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Banarsidas Chandiwala Institute of Information Technology

Affiliated to GGSIP University,
Kalkaji, New Delhi.

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From the Secretary's Desk



I welcome you all to this new edition of BCIT Magazine. Banarsidas Chandiwala Sewa Smarak Trust Society is working with a mission –To provide yeomen service in the field of Health and Education. BCIT was created by the society to fulfill its mission and the societal needs of higher technical education in the developing discipline of Computer Science in 1999. The society is aware of its responsibility to provide education to the youth of India.

The society has provided a serene environment of teaching/learning at BCIT with state of the art infrastructure comprising:

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- On campus, well-furnished Hostel.
- Multi-Specialty Campus Hospital

The thrust areas of BCIT are practical intensive teaching/learning and all round personality development of the students so that they may be ready to accept the challenges of contemporary professional life of IT industry. I am sure that students of BCIT are well equipped with necessary skills to deliver what is expected from them by the industry.

Dr. Bhuwan Mohan

From the Director's Desk



I welcome you all to this new edition of BCIIIT Magazine. In the information age, science and technology are the corner stone's on which the structure of society rests. The rapid advances in Information and Communication Technologies (ICT) has made the world increasingly hyper- connected and competitive, offering new challenges and opportunities, thus bringing fundamental transformation in society.

The Banarsidas Chandiwala Institute of Information Technology (BCIIT) has taken this unique initiative to encourage the innovative thoughts of its faculty and students to be put in the form of articles in e-magazine. These articles are put on the Institute website so as to be available to more people for their references, use and comments. This e-magazine is a regular annual feature of the Institute since the first issue in 2011. Some of the faculties and students who ultimately wish to pursue the Ph. D program get lot of inspiration and initiate their research in the area of interest.

One of our dreams is to see that BCIIIT stands tall among the other institutes of GGSIP University making an impact with value added contributions in the form of high standard and quality articles through its online endeavor. At our end, we feel that we have highly experienced and inspired faculty and excellent and academically brilliant students who can contribute a lot in this manner.

I hope our humble effort will go a long way in putting the resourceful thoughts of our faculty and students in improving the quality of education through technology. It is the genuine and sincere attempt of our faculty and students who are constantly putting their heart and soul to achieve the results.

I pray and wish them good luck in their endeavor.

Dr. Ravish Saggar
Director, BCIIIT

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Challenges faced by Ad Hoc Network Routing Protocols

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Abstract: *The communication medium in Ad hoc network is broadcast and the nodes are highly mobile and limited with resources. These nodes have constrained resources like power, computation ability and storage capacity. These networks are self-organized and require end-to-end communication. In general, a node in a mobile ad hoc network has to rely on neighbor nodes to route a packet to the destination node. The network is ad-hoc because it does not rely on a pre-existing infrastructure. The determination of nodes, which will participate in forwarding the data, is made dynamically based on the network connectivity. Adhoc networks uses flooding technique to forward the data. Routing in ad-networks is a challenging task; the major reason for this is the constant change in network topology. The topology changes because of high degree of node mobility. A number of protocols have been developed in the past. Cooperative behavior, such as forwarding other node's messages, can be quantified. Two types of uncooperative nodes may be identified namely faulty or malicious and selfish. Faulty/malicious behavior are either faulty and therefore cannot follow a protocol, or are intentionally malicious and try to attack the system. Selfishness refers to noncooperation in certain network operations. In mobile ad hoc networks, the threat from selfish nodes is dropping of packets (black hole). It affects the performance of the network severely. Both Faulty/malicious nodes and selfish nodes are problematic nodes. Due to the ad hoc connection, enforcing cooperation in such networks is particularly challenging. The unique characteristics of mobile ad hoc networks raise certain requirements for the security mechanism. The paper provides a comparative study between these protocols.*

Keywords: *Ad Hoc Networks, DSDV, AODV, MANETS*

I. Introduction

Wireless ad hoc networks are classified as Mobile Ad hoc Networks (MANET), Wireless Mesh networks (WMN), Wireless Sensor Networks (WSN). Mobile Ad-hoc Networks are self-organizing and self-configuring and changes dynamically. High mobility in the network is observed.

In Mobile Ad-hoc networks the networking takes place at the link layer. Some of the problems faced by Ad Hoc Networks are as follows:

- *Asymmetric links*
- *Routing Overhead*
- *External Interference*
- *Dynamic Topology*

II. Literature Review

The classification of routing protocols may be categorized as: *Table-driven and source initiated.*

A. Table-driven routing:

This is called Pro-active routing. In this the protocols maintains lists of destinations and their corresponding routes by exchanging and distributing routing tables periodically. It also maintains the routing information. Each router in the network maintains routing information to every other router. The main disadvantage of such protocol is that these protocols are not suitable for large networks with instable connections.

B. On-demand routing:

In this the protocol finds a route on demand by flooding the entire network. With the help of Route Request packets generated the routing is performed. They don't maintain routing information. In order to transmit and receive the packet, if a node transmit then this protocol searches for the route and establishes the connection. The route discovery usually occurs by flooding the route request packets through-out the network. But this algorithm faces problems of high latency time in route finding & Network Clogging through excessive flooding.

III. Destination-Sequenced Distance Vector (DSDV)

DSDV is a hop-by-hop protocol based on distance vector routing algorithm. In this protocol each node broadcast routing information updates periodically. The key advantage of DSDV over traditional DV protocol is that it guarantees loop free implementation. Such implementation leads to lesser number of copies generation in the network. The basic implementation includes maintenance of the route list. Each route has a unique sequence number.

The DSDV protocol requires each mobile station to advertise its routing table to each of its neighbors. Routing tables are updated periodically. The data broadcast by each node will contain its new sequence number and the information for each new route.

- Destination's address
- Number of hops
- Original Sequence number

The exchanged tables will also contain the hardware address and the network address of the mobile computer transmitting them. The routing tables will contain the sequence number created by the transmitter and hence the most new destination sequence number is preferred as the basis for making forwarding decisions. If the sequence number is same for the two routing nodes then the node with the smallest metric will be preferred over the other. Routes received in broadcasts are also advertised by the receiver when it subsequently broadcasts its routing information. The receiver adds an increment to the metric before advertising the route.

A. Dynamic Source Routing (DSR)

This protocol is developed for routing in MANETs. Nodes send out a ROUTE REQUEST message, all nodes the neighbor nodes to perform the source routing.

If a receiving node is the destination, or has a route to the destination, sends a REPLY message containing the full source route. Also, it may send back the reply in reverse direction or issue a ROUTE REQUEST. ROUTE REPLY messages can be triggered by ROUTE REQUEST messages. Out of several routes, the source selects the shortest route. It stores and sends messages along that path. The key advantage of source routing is that intermediate nodes do not need to maintain up-to-date routing information in order to route the packets they forward, since the packets themselves already contain all the routing decisions. The basic mechanisms involve route discovery and route maintenance. Route discovery method sends routes by broadcasting it. Route maintenance is a mechanism to check with all the updated routes for future.

B. AODV

It is a combined approach from DSR and DSDV. It follows the basic on-demand mechanism of Route Discovery and Route Maintenance and hop-by-hop routing, from DSDV. The basic mechanism involves each node with a sequence number and a broadcast id. All nodes that create the Route Request also create a reverse route back to the source node.

The routing misbehavior is mitigated by including components like watchdog and path rater in the routing scheme. Every node has a Watchdog process that monitors the direct neighbors by sending transmission.

IV. Security Issues faced by Adhoc Networks

In general, MANETS faces various security issues like authentication, integrity, confidentiality, access control and non-repudiation, in addition to the following challenges:

A. Co-Operation among Peers

Various Constraints like limited bandwidth, processing power, and battery life leads to application-specific tradeoffs in MANETS.

The selfish node drops the copy of the messages/ may abort the transmission in order to save on these limited resources.

B. Location Confidentiality

In many applications the location of the node is highly confidential and is of utmost importance rather than the message itself.

C. No Traffic Diversion

The networking may be optimized only when the information is from the genuine participating nodes. In many cases, the introduction of malicious nodes affects the advertisement of the routes.



A malicious node is capable of introducing the unusual traffic by means of false routing advertisements and eventually hampers the functioning of algorithms. Such malicious nodes disrupt network traffic and steal the network information. These nodes are non cooperating nodes. Eventually it affects the throughput and efficacy of the network.

V. Attacks faced by Ad Hoc Networks

Ad Hoc Networks are vulnerable to many security attacks. They are broadly classified as Active and Passive Attacks. In passive attack the malicious nodes tries to sniff the traffic whereas an active attack disturbs the regular course of operation. It is vulnerable to attacks on network data resulting in theft, loss or change. Other formal attacks like MCA Spoofing, Denial of Service Attacks, black hole attacks, grey hole attacks, replay attacks are some of the problems faced by the Ad hoc Networks.

VI. Conclusion

This paper will form the basis for the study of the routing protocols of the Ad hoc Networks and the challenges faced by them. After reviewing the popular algorithms and the set of problems being faced by the Ad Hoc Networks, it is suggested to optimize routing algorithms only after taking the malicious and selfish nodes into consideration. The routing protocols suggested must put emphasis on the working of the protocols in the dubious environment. So that the key protocols may be optimized and its efficacy can be measured in terms of network parameters like throughput, delivery ratio, latency, message abortion rates etc.

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Theory of Computation: A Review

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Abstract: *Mathematical and computer science concepts have been integrated to form theory of computation. This paper discussed the review of theory of computation. Automata is an important concept in computer theory, compiler design, parsing, and formal verification. Computability theory, commonly referred to as recursion theory, is a discipline of mathematical logic, computer science, and computation theory that began in the 1930s with the study of computable functions and Turing degrees. I have discussed automata theory, complexity theory, computability theory and formal languages in this paper.*

Keywords: *Automata, Algorithm, Computation, Complexity, Formal Languages*

I. Introduction

Formal Languages, Computability and automata theory are the most important areas of theory of computation. They are the primary founder members of the computation. The method is used to process strings of symbols as input in machines.

A language is any arbitrary subset of Σ^* over some alphabet Σ , and there are an infinite number of languages because there are an infinite number of subsets. Deterministic finite automata and regular languages are a relatively simple class of machines and languages. When we refer to a machine in this context, we are referring to an abstract rather than a physical machine, and we will be thinking in terms of a computer algorithms that may be implemented in a real machine. Our machine descriptions will be abstract, but they will be detailed enough to allow for development of an implementation. A theorem is a statement that is true in mathematics. A proof is a set of mathematical statements that together create an argument for proving the truth of a theorem. Axioms, hypotheses of the theorem to be proved, and previously proved theorems are all statements in the proof of a theorem. Most of all are interested in papers that report on experimental and applied research of wide algorithmic relevance, in addition to theoretical conclusions. According to many researchers' mathematics certainty was more likely to be found than in other fields and it has been analyzed that many of the mathematical demonstrations accept were full of fallacies, and that if certainty could be established in mathematics, it would be in a new subject with more solid foundations than those that had previously been believed secure.

II. Complexity Theory

Computational complexity is an area of computation theory. It is used to determine how difficult a task is to solve, with the most typical measures being time and space.

P, NP, NP-hard, NP-complete are common time complexity classes, while PSPACE, NPSpace, PSPACE-hard, and PSPACE-complete are common space complexity classes. Investigating a problem's computational complexity can reveal whether or not the problem has a viable solution algorithm. Complexity Theory largely focuses on worst-case complexity of computer problems, and this paper explains and discusses several key notions of computational complexity. When we claim that Factoring is not solvable in P, we mean that there isn't a polynomial-time algorithm that can factor every integer. It's arranged on procedures rather than results, the methodology was often created to get a specific result, and it covers a number of crucial results and key proof techniques.

Computing complexity theory is a branch of theoretical computer science's theory of computation that focuses on classifying computational tasks based on their intrinsic difficulty and relating those classes to one another. A computational problem is defined as a task that can be handled by a computer in principle, which is the same as saying that the problem can be addressed by mechanically applying mathematical processes, such as an algorithm. Whatever algorithm is employed, an issue is considered fundamentally complex if solving it needs large resources. By creating mathematical models of computation to examine these difficulties and measuring the number of resources required to solve them, such as time and storage, the theory formalizes this intuition. Other complexity measurements, such as the quantity of communication, the number of gates in a circuit, and the number of processors, are also utilized. Computational complexity theory's role includes determining the realistic boundaries of what computers can and cannot perform. The topics of algorithm analysis and computability theory are closely related in theoretical computer science. The difference between algorithm analysis and computational complexity theory is that the former is concerned with determining the number of resources required by a specific algorithm to solve a problem, whereas the latter is concerned with all possible algorithms that could be used to solve the same problem. Computational complexity theory aims to classify issues based on whether or not they can be addressed with adequately limited resources. In turn, placing constraints on available resources distinguishes computational complexity from computability theory, which examines what types of problems may be solved algorithmically in principle.

III. COMPUTABILITY THEORY

Computability theory, often known as recursion theory, is a subject of mathematical logic, computer science, and computation theory that began with the study of computable functions and Turing degrees in the 1930s. Computability theory, often known as recursion theory, is a subject of mathematical logic, computer science, and computation theory that began with the study of computable functions and Turing degrees in the 1930s. Since then, the discipline has broadened to encompass research into generalized computability and definability. Recursion theory intersects with proof theory and effective descriptive set theory in these areas. Although there is a lot of overlap in terms of knowledge and methods, mathematical recursion theorists are interested in the theory of relative computability, reducibility notions, and degree structures, whereas computer scientists are interested in the theory of sub recursive hierarchies, formal methods, and formal languages.

Turing computability was established as the accurate formalization of the informal idea of effective calculation based on the fundamental conclusions obtained by the researchers. As a result of these findings, Stephen Kleene (1952) integrates the terms Church's thesis and Turing's thesis. The CHURCH-TURING THESIS, which argues that any function that can be computed by an algorithm is a computable function, is now commonly regarded as a single hypothesis.

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IV. AUTOMATA THEORY

The study of abstract machines and automata, as well as the computational problems that can be solved with them, is known as automata theory. It is a computer science and discrete mathematics theory. The word automata is derived from the Greek word, which means selfacting.

This automaton is made up of states and transitions. When the automaton sees an input symbol, it transitions to a different state using its transition function, which takes the current state and the most recent symbol as inputs. Automata and Formal language theory are closely related. A finite representation of a formal language that can be an infinite set is called an automaton. The Chomsky hierarchy, which defines the relationships between various languages and types of formalized logic, is sometimes used to classify automata by the class of formal languages they can recognize. Automata are important in computer theory, compiler design, artificial intelligence, parsing, and formal verification.

V. CONCLUSION

In this paper, I have discussed computation theory, complexity, computability, and automata theory. It is a theory in theoretical computer science and a subject of research in both mathematics and computer science. Computability theory, commonly referred to as recursion theory, is a discipline of mathematical logic, computer science, and computation theory that began in the 1930s with the study of computable functions and Turing degrees.

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Real Estate Price Predictor Using Machine Learning

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Abstract: Machine Learning is playing a major role in various detections and predictions such as image detection, price predictions, fraud detection, speech recognition, and whatnot for the past many years. Present Machine learning algorithms opens a gateway for better understanding and provides concrete ground for many pieces of research to be performed. By using certain algorithms and utilizing their properties we can reach to unbelievable predictions and results. In this paper, we see the future price prediction for Boston City Real Estate (houses) by analysing data consisting of various features (class labels) of the property for example Number of rooms, tax, etc. The predictions are done by trying various machine learning algorithms. In order to select an algorithm, we compare and explore various algorithms and check for the least error. The algorithm having the least error proves to be the most reliable and will predict the best prices. We have chosen the Random Forest Regressor as the algorithm since it produced the least error. This algorithm comes under supervised learning. This model has been compared to various systems and the model produced considerable results. We recommend this system to the vendors as this can prove to be a huge turning point for their business. The manual calculation of prices is prone to errors which lead to a huge loss. Hence conversion of this manual process to modern technology can prove to be a big success for the people in this business. By this beautiful amalgamation of machine learning and artificial intelligence, we become capable of composing intelligent predictions.

Keywords: Machine Learning, Artificial Intelligence, Supervised Learning , Random Forest Regressor, Class Labels Algorithm

I. INTRODUCTION

Machine Learning and Deep Learning both are integral parts of Artificial Intelligence. Machine Learning as the name itself is self-explanatory that here the machines learn, now the question is what they learn? The machines learn human behaviour. How a human may calculate and analyse data, the machine tries to mimic that by using algorithms and various types of learnings. The machines regulate their reaction depending on what inputs are being given and identifying the patterns and hence producing the output. The difference between humans and these machines is of ACCURACY. While a human may create errors when huge data is given for analysis, but machines rarely produce any big errors or bad calculations as compared to humans. So as a result we can get better results as compared to calculations and analysis done by humans. The data is the major part of all the prediction and analysis work. It serves as the base ground using which we start to build our model and finally do the predictions.



As we have class labels here, those are the features of the house. We have labelled data, and for such kind of data Supervised Learning is used. Supervised Learning is the one, where we have a dataset which acts as a teacher and its role is to train the model or the machine. Once the model gets trained it can start making a prediction or decision when new data is given to it. This type of learning points at the input variable (X) and an output variable (Y). This learning gives the mapping function between the input and the output variables. In this price prediction system, we are using Regression since we already have the data that includes standards like crim, tax etc. Analysing the extracted data, the model predicts the price of new houses. Classification is also a part of supervised learning but as the data is already classified and is not present in the form of classless chunks of data, it is not needed.

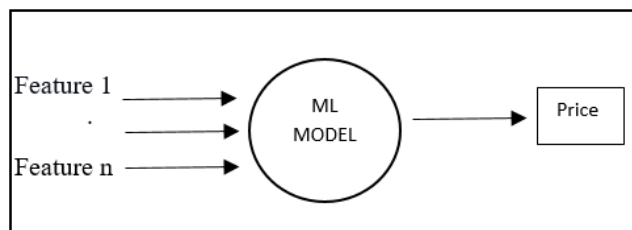


Figure 1. Depiction of the Price Prediction System

II. BACKGROUND

Real Estate – Price Predictor is a system that predicts accurate prices of the houses by analysing the features of houses. This system uses machine learning and various python libraries to get the desired results.

This system is a result of the need for a robust system to predict accurate house prices. Previously the prices were calculated manually using the old prices which could lead to around a 25% error rate in the house price prediction. The manual way of calculation is not capable of handling so many features or huge data for getting accurate analysis and predictions even if anyone tries to include numerous features; it gets difficult to extract correct prices manually.

For example, a Real Estate company has only manual way of data analysis and the data is in thousands, then the manual analysis is prone to bad calculations and hence wrong predictions which in turn can cause the company a big loss. Suppose, a house's real cost is 10 crores but due to manual calculation we get about 25% error, then the price would come out as 7.5 crores and the company will sell out the house on a loss of 2.5 crores. Whereas same calculations and analysis if done using this machine learning price prediction system, the model can predict the correct value or if there would be any error then it would be just 2-5% which is not going to cause a huge loss to the company as compared to the manual system of analysis. This is how the accuracy of a model can be defined. The less is the error or RMSE, the greater is the accuracy of the predictions. The main motive of using a modern technology system is to get correct predictions which only good accuracy can guarantee. This paper includes the research of the statistical data patterns about Boston City Real Estate prices. The progression in big data technologies and the Machine Learning domain leads us to get dominant and useful predictions.

We have used supervised learning as the data is already in a classified format. The analysis is based on the features present in the dataset of Boston City houses such as CRIM (each capita lawbreaking degree by town), AGE (properties built prior to 1940 acquired by owners), RM (typical figure of rooms each house), etc. The prices change according to the surroundings as well as the internal features of the apartments present in Boston City. As huge data is present, one more front of research is figuring out how a certain feature is correlated with the price of the house. How much impact of a particular feature can be on the price? For analysing this correlations are obtained. This System makes it easy to give the correct prices of the houses by which a company can make huge profits.

From the buyers' point of view also, using a modern technology system, the market patterns can be detected and predictions can be made with much more accurately to save the buyer from any loss. The statistical data represents the trends, on what feature the price of the house is mostly dependent. The predictions are done by splitting the data into training and testing, by this the model is being trained to predict values when out of dataset values are provided.

The research revolves around training the model after choosing a particular algorithm by trying out various algorithm and calculating root mean square error. Lower the error, the more accurate the model and predictions are.

III. METHODOLOGY

Random forest is a springy, stress-free to use machine learning algorithm that harvests, even without hyper-parameter tuning, a great outcome maximum of the time. It is also one of the greatest used algorithms, because of its easiness and range as it can be used for mutual classification and regression errands. Random forest is a supervised learning algorithm. The "forest" it shapes, is an ensemble of decision trees, typically trained with the "bagging" method. The overall impression of the bagging technique is that a grouping of learning models upsurges the complete outcome.

Regression Analysis method using Random Forest Regressor:

Steps

- Step 1: Load the dataset after changing the raw data into CSV (Comma Separated Value file) which is the most favoured format.
- Step 2: Import all the mandatory libraries to achieve the analysis.
- Step 3: Changing the loaded tabular data into a data frame to gain a format and check it for the analysis.
- Step 4: Isolate the dependent variables from the independent variables and split the data into train set and test set.
- Step 5: Form the model and attempt several models.
- Step 6: Check for the error in each model by calculating the root mean square. The model with minimum error is chosen. (Random Forest Regressor).
- Step 7: Apply the selected model to the train data set.
- Step 8: Implement the predictions using the produced model and hence use the same model for testing.
- Step 9: Compare the train and test values and check the competence of the model.
- Step 10: Finally, check the concluding general root mean square error and get the final prediction.

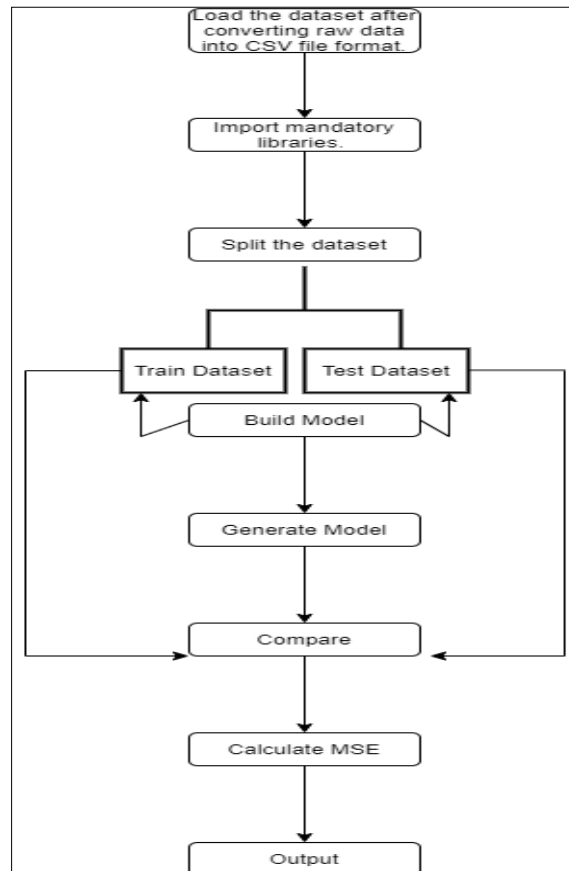


Figure 2. Flowchart for Regression analysis using Random Forest Regressor

Figure 1 – Shows the diagrammatic depiction of what the model is doing. The machine learning model takes the features as input and gives price predictions as an output. Figure 2 - is taken as a basic approach of the steps to be followed for the analysis of the dataset of Boston City.

IV. Experimental Results and Analysis

All the predictions are stored for the future analysis. This happens to be an exploratory data analysis and following are the outputs of the data analysis. The Boston City dataset happens to be a good dataset for initial exploration and also to understand how data plays a crucial role for doing predictions for people's businesses or just for exploring.

This paper shows all the necessary and exploratory outputs which are relevant to our research.

Table I - Shows all the 14 features which were used in the whole analysis of the Boston City Real Estate Prices.

Fig III– Shows the Boston City dataset and also tells that there are no missing values that need to be handled.

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Fig IV - Shows train and test data splitting. This is the most important step in order to train the model for doing the predictions.

Fig V - Shows which attribute is the most correlated with the price. (Positive value – Strong correlation exists, Negative Value – Weak or negligible Correlation exists).

Fig VI -Shows the highest correlation scatter plot. RM with MEDV, it shows a positive scatter plot going upwards which tells that it is the most dependent feature whose value can fluctuate the price of houses to a great extent.

Fig VII- Shows the lowest correlation scatter plot. LSTAT with MEDV, it shows a negative scatter plot going downwards which tells that it is the most independent feature whose value cannot fluctuate house prices much.

Fig VIII – Shows errors produced by different machine learning algorithms. The algorithm that produces the least error would be the final chosen model. Random Forest Regressor is the model that is being chosen as it produced the least error.

Fig IX – Shows model building using Random Forest Regressor.

Fig X- Shows the final RMSE error value which is not much and hence we can say that our model is working really well.

Fig XI - Shows the comparison between the measured and predicted values. The scatter points are very close and hence we can state that the model is working very well by predicting close values.

Fig XII – Shows the price Prediction of the house after entering the values of the 14 features.

Fig XIII – Shows the change in the predicted price of the house as the values of the features are changed.

Table I Features of the Boston City Real Estate

No.	S.	Features	Feature Explanation
1		INDUS	Share of non-tradable commercial estates each town.
2		AGE	Properties built prior to 1940 acquired by owners
3		LSTAT	Percentlesser status of the residents.
4		CRIM	Each capita lawbreaking degree by town.
5		DIS	Slanted distances to five Boston occupation centres
6		PTRATIO	Student-teacher proportion in township.
7		ZN	Part of housing land zoned aimed at lots over 25,000 sq. ft.
8		NOX	Nitric oxides absorption (portions for each 10 million)
9		B	$1000(Bk - 0.63)^2$ where Bk is the quantity of blacks by township.
10		RAD	Key of convenience of circular highways.
11		RM	Typical figure of rooms each house.
12		CHAS	Charles Waterway dummy variable (1 if zone bounds waterway; else 0)
13		TAX	Whole-valueestate-tax proportion per \$10,000
14		MEDV	Middleprice of owner-engagedhouses in \$1000's

```
In [6]: housing.describe()
Out[6]:
```

	CRIM	ZN	INDUS	CHAS	NOX	RM	AGE	DIS	RAD	TAX	PTRATIO
count	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000	2499.000000
mean	3.687084	5.866747	13.747543	0.094838	0.598849	6.300306	75.125450	3.257653	11.007203	450.607843	18.541216
std	6.478311	16.840675	6.598267	0.293050	0.133467	0.632259	26.554965	1.788438	9.338271	167.711237	2.230256
min	0.006320	0.000000	0.460000	0.000000	0.385000	3.561000	2.900000	1.129600	1.000000	187.000000	12.600000
25%	0.102900	0.000000	7.870000	0.000000	0.488000	5.942000	56.800000	1.987200	4.000000	305.000000	17.400000
50%	1.126580	0.000000	18.100000	0.000000	0.585000	6.245000	87.900000	2.496100	5.000000	403.000000	19.200000
75%	5.666370	0.000000	18.100000	0.000000	0.713000	6.525000	95.600000	4.239000	24.000000	666.000000	20.200000
max	88.976200	100.000000	27.740000	1.000000	0.871000	8.780000	100.000000	12.126500	24.000000	711.000000	22.000000

Figure 3. Boston City Dataset

```
In [13]: from sklearn.model_selection import train_test_split
train_set, test_set = train_test_split(housing, test_size=0.2, random_state=42)
print(f"Rows in train set : {len(train_set)}\nRows in test set: {len(test_set)}\n")
```

```
Rows in train set : 1999
Rows in test set: 500
```

Figure 4. Train and Test data Splitting

Looking for Correlations

```
In [21]: corr_matrix = housing.corr()
In [22]: corr_matrix['MEDV'].sort_values(ascending=False)
```

```
Out[22]: MEDV      1.000000
RM        0.679808
B         0.401779
CHAS     0.279196
ZN       0.256290
DIS      0.191914
AGE     -0.255972
INDUS   -0.301348
NOX     -0.394302
CRIM    -0.405351
RAD     -0.457209
TAX     -0.473463
PTRATIO -0.523600
LSTAT   -0.765250
Name: MEDV, dtype: float64
```

Figure 5. Showing correlation of price with attributes

```
In [24]: housing.plot(kind="scatter", x="MEDV", y="RM", alpha=0.9)
```

```
Out[24]: <AxesSubplot:xlabel='MEDV', ylabel='RM'>
```

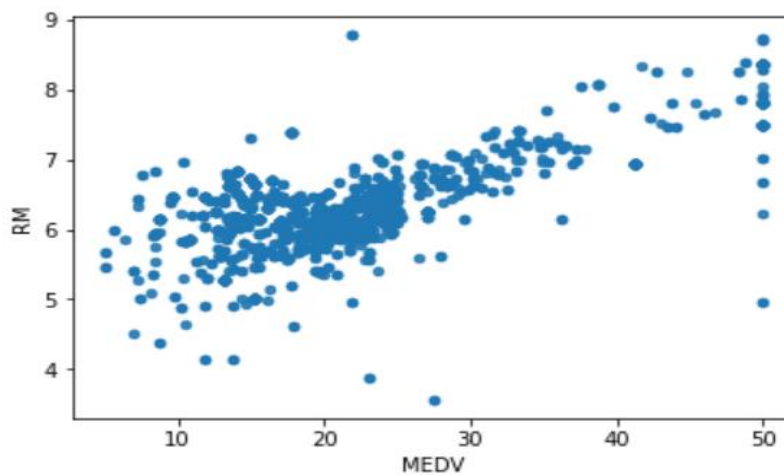


Figure 6. Highest Correlation Scatter Plot

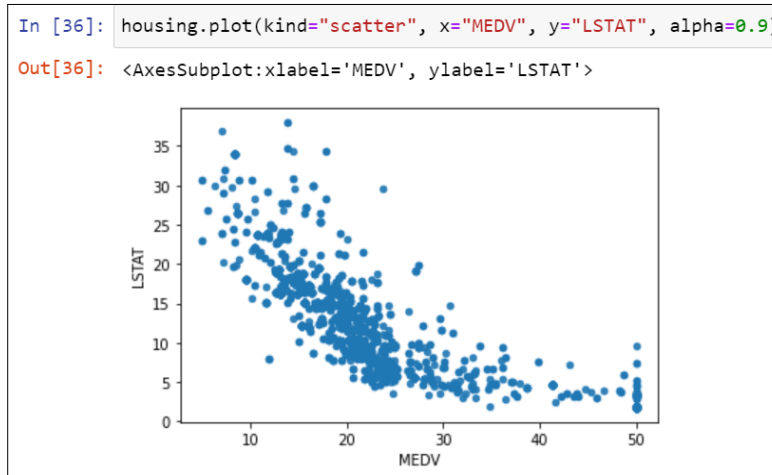


Figure 7. Lowest Correlation Scatter Plot

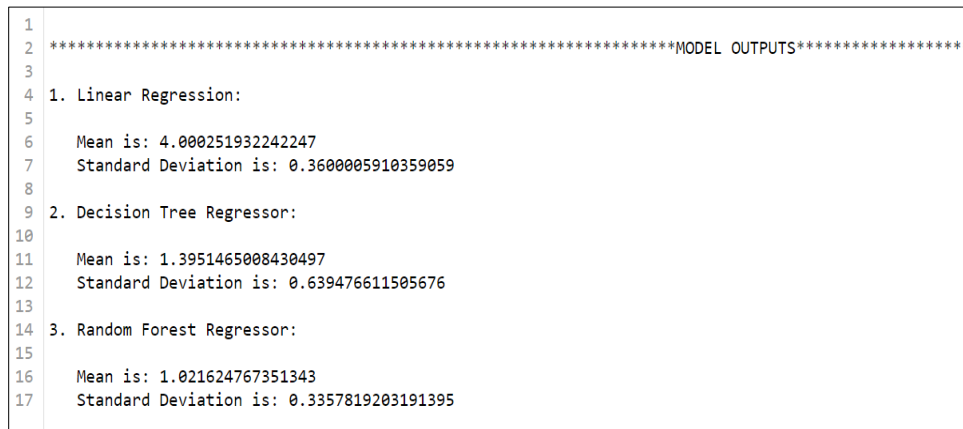


Figure 8. Mean and Standard Deviation of different models

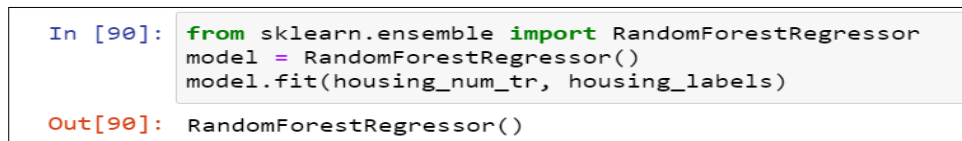


Figure 9. Model Building



Figure 10. Calculating final RMSE

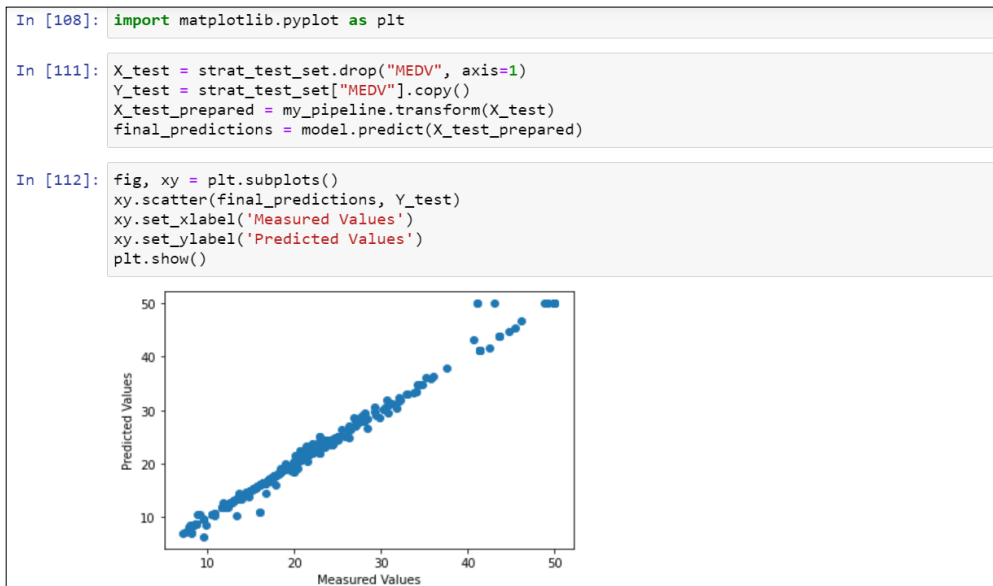


Figure 11. Scatter plot between the measured values and the predicted values

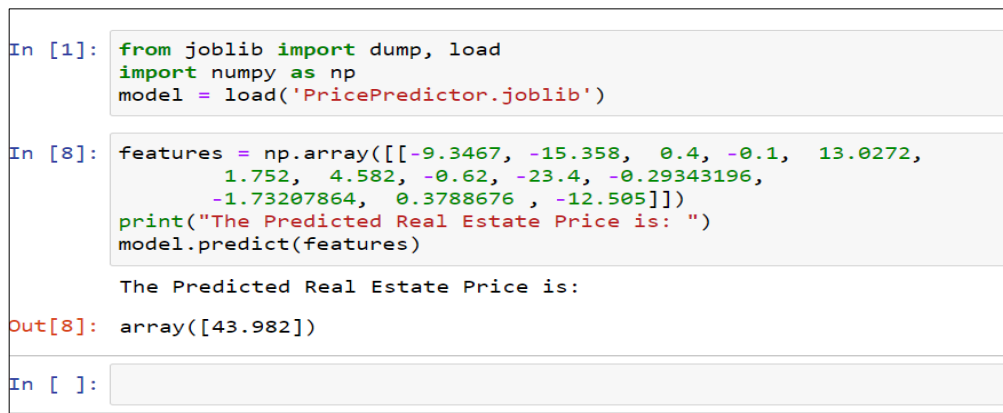


Figure 12. Predicted Real Estate price after entering the value of features

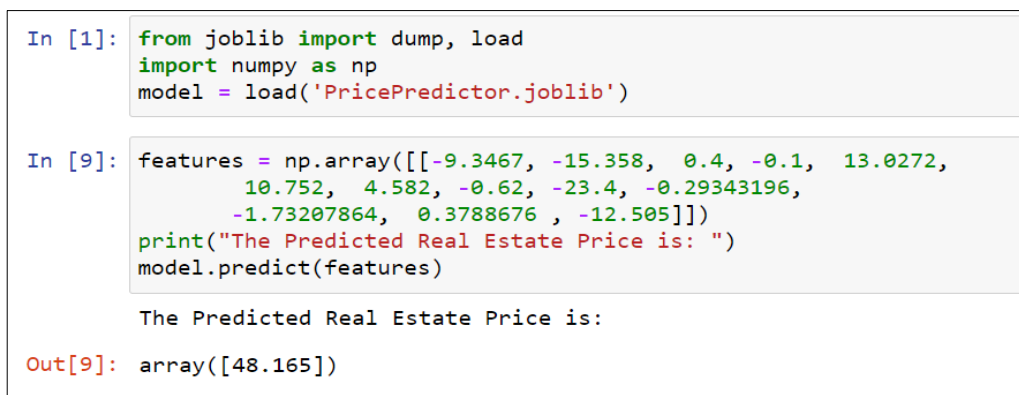


Figure 13. Predicted Real Estate price when one of the feature value is changed

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V. Conclusion

Regression technique is used along with the Random Forest Regressor to analyze and explore the Boston City real Estate data. Since the rate of adapting the modern technology is increased day by day, one can extract maximum profits by saving the predictions and enhancing the dataset even more when used in the business front. In this paper we have conducted an analysis and research over such data and obtained price predictions of the new apartments by giving the values of those 14 features given in **Table I**. These prediction results can be further used for more analysis or carry out other exploratory research purposes.

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Security from Insider Theft on Cloud Computing-A Review

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***Abstract:** Cloud Computing is nearly new concept, it's an advancement to grid computing that has the concept of virtualization in it and service on demand that can be accessed remotely from cloud servers. Key idea behind the development of the cloud is to provide public usefulness to which whole world can be connected. Cloud Computing is well known for its features which fascinates lots of organization to adopt this technology. Features like scalability, service on demand, Efficiency, High Performance, Easy to Deploy, Easy to use, No need to buy resources, cheap services and Ready to use services, No maintenance by users. To access all these services, a user only requires internet connectivity on their system. With all these features cloud technology has some drawbacks which make the organization to think whether they should adopt it or not. This paper reviews the security issues that are prevailing due to the insider theft on cloud computing.*

***Keywords:** Cloud computing, Security, Remote storage system, CSP*

I. Introduction

According to NIST [1] Cloud computing is a model for convenient, on-demand network access to a shared pool of configurable computing resources (e.g., networks, servers, storage, applications, and services) that can be rapidly provisioned and released with minimal management effort or service provider interaction. In cloud computing the data and applications are maintained through the central remote server and internet that allows consumers to use the applications without the need to install it and also through the use of internet cloud computing allows customers to access their personal data stored on a remote computer. Yahoo email, Gmail, or Hotmail etc. are examples of cloud computing. The software for email management and the server are fully managed and controlled by the CSP Google, Yahoo etc. and are all resident on the cloud (Internet) .

The lucrative features and widespread applications of cloud computing is the reason why organizations are using cloud storage for storing their critical information. Users can store their data remotely in the cloud storage which can be accessed using thin clients as and when required. One of the major issue in cloud today is data security in cloud computing. Storage of data in the cloud is at high risk due to the usage of Internet by cloud based services due to which the data that is stored inside the cloud is of less control by the user. The utmost and most important concern in cloud is how to avail all the benefits of the cloud while maintaining security controls over the organizations assets.

II. Features of Cloud Computing

- **Availability and Accessibility:**

It is the responsibility of CSP to provide the availability of data and services to their users, for this CSP has management teams which are expertise in managing cloud systems and provides availability all the time. As this cloud machines are accessed via Internet though it can be accessed globally.

- **Maintenance:**

Services and resources are on rental basis user need not to worry about maintenance of software as it is fully managed by CSP. User only need to use it but if we are using Infrastructure or platform than maintenance of security and API is user's concerns and all other kind of maintenance work is under CSP.

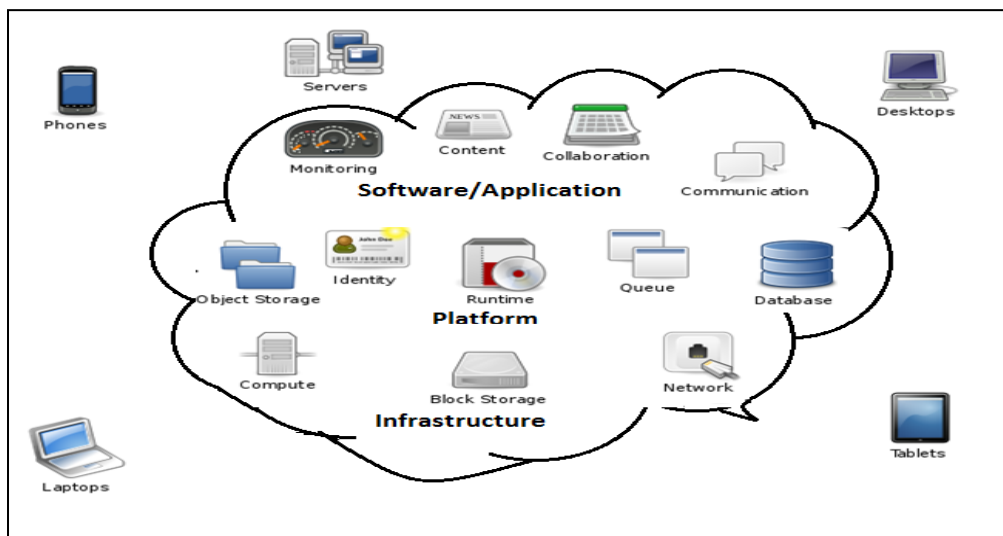


Figure 2.1: Cloud Computing.

- **Scalability:**

Services and resources of cloud computing are provided by CSP on rental basis. Users or Organization use service according to their demands at that time, but if after sometime or in future if they want to increase their resources than they can easily do it by asking for more resources to CSP.

- **Easy to access:**

To access cloud services we don't need extra hardware. To access Cloud services we only need a personal computer and browser installed on and high speed internet connection. It's similar to work on Web Servers.

- **High Processing Power:**

For individual it is very difficult to use such system that have processing power like super computer, but Cloud is consists number of high power machines which collectively provides system like super computer.

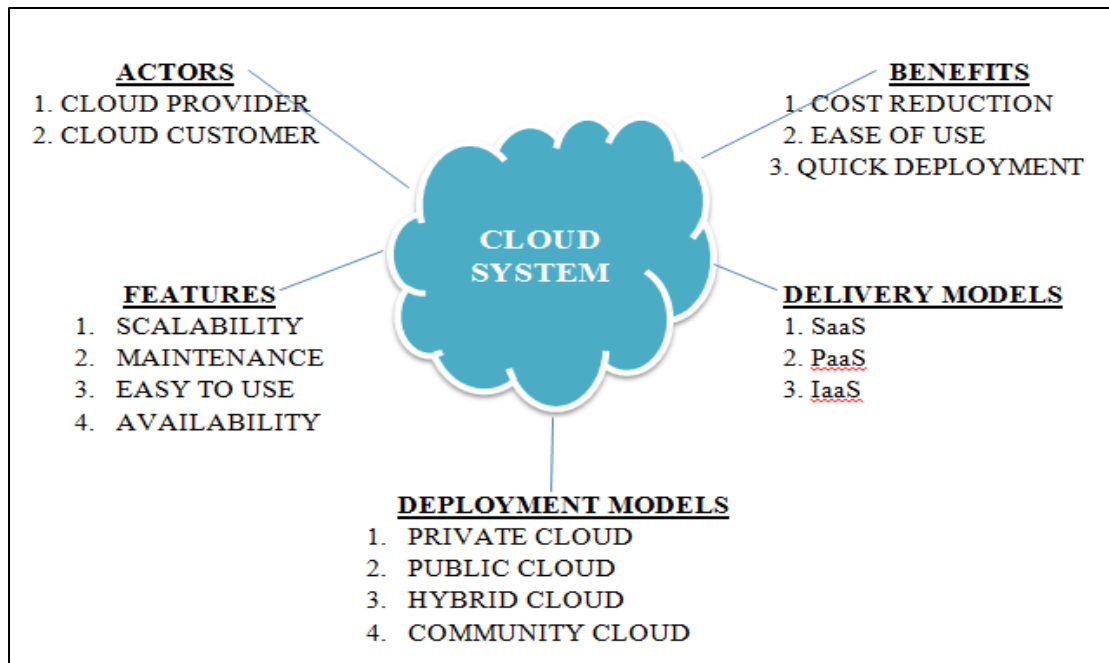


Figure 2.2: Cloud System

III. Security

Security issues are of utmost concern in Information technology. In order to keep organizational or user data secure is a primary concern. If the safety of the organization's data is not maintained on the cloud then the benefit of shifting the data from the older technology to cloud technology becomes useless. Lot of awareness about the security issues of cloud is been created by the Non-Profit Organization (NPO). CSA (Cloud Security Alliance), a Non Profit Organization each year publishes a report on the popular security issues prevailing in the cloud. In 2013 CSA reported nine notorious security threats to cloud which are harming the user's individual data without their knowledge.

Those are as follows:

1. Misuse of Cloud Computing (Cloud Abusing)
2. Weak and insecure Application Programming Interface (API)
3. Insider Theft
4. Vulnerabilities in shared cloud services.
5. Data Damage and loss
6. Data Breaching.
7. Eavesdropping
8. Service Denial Attack
9. Brute Force Attack

These are most effecting security issues reported by CSA.

IV. Review of Security Issues, Vulnerabilities and Challenges

When the data is transferred from one organization to another a lot of risks are involved. The risk can be from an insider from the organization or an outsider from the organization. A thorough understanding of these security issues is required and the Cloud service providers must at all time ready to resolve these issues.

- **Kuyoro S. O. et.al [6]** describes security challenges and issues and presents a report on analysis on these security issues. According to IDC survey it was concluded that if all the distributed data can be centralized then resources can be provided in a more secured manner. IDC survey revealed that not all Cloud service providers can be trusted completely by the users. The data must be kept on the cloud in Encrypted form. The research work performed by them concluded that as the era of cloud computing is approaching towards a growing technology the security threats with respect to the growing technology are also changing. To keep yourself safe from the changing security threats you must keep yourself familiar about the changes due to which the security issues and challenges occur time to time. The best solution is to have a choice of the cloud service provider that is updated about these security vulnerabilities.

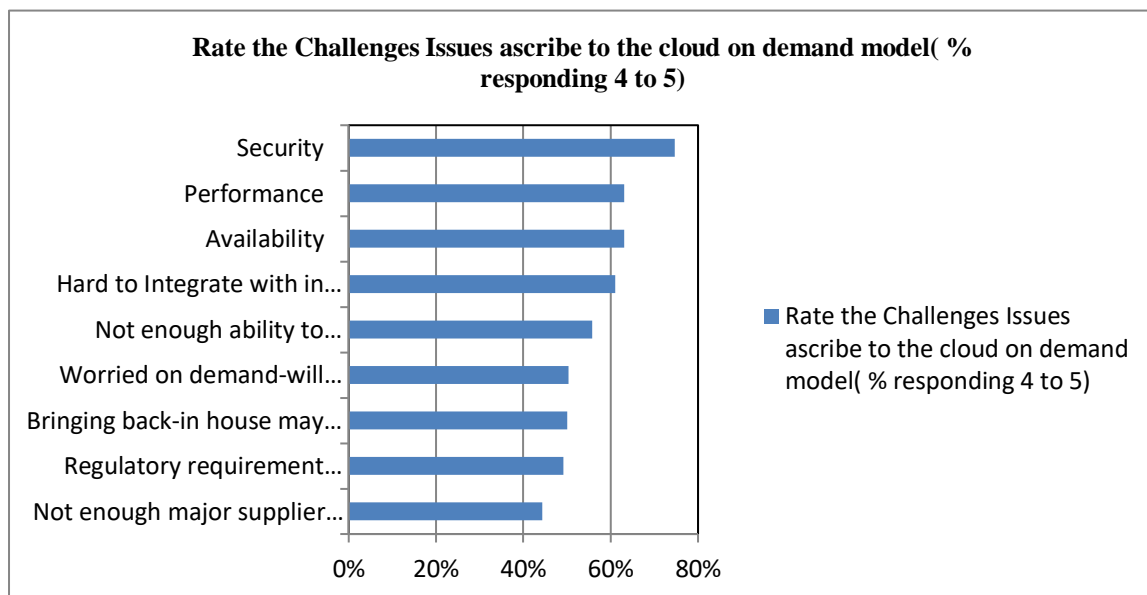


Figure 4.1: IDC security issues survey report analysis by Kuyoro S. O.

- **Mr.Tejas P.Bhatt et.al. [7]** Also describes a security model for cloud computing. In their research paper, they describe about all major security issues and then came up with a solution. According to their solution if we encrypt all data on cloud than we can save consumers data. As if someone breaches to consumers data than also he/she will not be able to understand about data. For this he developed a service on the top of and virtual machines as shown in figure. SaaS that encrypt each and every file saved on cloud storage on the basis of secure key given by consumer. And every time a file is forced to open needs the secure key to decrypt the file.

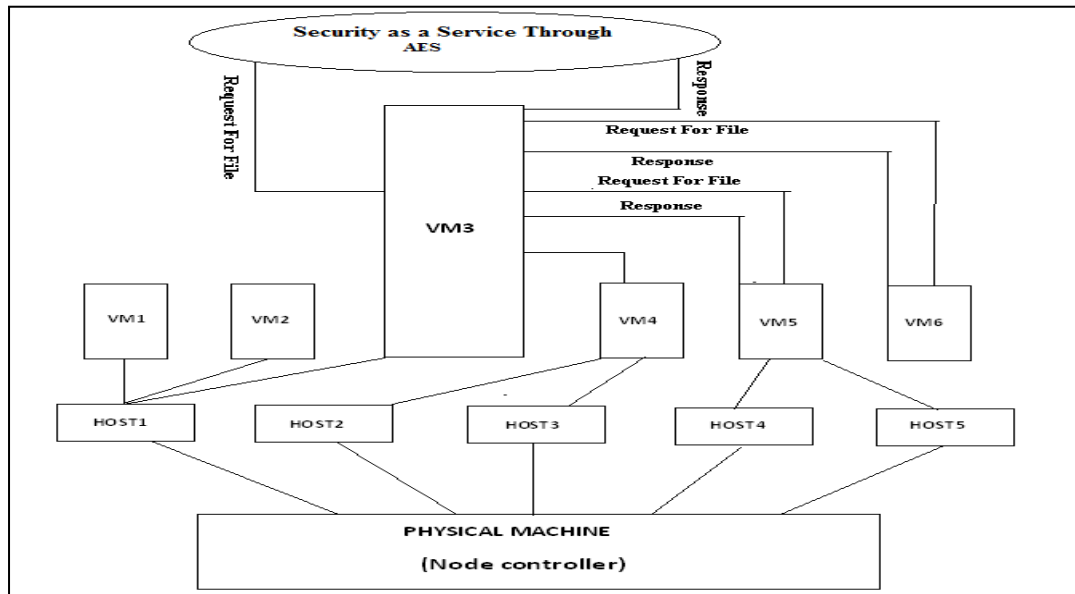


Figure 4.2: TEJAS AES based security model.

- Shucheng Yu et.al [8]** present their research that provide secure fine grained user data access control in cloud computing. Usually data are kept in encrypted form to provide security against entrusted cloud, but this solution provides an overhead of exchanging key to share data between users. Shucheng Yu in their research paper analysis this issue and gave a solution that minimize overhead of key exchange. For accomplish this, they combine proxy re-encryption, attribute based encryption and lazy-re-encryption techniques. Along with this technique their proposed model also contains features like user authentication secret key and access control techniques.

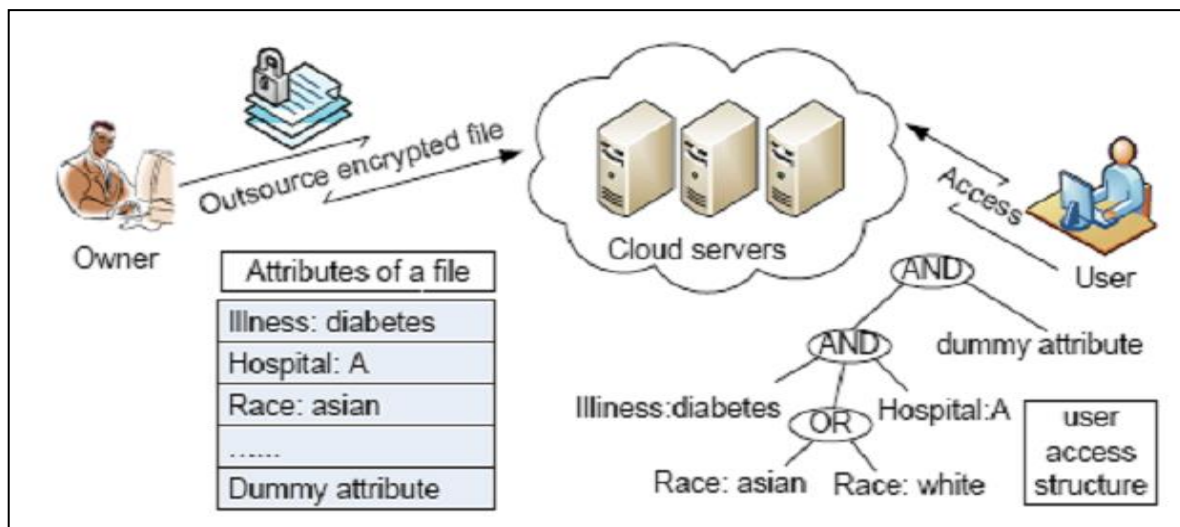


Figure 4.3: Model given by Shuchengyu for fine grained user access to their data.

Dongyang Xu et.al [9] presents a model for secure sharing of data in un-trusted clouds. According to his research work, users do not trust on cloud completely and simply encryption data techniques creates problem in public or shared cloud. Though they provide attribute based encryption scheme than will be used for encryption of data in cloud. It is like one to many encryption techniques in which data is encrypted by its owner and can be decrypted by many according to data access attributes. In previous work done by many researchers authorized users and digital content are given equal privileged. But in their paper they present a new approach that produce security keys of different classes by using hierarchical cryptographic key management and attribute based encryption.

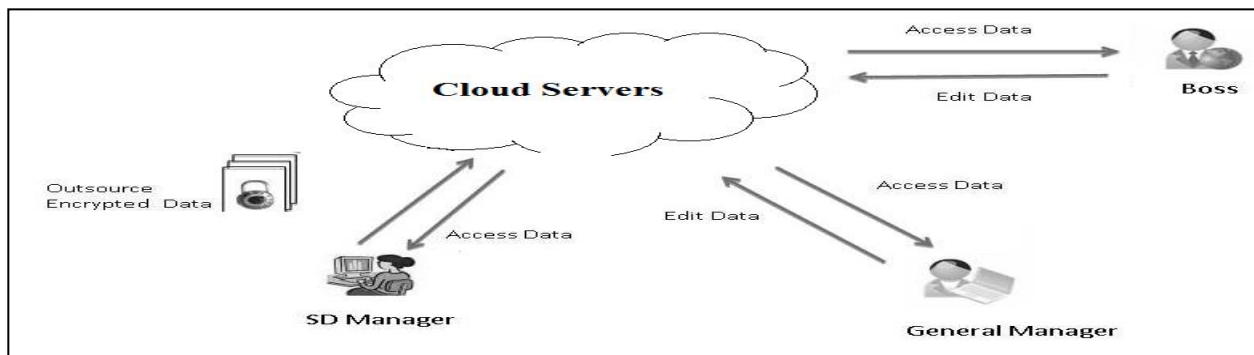


Figure 4.4: Model given by Dongyang Xu, of fine grained document sharing on cloud servers

Jan de Muijnck-Hughes[11] describes cloud security method. When data is send to cloud its protection is no more under control of users. His research paper describes PBE (Predicate Based Encryption) that helps to provide security on un-trusted cloud. In PBE, decryption of data is based on set of attributes which satisfied the certain predicate which provide coarse grained control over user's data. To encrypt user's data is not enough for security. Users must be known that how his/her data will be stored and used. Who can access his data and with whom his/her data can be shares must be known to users and it must be done with the permission of users.

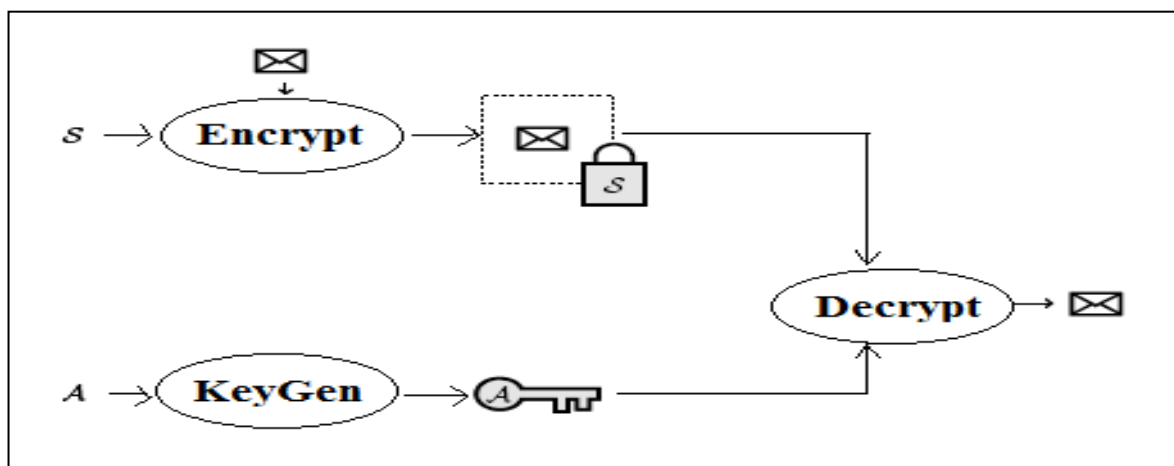


Figure 4.5: Predicate Based Encryption (PBE) Security Model

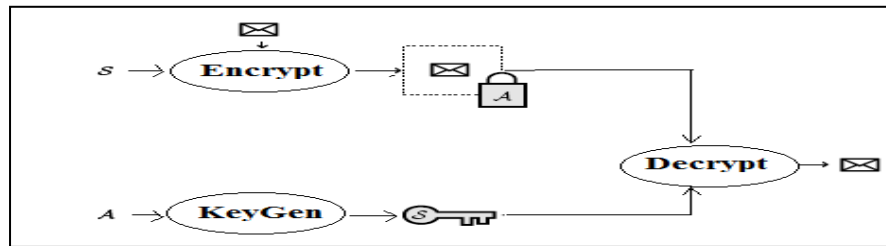


Figure 4.6: Predicate Based Decryption(PBD) Security Model

IV. Conclusion

Cloud computing is rapidly growing technology and safety of data on cloud should be higher. The paper describes the security issues that are prevalent in cloud and gives an insight into the vulnerabilities and challenges that are existing while using the cloud services. Enumerating these security issues was not enough; that is why we made a relationship between threats and vulnerabilities, so we can identify what vulnerabilities contribute to the execution of these threats and make the system more robust. However, new security techniques are needed as well as redesigned traditional solutions that can work with cloud architectures.

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Reading *Saachi Preet*, *Izzat* and *Aabru*: Confines of Immortality in Vijaydan Detha's *Duvidha*

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Abstract: *In the nooks of folk wisdom, with thoughts and voices now weighed down with dust, often in a language people fail to 'see' in the present day, lies one's deep and true perception of love. Love is not merely that which knits two individuals in a bond until bodily separation. But higher is the love that remains unrequited, is lost or never attains its muqaam. Love is in Ranjha renouncing the world and becoming a jogi, love is in river Chenab that reunited the two lovers Sohni and Mehiwal away from the worldly confines, and love is what made readers and viewers preach the ghost more than the Lakhmi in Vijaydan Detha's folk story Duvidha.*

Keywords: *Folk, Theatre, Mortality, Transcendence, Musicality*

I. Introduction

Far off and beyond the rationale of right and wrong, away from over-bearing patriarchal-feminist accusation of a literary text, is placed *Duvidha*, as adapted into a play and performed by Rasrang. The story, rooted deep in the culture of Rajasthan, brings to surface the agony and moral clash of a married woman through the character of Mohini. And it is through her clash that the viewers gather the true understanding of love. This love may be time-confined or may be only a figment of her imagination, but also pulls apart her existence into the question of morality, *izzat* and *aabru*, while at the same time truer than the material ties.

The newly-wed Mohini leaves her village and her parents' home to join Lakhmichand in their matrimonial ties, but it is even before she reaches the *haveli* of her in-laws that she is met with several realizations: that she is the daughter in law of a family rich enough to consider plums as a petty thing to eat off its branches, that her husband has worn the veil of a businessman even before removing the matrimonial threads, and more so that he was going to leave for Desawar for business for five years on the auspicious day of Teej. Without any remorse of leaving his bride behind for so long, he is an opportunist who puts material gains over relational ties.

Saachi preet, the concept extensively portrayed through the *gadariya* as a character that strings the play, can be read in the story on two levels through the characters of Mohini and the *maayavi*. Love has its different praxis weaving the two characters, who eventually meet their tragic end. While Mohini is still alive by the end of the play unlike Waris Shah's Heer or Hashim's Sohni, but she is equally static as the *maayavi* who is caught in the *mashak*. It is often received that the entire story is a fragment of Mohini's imagination for she, in utter hopelessness, thrives to see in the ghost the devotion she looked for in Lakhmi.

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But it will remain debatable even till the last day *Duvidha* is discussed whether Mohini's love lay with Lakhmichand or the ghost. And if it lay with the ghost, was she in love with him or with the idea of Lakhmi which the ghost was merely a means to fulfill? It is this *duvidha* that Detha wants to confound his readers in.

It is important to look at the character of Lakhmichand in order to understand the love that has been put under confines in the narrative. The *maayavi* could also be comprehended as a manifestation of Lakhmi's own conscience which pulls him apart. When he chooses his business over this pull of money and the sprouting young love of his bride, he is instantaneously put in the questionable status of a protagonist who fails to even catch a glimpse of his beautiful bride for he is caught up in the insatiable hunger for material gains and name from his father. A materialistic opportunist well so, Detha puts him in juxtaposition with the *sanaatan prem* the ghost has for Mohini, in order to establish evidently to the viewers where her soul lies. This difference between Lakhmi and the ghost can be well expressed through the following couplet,

Aap daulat ke taraazu mein dilon ko taulein,

Hum mohobbat se mohobbat ka silaa dete hain.. (Ludhianvi)

The inner conflict that defines the story also revolves around the ghost, who fell in love with Mohini the day he saw her dotting over beautiful plums on the tree in the forest where the *baraat* had taken a halt. As goes the meaning of her name, Mohini's naivety is what draws the *maayavi* to her. Devoted to her husband, she accepts the *maayavi* as Lakhmichand without suspicion until the ghost confronts himself. His *saachi preet* does not only make him careful to not cause Mohini any harm by capturing her or Lakhmi, but also makes him admit that he is a *maayaavi* before he consummates his love for her. The ghost's dialogue with Lakhmi before the *pareeksha* strengthens his love for Mohini when he says,

"Main aurat ki deh ke bheetar ka surajmukhi hun, uski preet ka maalik..Vyapaar aur paise ke bajaaye mujhe preet ki lalat hai. Vyapaar vastuon ka hove hai, preet ka nahi."(Detha)-
- (I am the bloomed flower of the woman's soul, the true owner of her love. I crave love instead of wealth. You can trade things, not love.)

While the *preet* that the ghost and Mohini share is short lived, the child bears a testimony to the union even after the two face a tragic separation. What the *maayavi*'s character imparts is that the sincerity of love lies in sacrifice, and as a result he performs all three tasks as asked by the *gadariya* to prove who was Mohini's real husband. The sacrifices a lover makes, and the vow that travels and transcends from the confines of mortality, reminds one of Chandradhar Sharma Guleri's 'Usne Kaha Tha.' Nandu vows to protect Kamli's husband Ram Singh during the days of war purely because his love was true and beyond the concept of tying his beloved in a relational knot. He vowed to protect the man he had lost his beloved to, for it was in him that Kamli's fulfillment rested. And so was the love of Detha's ghost for Mohini, even though it was beyond the test of time.

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The song “*Piyaa O Piyaa*” marks the end of the play and captures the pain of unfulfilled desires and distance between two doomed lovers. The song spears through the listeners as Mohini asks in desolation, “*aaaja oh bairi maahre, kaahe sataaye pardesi piya...*” (Detha). It encapsulates the entire story about Mohini’s internal conflict, the *duvidha*, of with whom she imparts her loyalties. She is in a bleak state when she calls out to her “bairi piya” but she would not have been singing the same song for Lakhmi if the ghost wouldn’t have met Mohini throughout the narrative.

Time separates the star-crossed lovers. When Mohini with her sweet sad song asks *kee kar aaun thaare des* (Detha), it leaves the listeners not in pale sympathy but in an utterly helpless state of looking answers with her, all in futile effort. Where a woman is often laden with the responsibility of *izzat* and *aabru* of her husband’s name and if left with little autonomy for her to define her love and loyalties, Vijaydan Detha through his story imparts to us a different understanding of love. What one takes from the story is that love breathes also in the longing, in the distance, and that true love goes beyond the confines of time, of bodily union and of the pangs of separation.

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Application of Matrix

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Abstract: *Applied Mathematics is categorized according to vector algebra, different calculus, aggregation, Direct Mathematics, Matrices & determinant etc. Between these topics matrices are often popular. Matriculants have a long history of being used in solving line math. Matrices are very useful materials that are available in many different places that are used. Matrix Mathematics works in a number of scientific disciplines, as well as various mathematical disciplines. Engineering statistics are used in our daily lives. We see the effects of the matrix on all computer-generated images that reflect or distort the light passing through moving water. Prior to computer simulations, Optics science used a matrix to respond to displays and retrieve them. In mathematics, single use of matrix notation supports graph theory. In a nearby matrix, the total value of each element indicates how far a particular node is connected.*

Keywords: *Matrices, calculus, determinant, reflection, refraction, cryptography*

I. Introduction

Matrices is a two-dimensional system of numbers in a row and a column closed with square brackets or can say that matriculants are nothing but rectangular numbers, idioms, columns and rows. Generally, the matrix above the field F is a rectangle of each scalar that is a member of F . Each element in the matrix is called an element or element. Provided that they have the same size i.e. the same number of rows and the same number of columns, two matrices can be added or subtracted element by element. The law of multiplication of the matrix, however, is that two matriculants can be multiplied only if the total number of columns in the first is equal to total number of rows in the second. Any matrix can intelligently replicate an object with a scale from the associated field. The main application of the matriculation is to represent the transformation of the line, that is, the normal performance of line functions such as $f(x) = 2x$. For example, rotating vectors in a three-dimensional space is a line transformation that can be represented by a rotating matrix R , if v is a column vector (matrix with only one column) defining the point of the point in space, the product. Rv is a column vector that signifies the location of that point after rotation. The product of two conversion matrix is a matrix representing the formation of a dual conversion line. Another use of matrix is in the solution of line mathematical systems. If the matrix is square, it is possible to find some of its properties by making a computer of its specification. For example, a square matrix is the opposite if and only if its specification is not zero. An understanding of the geometry of line conversion is found in the Eigen values of the matrix and the Eigen vectors. A major branch of numerical analysis is dedicated to the development of effective matrix mathematical algorithms, a subject that is hundreds of years old and today is a growing area of research.

Matrix decay methods make calculations easier, both theoretically and physically. Algorithms are designed for the structure of a particular matrix, such as a few matrices and matrices that are almost diagonal, speeding up calculations in the form of a fixed element and other calculations. Endless matrices are derived from planetary theory and atomic theory. A simple example of an endless matrix is a matrix, representing an alternative operator, operating in the Taylor series of work. Matrices are widely used in scientific fields and are applicable to real-life problems, thus making an important point in solving many practical problems. Matriculants are used to represent real-world data such as demographic characteristics, practices, etc. Matric can be solved physically related and one is used in the study of electrical circuits, quantum mechanics and optics, with the help of matric, battery power calculator, conversion of electrical resistor to other useful powers, these matrices play a role in calculation. Matrix math simplifies line algebra, at least providing an integrated approach to dealing with mathematical groups in line algebra. Some matrix mathematical structures are important in mathematical theory.

II. History

Matriculants have a long history of use in solving line calculations, between 300BC and AD200. The first example of the use of matrix methods to solve simultaneous arithmetic which includes the concept of determination, simply matrix theory emphasizes decisions more strongly than matric and the independent concept of matrix similar to the modern theory that emerged only in 1858. of matrices, the word matrix was coined by Sylvester, who understood the matrix as the cause of a number of decisions today called children. The first concept of Mathematics was used in about 1850AD but its use was in use in ancient times. The Latin word matrix means caterpillar. It can also mean generally any place that builds or produces something. Use of Matrices:

- In the computer field, matriculants are used to encrypt the message. They are used to create vivid three-dimensional images and real-time visual effects on a two-dimensional computer screen and in the calculation of the algorithms that create Google page rank.
- Matriculants are used to compress electronic information and participate in the keeping of fingerprint details.
- In resolving problems using Kirchhoff's Laws of voltage and current, important matrices.
- Errors in electronic transmissions are identified and corrected through matric usage.
- In calculating battery power output, converting electrical power resistor to other useful power, these matrices play a major role in calculating.
- The matric and their matric mates are used by the code editor or message encryption.

The message is created as a sequence of numbers in the binary communication format and follows the theory of the resolution code.

- With this encryption only, online services also work and banks can work with sensitive and confidential data.
- In geology, matriculants are used to conduct earthquake research.
- Matriculants are used to plan graphs, mathematics and to do science subjects in almost all fields.
- Matric is the best way to stand out in order to plan the most common survey items.
- Matriculants are used to calculate the total amount of domestic products in the economy which ultimately helps to calculate the effective production of goods.

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- Matriculants are used in many organizations such as scientists to record their test data.
- In robots and automation, matriculants are fundamental components of robotic movement.
- The movement of robots is organized by counting the rows and columns of the matrices.
- Robots control inputs are provided based on matric results.
- In the medical field, CAT scans and MRI's use matrices.
- In physics, matriculants are used to study electrical circuits as well as quantum mechanics and optics.
- Matrix statistics help us to calculate the electrical characteristics of a circuit with voltage, amperage, resistance, etc.
- Optics Science used matrix calculations to respond to assumptions and regressions.
- Computers use Markov simulation based on stochastic matrices to illustrate events ranging from gambling to weather forecasting to quantum mechanics.
- Matriculants are used to represent real-world data about specific demographics, such as the number of people with a particular trait. They can also be used to set an example of human growth.
- Matriculants are used to calculate the total amount of domestic products in the economy which ultimately helps to calculate the effective production of goods.
- Matriculants are used in many organizations such as scientists to record their test data.
- Matrix is also used to cover channels, a tent hidden inside web pages, hidden files, null ciphers and steganography.
- The latest wireless internet connection, known as wireless application protocol and uses matrices in the form of stenography.
- Cryptography also uses matric, cryptography science security information. These technologies hide information in storage or transportation.
- They are the best representation methods for organizing common research items.
- Stochastic matriculants and Eigen vector solutions are used in page-level algorithms used to deliver web pages in Google search.

III. Matrices - Applying for Cryptography

The basic idea of cryptography is that information can be written using an encryption system and extracted by anyone who knows the system. There are many encryption schemes ranging from the simplest to the most complex. Most of them are mathematical by nature. Today, sensitive information is sent online every second, credit card numbers, personal information, bank account numbers, credit letters, important passwords, etc. Usually, that information is encrypted or encrypted. The encoder is a matrix and the decoder is opposite. Let A be the text of the code, M is the message matrix, and X will be the encrypted matrix (sizes A and M will need to be aligned and will determine the size of X). Then, statistically, performance is

$$AM = X$$

Someone has an X and knows A, and wants to return M, the real message. That would be like solving the M matrix number. Multiplying both sides of the figure on the left with the A-1 we have.

$$M = A^{-1}X$$

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(notice: A must have an inverse) instance: let A=1, B=2, C=three, and so forth, let a blank be represented with the aid of 0. permit's encode the message "THE EAGLE HAS LANDED". We want to translate letters into numbers. the usage of the listing above, the message will become: 20, 8, five, zero, 5, 1, 7, 12, five, zero, 8, 1, 19, zero, 12, 1, 14, four, 5, 4

Now we want to determine on a coding matrix A as

$$\begin{bmatrix} 3 & 0 & 1 & 1 \\ 1 & 2 & 5 & 0 \\ 1 & 1 & 3 & 0 \\ 2 & 0 & 1 & 1 \end{bmatrix}$$

when you consider that this is a four x 4 matrix, we are able to encode only four numbers at a time. We wreck the message into packets of 4 numbers every, adding blanks to the quit if important. the first institution is 20, 8, 5 and 0. The message matrix may be 4x1.

$$\begin{bmatrix} 3 & 0 & 1 & 1 \\ 1 & 2 & 5 & 0 \\ 1 & 1 & 3 & 0 \\ 2 & 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 20 \\ 8 \\ 5 \\ 0 \end{bmatrix} = \begin{bmatrix} 65 \\ 61 \\ 43 \\ 45 \end{bmatrix}$$

So the primary 4 encrypted numbers are sixty five, sixty one, forty three, and forty five next 4 encrypted numbers are 5, 1, 7, and 12

$$\begin{bmatrix} 3 & 0 & 1 & 1 \\ 1 & 2 & 5 & 0 \\ 1 & 1 & 3 & 0 \\ 2 & 0 & 1 & 1 \end{bmatrix} \begin{bmatrix} 5 \\ 1 \\ 7 \\ 12 \end{bmatrix} = \begin{bmatrix} 34 \\ 42 \\ 27 \\ 29 \end{bmatrix}$$

The second one group is 34, 42, 27, and 29. observe that five came out as 43 in the first group, but as 34 in the 2d institution. it truly is one of the blessings of the matrix scheme. The same information can be encoded one of a kind approaches making it more difficult to find a pattern.

Encoding the complete series gives us the encrypted message:

sixty five, 61, forty three, forty five, 34, forty two, 27, 29, 24, forty five, 29, 19, 70, seventy nine, 55, fifty one, fifty one, 47, 33, 37

permit's decode it using the inverse matrix A^{-1}

$$\begin{bmatrix} 1 & 0 & 0 & -1 \\ 2 & 3 & -5 & -2 \\ -1 & -1 & 2 & 1 \\ -1 & 1 & -2 & 2 \end{bmatrix}$$

Interpreting the primary four numbers, we have:

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$$\begin{bmatrix} 1 & 0 & 0 & -1 \\ 2 & 3 & -5 & -2 \\ -1 & -1 & 2 & 1 \\ -1 & 1 & -2 & 2 \end{bmatrix} \begin{bmatrix} 65 \\ 61 \\ 43 \\ 45 \end{bmatrix} = \begin{bmatrix} 20 \\ 8 \\ 5 \\ 0 \end{bmatrix}$$

The first four numbers decode because the first four numbers within the unique message. Matrix encryption is just one in every of many schemes. each year, the national protection employer, the navy and private companies rent loads of people to devise new schemes and decode present ones.

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Web Mining and its Applications

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Abstract: *Due to increased information on the web, it has become necessary to extract the relevant information within a short span of time. This has evolved the concept of web mining that discovers the pattern from the web and eases the task of users. This paper discusses the need of web mining, types of web-mining, its pros and cons, and applications areas. The different categories of web mining have its own advantages and challenges. This paper discusses in detail the different aspects of web mining to reduce the problem of information overload. This paper forms the base for researchers and industrialists working in this domain.*

Keywords: *data, information retrieval, mining, web*

I. Introduction

Web mining is a sub-part of data mining that is useful to extract the desired information from the web such as web documents, hyperlinks, logs etc. The main objective of web mining is to extract deeper insights about the data to utilize the information efficiently [1]. Now the web consists of different types of data that might be in structured or unstructured format. Accordingly, the web-mining has been categorized into the following three categories as shown in figure 1.

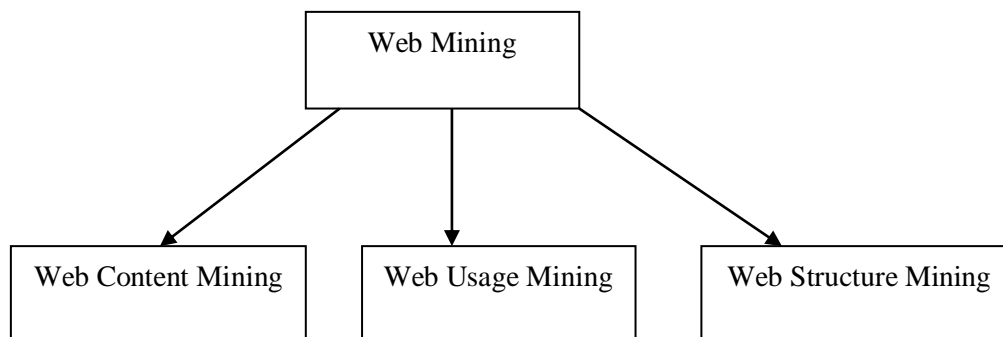


Figure 1. Types of Web Mining

II. Types of Web Mining

The web mining has been categorized into the following categories [2]: It is useful for e-commerce sites and business.

A. Web Content Mining

It is used to extract the useful information from the content displayed in web pages and web documents. The content can be in the form of text, images, and audio/video files. The techniques that are used to extract the content are Natural Language Processing (NLP), information retrieval and many more. Example, on surfing any search engine, a list of web pages is suggested to the user.

B. Web Usage Mining

It is used to extract the information about the user activity like click history of user, how many times a user clicked on a particular item on a specific site. This information would be beneficial for e-commerce business to retain the customers by providing similar suggestions as per their access pattern. The techniques that are used to analyze the web usage pattern are session analysis that gives the information about the frequently visited web pages. Another popular technique is Online Analytical Processing (OLAP) that is used to perform multi-dimensional analysis of data. It can be performed on different parts of user-log at different periods of time.

C. Web Structure Mining

It is used to determine the structure of the hyperlink that is whether the web pages are directly linked or not. It provides the summary of the structure of the website. Example, it is useful for businesses to determine the connection between two websites. The PageRank algorithm and many other similar algorithms are used to determine the ranking and relevance of the pages.

The detailed form of data usage in each category of web mining is illustrated in figure 2 below:

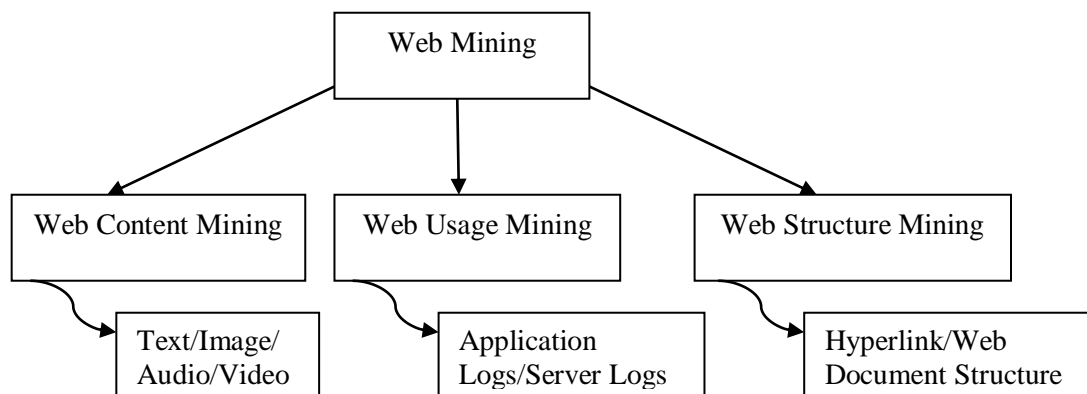


Figure 2. Web Mining Process

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III. Challenges of Web Mining

- A. **Dynamic Nature:** The web page is dynamic in nature as information on the web keeps on updating every minute.
- B. **Complexity:** The data on web pages is not in an organized order. The data may be in structured format or unstructured format. The volume and complexity of data is challenging in utilization of web mining based algorithms.
- C. **Diversity:** The users on the web are continuously increasing and every user has different interests that might change with time. Thus, diversity is a major challenge in efficient extraction of the desired information.
- D. **Relevant Data:** The task of providing the relevant data to the users is itself a challenging task as sometimes user is interested only in part of the available data instead of complete web document.

IV. Applications of Web Mining

There are various applications of Web-Mining that are listed below [3]:

- E-Commerce Business
- Retention of Customers
- Analysis of Website
- Marketing Tool
- Predict User Behavior
- Web Searching
- Social Network Analysis
- Customer Relationship Management
- Keywords Extraction

V. Conclusion

The World Wide Web is an enormous source of information that consists of large amount of data, due to which it becomes tedious for the users to extract the relevant information. The web-mining is beneficial for users as well as e-commerce sites to convert customers into potential customers by discovering the user patterns. This paper discusses about different types of web mining techniques, challenges faced and application areas wherein web mining is being utilized efficiently. This study would give the researchers a basic idea about the web-mining that can be explored further for effective decision making.

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Impact of Web 3.0 on Education

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Abstract: Web 2.0 has change the world of Internet users that how they benefit from a number of tools that allow them to browse for information, exchange data, and interact with others. Web 2.0 has been a turning point in human interaction with computers, Now, a leap forward is represented by Web 3.0, which should provide computers with the possibility to extract meaningful and filtered information from the Internet to better suit users' needs. Thus, the students will be assisted by a virtual agent, which will select the required information and tailor it according to their learning needs. In this paper, the concept of Web 3.0 will be examined to find its possible educational benefits and issues. Moreover, evolution of web is also described with the future of Web 3.0 in the world of internet.

Keywords: Web 3.0, Semantic Web, Decentralization, Block-chain

I. Introduction

Web 3.0 is the new third generation of the internet where websites and apps will be able to work in a smart human-like way through technologies like Big Data, machine learning, blockchain, decentralized ledger technology (DLT), etc [1]. Web 3.0 is sometimes referred to as the 'spatial web' or 'Semantic Web'. It was aimed at being a more autonomous, intelligent, and open internet.

Web 3.0 is about to add meaning to content and developing methods to interact with environment[1]. In the web 3.0, content will find you according to your interest areas. your activities and interests will determine how information finds you and the format you need, and display it within your preferred channel instead of now which is based on keywords[2].

II. Evolution of Web

Web 3.0 builds on earlier phases:

- Web 1.0, also called the Static Web, was the first and most reliable internet in the 1990s. It can be considered as 'read only' as the information is published to a website where users can read and search for information, but there is no opportunity to easily share or interact with it. Web 1.0 didn't have any method to interconnect internet pages, which made it extremely tough for users to find relevant information [2].
- The Social Web, or Web 2.0, made the internet a lot more interactive thanks to advancements in web technologies like Javascript, HTML5, CSS3, etc. Web 2.0 can be thought of as 'read and write' as it provides social networking tools and platforms such as blogs, wikis, YouTube, Facebook and many more. It focuses on its ability to bring people together, share knowledge and facilitate communication [1].

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The problem with Web 1.0 and Web 2.0 is that information is unstructured, limiting the ability to retrieve relevant and accurate information. Web 3.0 promises to solve these problems[1].

Particulars	Web 1.0	Web 2.0	Web 3.0
General	The hypertext web	The social web	The semantic web
Features	Read-only and static web	Interactive	Intelligent and decentralized
Content	Static Content	Dynamic Content	AI, 3D, Blockchain
Use Cases	Content and Information Publishing	Social media, Microblogs	DeFi, distributed ledger, P2P transfer
Key Technologies	HTML, Netscape	Mobile application, big data	Block chain, IoT, AI, ML
Examples	CNN,BBC	Amazon, Apple, Meta	Amazon Alexa, Apple Siri

III. Web Technologies

The following are the some key technologies that will change the way users find information.

- **Artificial intelligence**

Artificial intelligence is self-learning programmes that can learn and evolve on their own, for example, track the habits and preferences of users and provide search results that suit their personality [2]. And since Web 3.0 machines can read and translate the meaning and emotions depicted by a set of data, it brings forth intelligent machines [3]. Although Web 2.0 presents similar capabilities, it is still predominantly human-based, which opens up room for corrupt behaviours such as biased product reviews, rigged ratings, etc[2].

- **Personalisation**

With Web 3.0 users will be able to enter their preferences and interests, and the computer will customise and provide information that fit these criteria, user profiles will represent them and their taste or interest online[2].

For example, the local store may know you like sugar-free items, so they may tell you they have a fresh batch coming out in a few minutes.

- **Virtualisation**

Web 3.0 will enable users to interact with their surrounding environment using augmented reality and virtual reality[3]. Our search results will not depend on text only, mean we can search by inputs like 3D objects or images. The real environment can be interacted with virtual interfaces smart glasses and voice where both physical as well as digital layers are merged[3].

- **Decentralised computing**

Decentralised Computing is where computing power is not in control on a few central servers but also it is shared with multiple servers that provide more sophisticated results and information can be held very securely. It will not depend on some information providers only[1].

For example, Blockchain technologies where information is distributed among many devices.

IV. Web 3.0 and Education – Benefits

In Education the Web 3.0 will play a vital role, it will change the layout of teaching as well as studying. The benefits of Web 3.0 in the field of Education are as:

- **Reduced expense** as all the machines and devices will be internet-connected and provide access to knowledge so it will reduce the expenses incurred in education[4].
- **Changes in teaching** – teachers will be able to develop engaging and more complex assignments that are supported by a variety of resources[4]. Students will be free to develop their own content it will provide them independency from a teacher or a group of teachers. They will have a large pool of teachers to study and understand the topics.
- **Learning** – By the access of the internet widely there will be no time and location boundation on students they will be able to learn anytime and anywhere with access of internet.
- **Smart searches** – customised search capabilities will yield only information tailored to the user, preventing frustration and saving time [4]. Search engines will include more resources, articles, blogs, videos etc. on the topic on which students wants to learn.
- **Personal learning network maintenance** – Personal learning agents will search for information related to a learning goal and only report relevant information [3]. Location-based services will send appropriate information.
- **Personal educational administration** – Admin use web3 to describe courses and degrees so that it will be easy to transfer credits, and students can easily determine universities that will give them the knowledge they seek. E-learning and just-in-time learning become easily acceptable.

V. Web 3.0 and Education – Issues

- **Impact on student learning** – When Students will get all information and study material at one place with in less time a less effort, they will be lack of critical thinking, evaluation and argument[2]. For example, when any machine is introduced it is to be expected to free people from hard physical work so they can concentrate on their work and complete the work within time. But by using these kind of machines regularly a person is not able to do basic physical task also because they are prone to use machine.
- **Tagging information** – It will take significant time and resources to tag content and add additional coding to the web pages each and every time when there is additional information related to topic comes into existence[2].
- **Information security and privacy** – user preferences and online behaviour can be inaccurately interpreted and used to filter their information in ways the users did not intend[4].
- **Data Scraping** – With web 3.0 there may be chances of data scraping. Data scraping means data from actual source can be extracted and used for other purpose that imply completely different conclusions than intended by the actual resource and without giving credit to the author[4].

VI. The Future of Web 3.0

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As the resources of information are limited the web browsers have limited capacity for making connections among different pieces of information from different sources that might be useful or valuable. Like A standard Google search yields thousands of results, many of which are irrelevant or marginally relevant[4].

- With Web 3.0, standards will create structured online content using fields or tags that allow a browser to identify and understand the meaning of information more readily. For this all the online information must be translated into ‘micro content[1]’.
- To translate content into Micro Content, content managers needs to add and elaborate more metadata descriptions to give meaning to online information available on website and describe the structure of existing knowledge about it[1]. By this, content will be more interconnected and efficiently searchable. There are various standards available that can be used to tag data[1].
- As well as tagging content there are various approaches to creating relationships between content that is known as ontologies[1].

VII. Conclusion

Web 3.0 will enable users to get information and interact with it in more meaningful and effective way. It will improve the intelligence of students but as they will get all information without any effort it may degrade their quality as well. We have to use web 3 to understand and learning purpose but without deskilling and reducing our quality.

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