside sensors and make consistent changes in accordance with all vitality expending frameworks.

As I let you know previously, a large portion of oneself altering frameworks works better when are associated with other self modifying frameworks. Investigate the canny vehicles, numerous makers are not really attempting to cause a self driving vehicle with 100% wellbeing however this will to not be conceivable until all vehicles will probably convey one another. The house fundamental focal programming ought to have the option to interface with different houses and contrast information all together with make increasingly exact alterations and better choices. Likewise thinking of you as have a parallel efficient power vitality framework like sun based boards, the house inward framework ought to oversee vitality stockpiling and how to disseminate it relying upon house stacking and climate conditions.

**Insight** – likely this is the most significant factor yet additionally hardest to accomplish. Give me a chance to reveal to you few highlights that from my perspective change a normal house into a clever one:



- House should know at whenever what number of individuals are inside, and furthermore what number of individuals are in each room. This is significant, it tends to be the primary factor in controlling the warming frameworks, lights and furthermore setup the security border and disturbing, and can be effectively accomplished with closeness sensors and entryway attractive counters. Whith this advantage It ought to have the option to close the TV, turn off the lights and spare the warming vitality in rooms when there are no individuals in, and furthermore know when you are gone in opening by tallying the days since nobody went into the house.
- House ought to be associated with the web. This is required. Next to that it should give you remote access to the frameworks, the house ought to have the option to get to online climate suppliers and join the figure information with the estimations from sensors so as to modify the warming frameworks ahead of time for a smooth temperature evolving.
- A shrewd house should chat with you. It should give you constant warnings with respect to enhancements and modifications that you can do, in view of the input from different houses. It ought to likewise disclose to you that you neglected to close the entryway and no one is in the house, or while in the front room are 24°C, in the quarters are just 12°C and you ought to presumably check the opened window. There are bounty data that can be conveyed progressively dependent on the sensor readings. Yet additionally you ought to have the option to chat with the house. For example I'd like to tell my home that I'm getting back home in 60 minutes, and afterward the house will begin the cooling unit, set up the security framework, begin reviving the air and possibly turn on the TV.
- Never the less the a keen house ought to have the option to interconnect with other shrewd gadgets, particularly brilliant home hardware and machines which sooner or later moved toward becoming piece of the house. In spite of that the majority of the machines are highlighted with WiFi abilities there is no normal language between them, there is no worldwide correspondence convention to cause them to impart one another. With different words... they are NOT keen. There is nothing shrewd in having the option to watch YouTube on your TV or make an electronic shopping list on your cooler. Those are simply modest highlights which as a general rule are not having any effect. Rather makers ought to give a characteristic reasonable API to designing and controlling the gadget, with the goal that you

would then be able to fabricate a coordinated framework which can direction on interest.

### Literature Review:

Farris [1] et.al. said that, The Internet of Things (IoT) biological system is advancing towards the organization of incorporated conditions, wherein heterogeneous gadgets pool their abilities together to coordinate wide-running client and administration necessities. As a result, answers for proficient and synergistic participation among items procure incredible significance. Along this line, this paper centers around the selection of the promising MIFaaS (Mobile-IoT-Federation-asa-Service) worldview to help delay-delicate. applications for top of the line IoT gadgets in next-to come fifth era (5G) situations. MIFaaS cultivates the provisioning of IoT administrations and applications with low-idleness prerequisites by utilizing participation among private/open billows of IoT objects at the edge of the system.

### Bego Blanco.

Bego Blanco [2] et.al. talks about current institutionalization circumstance of 5G and the job arrange softwarization plays so as to address the difficulties the new age of versatile systems must face. This paper studies ongoing documentation from the fundamental partners to select the utilization cases, situations and rising vertical divisions that will be empowered by 5G advancements, and to recognize future abnormal state administration necessities. Driven by those administration necessities 5G frameworks will bolster various radio access innovation situations, meet start to finish client experienced prerequisites and give capacity of adaptable system sending and proficient tasks.

### Findings/Methodology:

A minimal effort and productive brilliant home framework is exhibited in our plan. The upside of our model is that the usefulness of electrical and gadgets can be controlled easily. Some of the time the bustling life and traffic make it hard for us to be grinding away and to be at home in the meantime. One of the highlights of our model makes it conceivable as it gives home framework getting to

remotely sparing a ton of time. Another component of our proposed model is that turning of lights and fans and different hardware and electrical gadgets remotely in the event that they are not being used dealing with the vitality utilization of that home. To control these machines remotely keen gadgets should be synchronized with the fundamental server. The client may utilize the login id and secret word to change the status of any machines sparing time, vitality and cash. notwithstanding that our proposed model gives total security. On the off chance that the client isn't sure turning OFF the T.V/P.C then the client may check the information on-line from the database present and change the status in like manner. Inside and out our HAS gives 100% productivity as it spares time, oversees vitality utilization which thus sets aside cash and gives ideal security to the client making the client's home a wellbeing and a more intelligent spot to live in.

### Conclusion:

The task has proposed savvy homes that can bolster a ton of home computerization frameworks. A keen home contains an association between remote correspondence, sensors, observing and following. Savvy homes are a colossal framework that incorporates different innovations and applications that can be utilized to give security and control of the home effectively.

This task examined the structured modules like sensors' circuits, observing and following of the home through IP camera, portable warnings and home guide.

In this task, a proficient methodology for savvy homes was proposed and executed. C# programming language and ATMEL AVR microcontroller have been utilized to interface the sensors circuit to the home and to control the IP camera.

A progression of investigations have been completed on the proposed savvy home. These analyses tell the best way to recognize the flame, water spilling, smoke. Additionally how to recognize any gatecrasher to the home, distinguish and control the climate of the any room and how to verify the home through an entrance code. What's more this venture outline the best approach to

observing and following the home through an IP camera, and the best approach to send notices to the property holder about the activities in the home. Additionally this task demonstrated making a guide in the home to estimating the temperature in all rooms and recognize any flame occurs and to identify any movement in the home by utilizing ultrasonic sensors.

Focal control for the whole home has been planned utilizing three microcontroller framework structures. These plans were for access control to the home, temperature approval, and control board framework to associate all the security and control circuits together.

#### Future Scope:

There are an assortment of upgrades that could be made to this framework to accomplish more prominent precision in detecting and discovery.

- a) There are a great deal of different sensors that can be utilized to expand the security and control of the home like weight sensor that can be put outside the home to recognize that somebody will enter the home
- b) Changing the method for the computerized warnings by utilizing the GSM module to make this framework increasingly proficient.
- c) A savvy carport that can gauge the length of the vehicle and pick which square to put the vehicle into it and it will explore the vehicle through the carport to make the leaving simple for the mortgage holder in his carport.

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# Security Issues over E-Commerce and their Solutions

Dr. Esha Dixit\*

## ABSTRACT

*E-commerce (electronic commerce) or EC is the purchase and sale of goods and services, or the transfer of funds or data, through an electronic network, primarily through the Internet. These company transactions happen either as b to b (business-to-business), b to c (business-to-consumer), c to c (consumer-to-consumer) or c to b (consumer-to-business). These transactions are trading or in products or services that use computer networks such as the Internet or internet social networks. Here the business carried out by using pcs, telephones, fax machines, barcode readers, credit cards, automatic teller machines (ATM) or other electronic equipment without exchanging paper-based records or physically moving to a shopping mall. It involves operations such as procurement, order entry, processing of transactions, internet payment, authentication, inventory control, order completion, delivery and client support. When a customer pays through a magnetic-stripe-reader with a bank card, he or she is involved in e-commerce. E-commerce Security is part of the framework for information security and is specifically applied to components affecting e-commerce, including data security and other broader areas of the framework for information security. E-commerce safety is the protection against unauthorized access, use, modification or destruction of e-commerce property. Security-Integrity, Non-repudiation, Authenticity, Confidentiality, Privacy, Disponibility dimensions of e-commerce. Therefore, any efficient and effective online payment transaction operations are an important management and technical requirement. It needs a coordinated match of algorithm and technical alternatives due to the steady technological and company shift. In this document we addressed e-commerce safety overview, multiple steps to place an order, e-commerce safety intent, multiple safety problems in e-commerce, online shopping instructions, etc.*

**Keywords:** *E-commerce, Non-repudiation, Authenticity, Confidentiality, Privacy, Availability*

## Introduction

E-commerce security is component of the framework for information security and is specifically applied to components that affect e-commerce, which include computer security, data security. E-commerce requires elements of high safety that influence the end user through their daily company payment interaction. E-commerce needed a credible infrastructure and structure for safe and successful e-commerce[ Fig.1 Basic e-commerce infrastructure] Today, privacy and safety are a significant issue of digital technology. M-commerce shares safety issues with other ecommerce

companies and organisations. Applications on web e-commerce that handle payments like online banking, electronic transactions or using debit cards, credit cards, PayPal, e-cash, prepaid cards, master cards, visa cards or other tokens have more compliance issues, field technologies. Concerns about privacy have been identified, showing a lack of confidence in a multitude of environments, including trade, electronic health records, e-recruitment technology and social networking, and this has directly affected consumers. Security is one of the most significant variables restricting the involvement of ecommerce clients and organizations.

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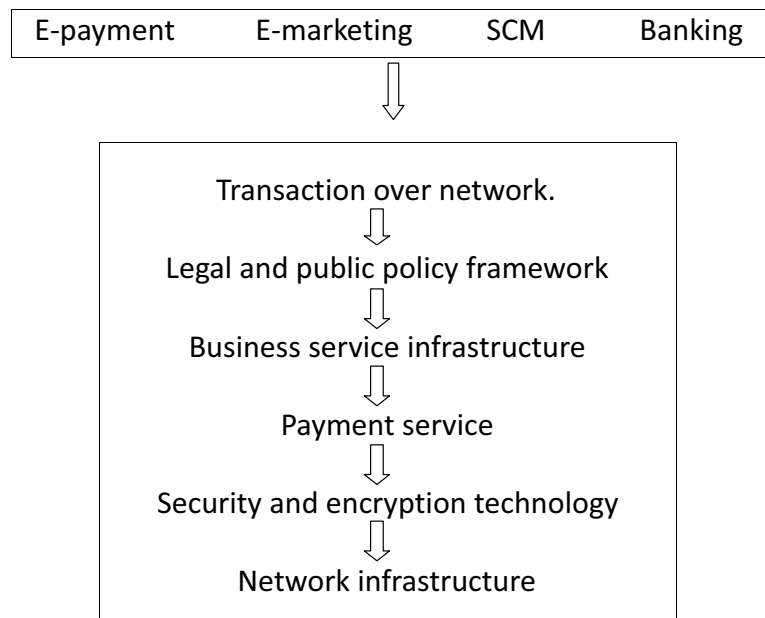


Fig.1 Basic infrastructure of E-Commerce

Electronic commerce is now gradually addressing security issues in its inner networks. For e-commerce system employees such guidelines can be read and executed to secure systems and networks. As most customers who shop on the Internet, some are literate and some are illiterate, it is still in its infancy to inform consumers about safety issues, but it will prove to be the most critical component in e-commerce security architecture. Virus, worms, Trojan client horse programs Big threat to e-commerce as the majority of authentication and approval mechanisms used in the e-commerce transaction can be ignored or undermined. Email attachments are the easiest way to install these programs on remote computers. Consequently, some privacy has become important for buyers with an increase in theft and impersonation of identities and any consumer concern must be taken as a major concern for e-commerce suppliers.

**Related Work**

Security is one of the key issues restricting e-commerce customers and businesses. The goal of this paper is to explore the perception of e-commerce security primarily from customer to company, B2C, and from customer-to-customer, C2C, websites. (1) Security issues stem from people's attention, as the world e-commerce market grows rapidly. Online

trading security is at the heart of the development of e-commerce. This paper on e-commerce security issues advances the two aspects solution strategy, I. Technology and system to improve the e-commerce development environment and ii. Promoting further e-commerce development.(2).

Increasingly,web applicationsintegrate thirdparty services. The integration introduces new security challenges because it is complex to coordinate your internal states with the component services and the web client on the Internet for a web application.(3) The owners of Ecommerce websites now think about how to get more clients to buy products on the site and what to do to make tourists feel secure about how end-users rate an ecommerce site and to defend themselves as one among the online community. The main aim of the journal is to give viewers a clear understanding of web technology, which will help all online customers to carry out secure transactions along with tips and tricks for safety. The online ecommerce site owners must use trust marks and their security strategies to make their online visitors comfortable or trust a ecommerce site. (4)

Every transaction has a security measure which belongs to e-commerce.

- a. **Phases of e-commerce operations**
  - a) Phase of information



- b) Phase of registration
- c) Phase of negotiation
- d) Phase of payment
- e) Phase of delivery or delivery

**b. Measures of security**

- a. Control of access for restrictions of integrity
- b. Secure identification of contract
- c. Number of votes
- d. Encryption
- e. Secure product delivery with integrity controls
- f. Product tracking

The biggest problems in the world of e-commerce are viruses, worms and Trojan horses. They only interrupt e-commerce operations and should be classified as a service denial tool (DoS). Apparently valid client system can be found in Trojan horse programs that allow data integrity and fraud attack and can be extremely difficult to solve. A hacker could initiate a victims ' system's fraude and the ecommerce server would tell you that the order is false or real. The fact that the Trojan Horse program allows the hacker to see all the plain text prior to encryption, all of which is denied password protection, encrypted client server communication, public private key encryption schemes.

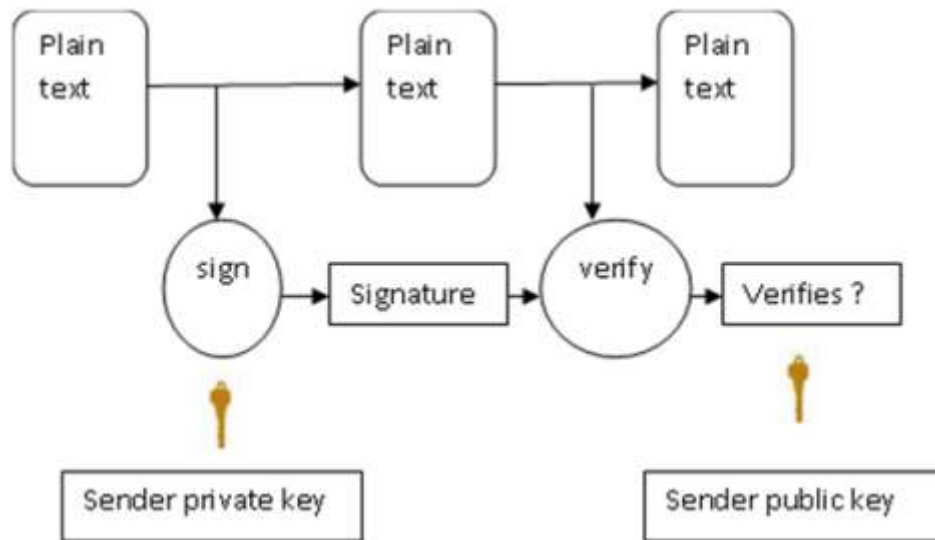


Fig.2 public/private key process

The traditional mechanism for authentication is identity based on security and access control. Some traditional authentication and encryption algorithms require high computer equipment computing power to avoid this type of problem. The focus of peer to peer (P2P) e-commerce can be on how to improve the authentication process and optimize the traditional authentication and encryption algorithm.(6)

The banking sector offers a excellent chance for all e-commerce operations but, at the same moment, generates fresh hazards and issues, including safety threats. Therefore, information safety is a key management and technical requirement for any

efficient and effective online payment transactions. Given that the cash transactions are very essential for e-commerce, a coordinated algorithm and technical solutions are necessary. (7)

Most e-commerce transactions are between buyers and vendors. This type of e-commerce transaction involves quotation applications, data, payment, distribution of orders and lastly service after receipt from the client of the item. It can be difficult to maintain the high level of trust that such transactions need for their authenticity, their confidentiality and timely delivery through the internet.[8]

Privacy and safety on e-commerce can be regarded as ethical issues. At the same moment, the area of privacy and safety is very much attracted by the commercial industry, as it has the ability to identify the success or failure of many businesses, especially trade activities.[9]

When shopping on-line, the payment feature ensures the quick and easy safeness and privacy of the sides to a deal that involves full electronic trading schemes by the customers or purchasers. The payment feature is the main problem.[10]

**Purpose of Study**

There may be various types of e-commerce issues.

- i. Properly registered in the internet portal.
- ii. Details about credit or debit card
- iii. Proper addresses of shipping
- IV. Product loss or damage etc.

So we need to focus more on below-

- Study overview safety of e-commerce
- Understand the online shopping by providing appropriate product shipping information.
- Safety of on-line payments
- Discuss different questions in e-commerce.

**A Digital E-Commerce Life Cycle**

Now millions of people are shopping online a day because they're easier and more convenient. Rather than move a physical shop customer uses the online shop to purchase because of saving time, choosing different products, reduced prices, delivery to the door, etc. Nearly anything like music, clothing of toys, cars, food, and even porn is available. Although some of these shopping is illegal, we will concentrate on all items you can buy legally on the Internet. The web sites are popular among eBay, iTunes, Amazon, HMV, Mercantile, dell, Best Buy, Flipkart, Snapdeal and many more.

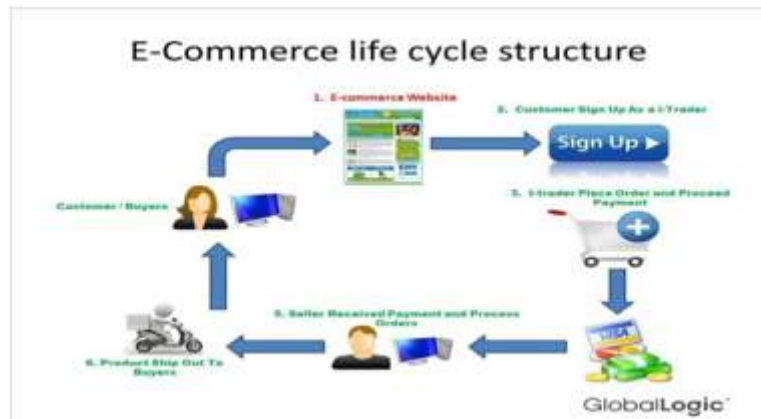


Fig-3. Online Shopping Phases



[Fig-4 E-Commerce steps to place an order and Digital Payment methods in E-Commerce]

## Security Tools For E-Commerce

E-commerce safety shall be the protection against unauthorized access, use, modification or destruction of e-commerce property. Security of e-commerce has different sizes [table .5]

- Integrity: prevention of unauthorized information change
- No repudiation: prevention of renegeing on an agreement after the fact
- Authenticity: information source authentication
- Privacy: protection from unauthorized information disclosure
- Data protection: data monitoring and disclosure provision
- Disponibility: Data delays prevention or deletion

Different safety measures are required in order to make online shopping are-

- firewalls – Software and Hardware
- Public Key infrastructure
- for encryption software
- for safety certificates
- for retinal scan, fingerprints, speech
- for network activities
- network operating Centre, and for secure protocol, such as the firewall and hardware
- for internet shopping.

## Purpose of Security

1. Cryption / decryption is a confidentiality of the data.
2. Crediting and identification – ensuring that someone claims to be implemented with digital signatures
3. Access control – governs the means that a user can access the system.
4. Data integrity – ensures that info was not distorted. Is implemented by the digestion or hacking of the text message.
5. Non-repudiation – not refusing to sell or to buy Implemented with digitized signatures.

The crypto graphing algorithm is a cipher. It is a math function. Most attacks are aimed at finding the key to. The reverse procedure means call decryption. The crypto graphing algorithm is called a cipher.

## Security Threats

In e-commerce a, there are 3 kinds of safety threats.

### A) Threats to the client

1. Action of content
2. Mischievous content
3. The server-side masquerade

### B) Challenges to Communication Channel

1. Confidentially threatening
2. Threat of integrity
3. Threat of availability

### c) Threats to servers

1. Threats to the web server
- ii. Threats to the trade server
- iii. Threats to the database
- iv. Common threats to gateway interface

## Guidelines for Secure Online Shopping

- A) Use Familiar Websites Instead of shopping with a search engine use a trusted site. Search results can be rigged to make you stray, especially if you're drifting past the first few link pages. If you understand the site, it is unlikely that it will be a rip off. Beware of misspellings or sites using a different top-level domain (for example.net instead of.com)—these are the book's oldest tricks. Yes, the sales on these locations may seem attractive, but that's how they trick you to give up your information.
- b. Look for the Lock  
Never purchase anything online from a site that has no SSL (safe sockets layer) encryption installed—at least. You're going to learn if the site has SSL because the site URL will begin with HTTPS:/ (Instead of HTTP :/). A locked padlock icon will appear at the bottom of your internet browser, typically in the status bar, or at the address bar right next to the URL. It relies on the browser you are using. Never offer your credit card by email to anyone.
- c. Don't tell all you don't need your social security number or your birthday to do business. If crooks get them, however, in combination with your purchase credit card number, they can do a lot of damage. The more they know, the easier

their identity can be stealed. Default to give up the least amount of information when possible.

d. Check Statements

After regular good shopping during the holiday season, check your loan card, debit card and check accounts for digital statements. Make sure you don't see any fraudulent fees, even from locations such as PayPal. (After all, there is more than one way to get to your money.) If you see something incorrect, pick up the phone to rapidly get to grips with the issue. Only pay the bill in the case of credit cards once you know that all your charges are accurate. However, you have 30 days to report issues to the bank or card issuer; after that, you may still be responsible for the fees.

e. Use Strong Passwords

The best practice for online shopping is to change passwords periodically. Our password tips can be handy throughout the year when shopping is likely to mean creating new accounts on all kinds of e-commerce sites.

f. Think Mobile

Most of the young generation compare the goods from different locations when they go to buy any item online. The National Retail Federation suggests that before making a purchase, 5.7 percent of adolescents will use their mobile devices to compare shopping. (And 32.1% will also compare the internet store with a laptop.) For more detailed data, please also read our mobile device shopping tips).

g. Hopefully we don't have to inform you that using a public computer to create purchases is a bad idea, but we're still going to. If you do, remember to log out whenever you're using a government terminal, even if you're just checking email.

h. Don't Fall for Phishing Messages Identity thieves send massive numbers of emails to Internet users asking them to update their bank account information, credit cards, online payment services, or popular shopping sites. Your email may indicate that your account information has expired, has been

compromised or has been lost and that you need to forward it to the company immediately.

Other times e-mails request the consumer to download and submissions an electronic form. More information on phishing can be found at [www.antiphishing.org](http://www.antiphishing.org) and in [www.onguardonline.gov](http://www.onguardonline.gov). For detailed information regarding phishing, please contact our website at [www.antiphishing.org](http://www.antiphishing.org). [www.onguardonline.gov](http://www.onguardonline.gov).

i. Count the Cards Gift cards are the most requested annual holiday gift and no exception this year. Keep to the source when buying one; scammers like auctioning off donation cards on sites such as eBay with few or no funds.

j. Use the Intuition of Shopper Look at the site with a critical eye. And listen to the old saying,

### How People Feel Safe When Shopping On-Line?

If a customer is a regular shopper online, he / she must follow the guidelines below.

1. Check the currency or exchange rates before buying the goods on global sites.
2. Find the shipping costs and whether or not your product is being delivered.
3. Check out the buyer and seller feedback if you bid on E-bay. Before you ever make an offer, this should become standard.
4. For more information and their rules, legislation and regulations, please find the FAQs on the website.
5. If you are asking money for a payment, don't say anything. You are going to be protected from fraud using your credit card. Credit card companies reimburse accounts where the activities are fraudulent.
6. Please read the full period before placing an order, as well as the e-commerce website privacy policy.
7. Try searching with Google or one of the other search engines, if you are not certain about a site. You can find comments from other customers regarding the shopping site.

These simple guidelines for bidding should also apply

## Conclusion

E-commerce is widely considered for the purchase and distribution of products over the internet, but e-commerce can be regarded as a transaction which is carried out only via electronic actions. E-commerce and M-commerce play a very important role every day in online retail marketing and the use of that technology is growing every day around the globe. Security for e-commerce is protection against unauthorized access, use, alteration and destruction of e-commerce assets. Security of e-commerce dimensions; Prevention of unauthorized data change, No repudiation: prevention of renegeing on agreement after the fact against any party. Authenticity: data source authentication. Protection from unauthorized data divulgation: confidentiality. Database: data monitoring and divulgation provision. Availability: Data delay prevention or removal

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## About the Institute

IPEM made a modest beginning in the year 1996, with few Management and Computer Application Programmes. Today the IPEM Group of Institutions are in the forefront of imparting knowledge in the field of Education, Law, Management and Information Technology. The Computer & IT department was started in 1996 with Bachelor of Computer (BCA), affiliated to the Chaudhary Charan Singh University, Meerut with 120 seats. This journal of Computer & IT Department students are exposed to emerging trends in the areas of information Technology by value additions through workshops, Live Project and a regular interaction with Experts from Industry. This is reflected in the performance of the students as we have 100% result with maximum 1st division. We provide best placement to the students.

The Computer & IT Department is running two courses successfully: Master of Computer Application (MCA) is approved by All India Council for Technical Education (AICTE) and affiliated to Dr. A.P.J. Abdul Kalam Technical University (APJAKTU) Lucknow and Bachelor of Computer Application (BCA) is affiliated to the Chaudhary Charan Singh University, Meerut. The other courses are running under IPEM group of Institution are Master of Business Administration (MBA) and Master of Applied Management (MAM) approved by all India Council for Technical Education (AICTE) and affiliated to DR. A.P.J. Abdul Kalam Technical University (APJAKTU) Lucknow. The Post Graduate Diploma in Management (PGDM) is approved by All India Council for Technical Education (AICTE) Govt. of India, Ministry of HRD. The Bachelor of Business Administration (BBA), Bachelor of Law (LLB) (3 years) BALLB (5 Years) approved by Bar Council of India and affiliated to the Chaudhary Charan Singh University, Meerut, Bachelor of Education (B.Ed.) and Basic Teacher Certificate (BTC) approved by National Council for Teacher Education (NCTE). Bachelor of Education (B.Ed.) is affiliated to the Chaudhary Charan Singh University, Meerut and Basic Teacher Certificate (BTC) is affiliated to the State Council of Educational Research and Training (SCERT) Lucknow.

The focus of IPEM has always been to be at the forefront of optimum utilization of IT resources and leverage the power of IT in making the learning process, informative and engaging. The students are provided with hands on experience and learning process, informative and engaging. The students are provided with hands on experience and learning with the state-of-the-art technology.

The computer & IT Department has enriched with well equipped labs in Aryabhata Block i.e. Programming Lab for the specialization in Database, Java, .Net etc (Aryabhata Lab-1), Internet Lab (Aryabhata Lab-2) and for UNIX, LINUX, Android etc (Aryabhata Lab-3). The Computer & IT Department of IPEM group of Institutions prepare the students who would be able to lead the future Industry and chase the world-wide mega trends. The Department has shined covered out for itself's commanding position with best results and placement.

IT Department of IPEM Group of Institutions organizes various workshop and seminar on latest IT trends every year. Seminars often feature several speakers, each one providing information from a different angle or perspective. People who attend seminars learn new ideas and skills to help them improve their production, while those who present at seminars gain exposure for their products or services. Presenting at an academic seminar is an important part of a researcher's/Scholars life, and is an opportunity that most young researchers look forward to. A good mix of paper presentations and journal publications is important when looking to move up the academic career ladder as well.

Spacious Lecture Theaters are thoughtfully designed to induce high quality learning and are equipped with high and teaching aids such LCD and OHP projectors. Priority is attached to achieve optimal convergence of stimulating pedagogy & enabling environment. The latest audio-visual aids and multimedia technology enables the Faculty members to have interactive sessions. Classroom learning is meant primarily for theoretical and conceptual input & consolidated by combining lectures with Case methods and Group Discussion for group learning. Extensive use of laptops is made by students in the well networked class rooms.

