ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

IJESRT

INTERNATIONAL JOURNAL OF ENGINEERING SCIENCES & RESEARCH TECHNOLOGY

IMPLEMENTATION OF STUDENT PERFORMANCE EVALUATION THROUGH SUPERVISED LEARNING USING NEURAL NETWORK

Karan Manchandia*, Navdeep Khare

DOI: 10.5281/zenodo.438101

ABSTRACT

As we know that in maximum university the evaluation of the student's performance I done manually by the faculties. This System of student performance evaluation is non-transparent and often leads to dissatisfaction among students. This project aims to solve the problem by designing a user interface which would work on supervised learning using Neural Network. Data mining techniques are widely used in educational field to find new hidden patterns from student's data. The hidden patterns that are discovered can be used to understand the problem arise in the educational field. Data Mining (DM), or Knowledge Discovery in Databases (KDD), is an approach to discover useful information from large amount of data. DM techniques apply various methods in order to discover and extract patterns from stored data. The pattern found will be used to solve a number of problems occurred in many fields such as education, economic, business, statistics, medicine, and sport. The large volume of data stored in those areas demands for DM approach because the resulting analysis is much more precise and accurate.

KEYWORDS: education, KDD, Neural Network, performance, evaluation.

INTRODUCTION

Normally in Education System, the student performance evaluation is done by faculty manually. This System of student performance evaluation is non-transparent and often leads to dissatisfaction among students. This project aims to solve the problem by designing a user interface which would work on supervised learning using Neural Network. Data mining techniques are widely used in educational field to find new hidden patterns from student's data. The hidden patterns that are discovered can be used to understand the problem arise in the educational field. Data Mining (DM), or Knowledge Discovery in Databases (KDD), is an approach to discover useful information from large amount of data. DM techniques apply various methods in order to discover and extract patterns from stored data. The pattern found will be used to solve a number of problems occurred in many fields such as education, economic, business, statistics, medicine, and sport. The large volume of data stored in those areas demands for DM approach because the resulting analysis is much more precise and accurate.

This project aims at mining student's data using MATLAB and to categorise students according to input data as Best, Average and Worst. Educational Data Mining (EDM) is concerned with developing methods and analysing educational content to enable better understanding of students performance. It is also important to enhance teaching and learning process.

LITERATURE SURVEY

A thorough literature review has been conducted in preparation for the following project methods and to inform findings and recommendations. Data Mining is recently widely used in the field of education for student performance evaluation, performance prediction, future predictions etc. In our project titled "**Student**

Performance Evaluation through Supervised learning using neural network" we have used various concepts of data mining such as concept of Neural Network and back propagation algorithm which would evaluate students performance and would classify them as best, average or worst.

Educational Data Mining: Poised to meet the growing need for pervasive assessment is the nascent field of Educational Data Mining (EDM). EDM focuses on the collection, archiving, and analysis of data related to student

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

learning and assessment. EDM is a very new and very small academic field. The first publications to mention educational data mining were published in the last two years, and there are likely fewer than thirty people in the world that identify themselves as being a part of it.

Artificial Neural Network:

An artificial neural network (ANN), often just called a "neural network" (NN), is a mathematical model or computational model based on biological neural networks, in other words, is an emulation of biological neural system. It consists of an interconnected group of artificial neurons and processes information using a connectionist approach to computation. In most cases an ANN is an adaptive system that changes its structure based on external or internal information that flows through the network during the learning phase.

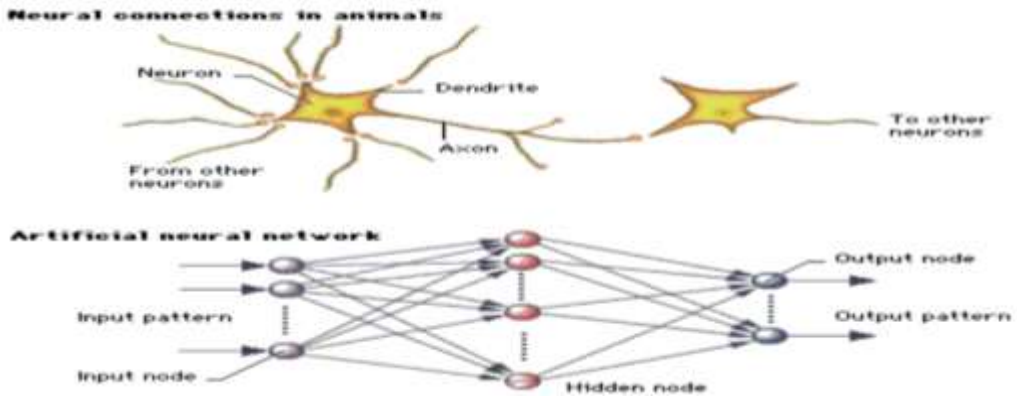


Figure: Artificial Neural Network

Neural Network Topologies:

Feed forward neural network: The feed forward neural network was the first and arguably simplest type of artificial neural network devised. In this network, the information moves in only one direction, forward, from the input nodes, through the hidden nodes (if any) and to the output nodes. There are no cycles or loops in the network. The data processing can extend over multiple (layers of) units, but no feedback connections are present, that is, connections extending from outputs of units to inputs of units in the same layer or previous layers.

Recurrent network: Recurrent neural networks that do contain feedback connections. Contrary to feed forward networks, recurrent neural networks (RNs) are models with bi-directional data flow. While a feed forward network propagates data linearly from input to output, RNs also propagate data from later processing stages to earlier stages.

Training Of Artificial Neural Networks:

A neural network has to be configured such that the application of a set of inputs produces (either 'direct' or via a relaxation process) the desired set of outputs. Various methods to set the strengths of the connections exist. One way is to set the weights explicitly, using a priori knowledge. Another way is to 'train' the neural network by feeding it teaching patterns and letting it change its weights according to some learning rule. We can categorize the learning situations as follows:

• **Supervised learning or Associative** learning in which the network is trained by providing it with input and matching output patterns. These input-output pairs can be provided by anexternal teacher, or by the system which contains the neural network (self-supervised).

• **Unsupervised learning** or Self-organization in which an (output) unit is trained to respond to clusters of pattern within the input. In this paradigm the system is supposed to discover statistically salient features of the input population. Unlike the supervised learning paradigm, there is no a priori set of categories into which the patterns are to be classified; rather the system must develop its own representation of the input stimuli.

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

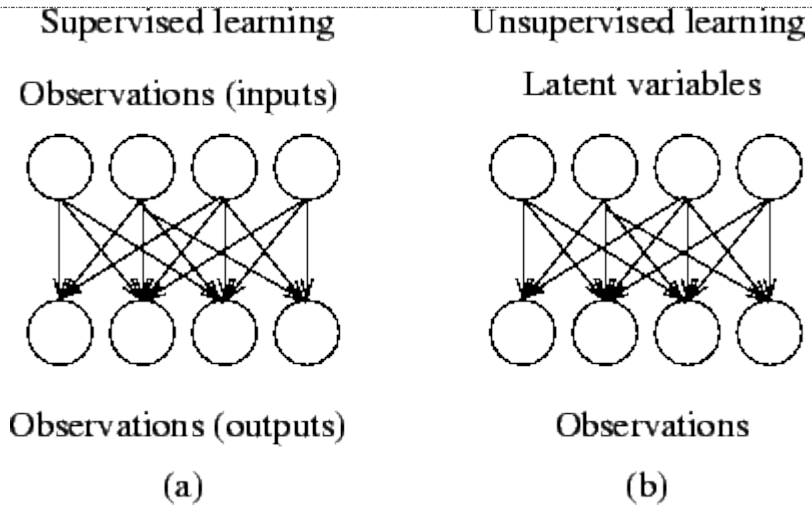


Figure: Supervised and Unsupervised Learning

•**Reinforcement Learning** This type of learning may be considered as an intermediate form of the above two types of learning. Here the learning machine does some action on the environment and gets a feedback response from the environment. The learning system grades its action good (rewarding) or bad (punishable) based on the environmental response and accordingly adjusts its parameters.

Neural Network in Data Mining

In more practical terms neural networks are non-linear statistical data modeling tools. They can be used to model complex relationships between inputs and outputs or to find patterns in data. Using neural networks as a tool, data warehousing firms are harvesting information from datasets in the process known as data mining. The difference between these data warehouses and ordinary databases is that there is actual manipulation and cross-fertilization of the data helping users makes more informed decisions. Neural networks essentially comprise three pieces: the architecture or model; the learning algorithm; and the activation functions. Neural networks are programmed or "trained" to ". store, recognize, and associatively retrieve patterns or database entries; to solve combinatorial optimization problems; to filter noise from measurement data; to control ill-defined problems; in summary, to estimate sampled functions when we do not know the form of the functions." It is precisely these two abilities (pattern recognition and function estimation) which make artificial neural networks (ANN) so prevalent a utility in data mining. As data sets grow to massive sizes, the need for automated processing becomes clear. With their "model-free" estimators and their dual nature, neural networks serve data mining in a myriad of ways. Data mining is the business of answering questions that you've not asked yet. Data mining reaches deep into databases. Data mining tasks can be classified into two categories: Descriptive and predictive data mining. Descriptive data mining provides information to understand what is happening inside the data without a predetermined idea. Predictive data mining allows the user to submit records with unknown field values, and the system will guess the unknown values based on previous patterns discovered form the database. Data mining models can be categorized according to the tasks they perform: Classification and Prediction, Clustering, Association Rules. Classification and prediction is a predictive model, but clustering and association rules are descriptive models. The most common action in data mining is classification. It recognizes patterns that describe the group to which an item belongs. It does this by examining existing items that already have been classified and inferring a set of rules. Similar to classification is clustering. The major difference being that no groups have been predefined. Prediction is the construction and use of a model to assess the class of an unlabelled object or to assess the value or value ranges of a given object is likely to have.

Feed forward Neural Network: One of the simplest feed forward neural networks (FFNN), such as in Figure, consists of three layers: an input layer, hidden layer and output layer. In each layer there are one or more processing elements (PEs). PEs is meant to simulate the neurons in the brain and this is why they are often referred to as neurons or nodes. A PE receives inputs from either the outside world or the previous layer. There are connections between the PEs in each layer that have a weight (parameter) associated with them. This weight is adjusted during training. Information only travels in the forward direction through the network - there are no feedback loops.

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

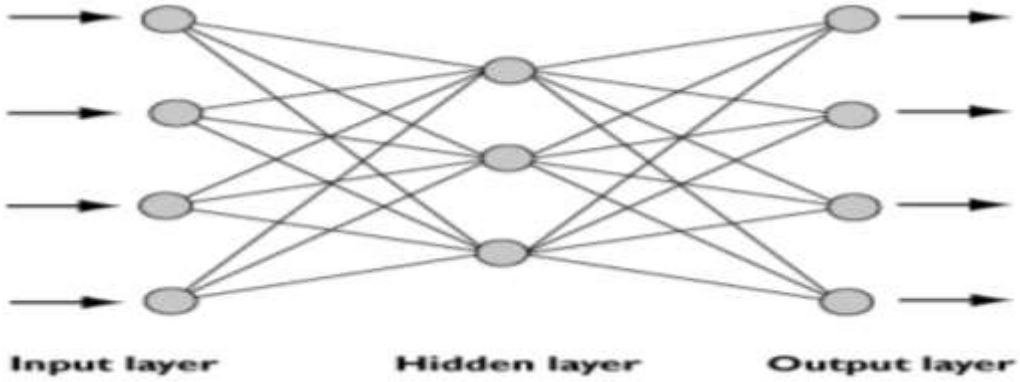


Figure: Feed forward Neural Network

The simplified process for training a FFNN is as follows:
1. Input data is presented to the network and propagated through the network until it reaches the output layer. This forward process produces a predicted output.
2. The predicted output is subtracted from the actual output and an error value for the networks is calculated.
3. The neural network then uses supervised learning, which in most cases is back propagation, to train the network. Back propagation is a learning algorithm for adjusting the weights. It starts with the weights between the output layer PE's and the last hidden layer PE's and works backwards through the network.
4. Once back propagation has finished, the forward process starts again, and this cycle is continued until the error between predicted and actual outputs is minimized.

PROBLEM STATEMENT & PROPOSE SOLUTION

In different educational institutions a huge amount of data is generated for the evaluation of student's performance. The data for each student is needed to be analysed separately for his/her performance evaluation by the faculty. This type of evaluation takes much time.The process of student evaluation by the faculty is manual, also there is chances of partial evaluation by the faculty. So the problem statement is to implement a algorithm which would analyse student's data and thus evaluate student's performance.

In the current educational system, academic auditing of students is done by faculty manually. In the academic auditing, faculty collects the records of all academic activities of students including internal evaluations and examinations. Monthly reports of students are also collected by faculty. They also needs to collect and organize mid semester test records of student , analysis of student attendance records and collection and analysis of student extracurricular and co curricular records is also done manually. After collecting all kinds of reports and records , faculty needs to calculate final grades of student which is a very tedious work and lots of time is wasted. After mathematically calculating the final grades of students, the result of student is generated. The disadvantage of existing system is that it is time consuming and since it requires the mathematical calculation of final grades, chances of error are high. The diagram shown below describes the above process flow briefly.

Grouping students as best, average and worst in performance. Admin can upload and save students data for machine learning. Faculty can upload and maintain student's record. Faculty can modify (insert, update and delete) student's record. Supervised learning of the machine is done using Neural Network. The admin can view uploaded student data. Excel sheet can be directly imported to upload students record. Project provides a graphical user interface. The final result can be directly exported to excel file. The project uses neural network (back propagation) which provide the most accurate results. The faculty as well as the admin can view final mining result.

RESULT & SCREEN SHOTS

A stand alone application which takes student academic record in an excel sheet as Input and it classifies the records using the embedded Neural Network through Backpropagation Algorithm and generate the output which contains the classified result.

Following screenshot shows the homescreen of the software:

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

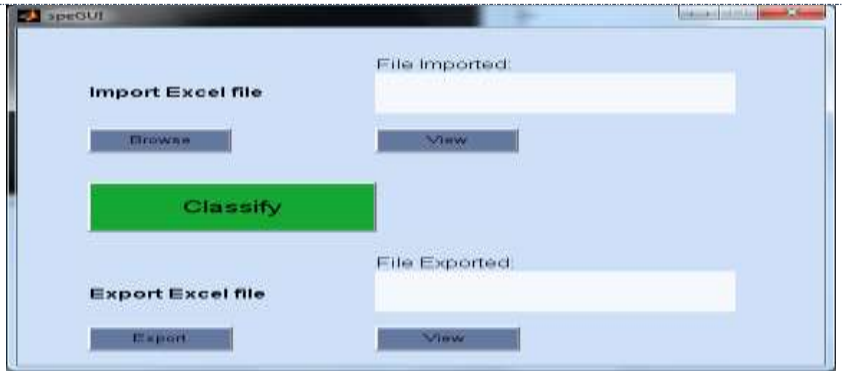


Figure: Home screen

Figure: Classifying the student data

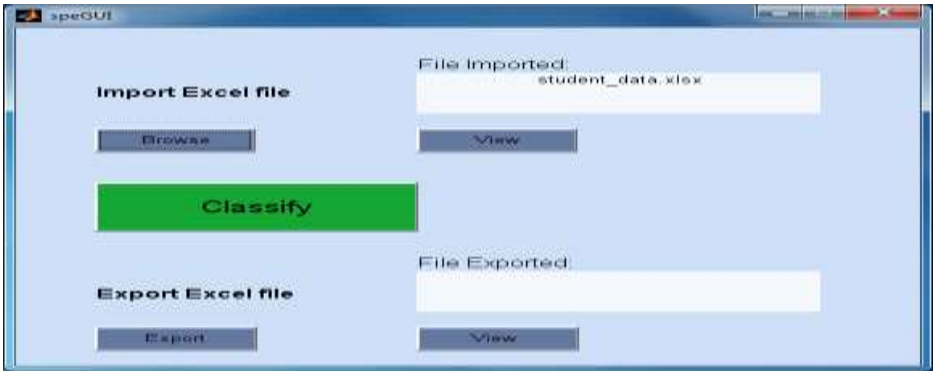
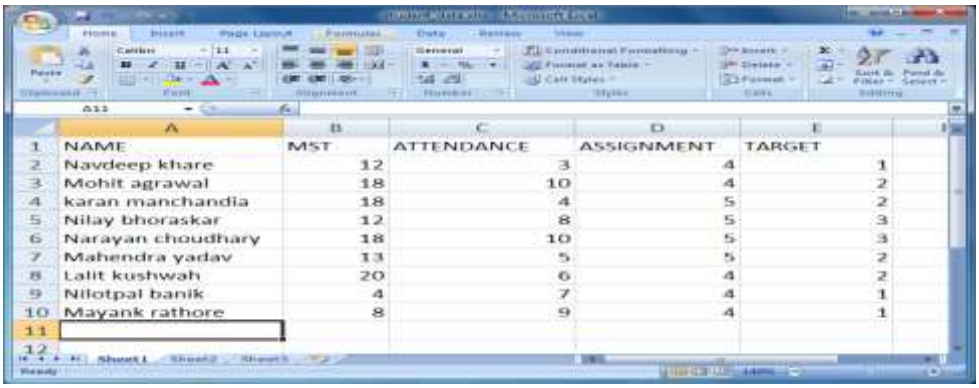


Figure: Import Student Data File



	A	B	C	D	E
1	NAME	MST	ATTENDANCE	ASSIGNMENT	TARGET
2	Navdeep khare	12	3	4	1
3	Mohit agrawal	18	10	4	2
4	karan manchandia	18	4	5	2
5	Nilay bhoraskar	12	8	5	3
6	Narayan choudhary	18	10	5	3
7	Mahendra yadav	13	5	5	2
8	Lalit kushwah	20	6	4	2
9	Nilotpal banik	4	7	4	1
10	Mayank rathore	8	9	4	1
11					
12					

Figure: Input Test Data

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

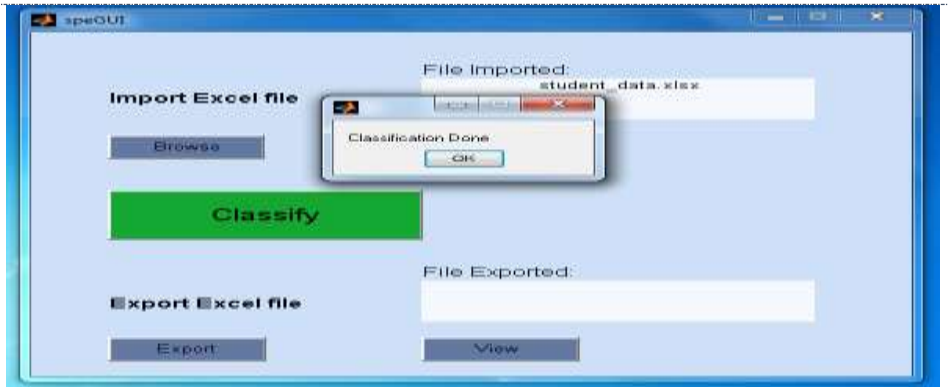
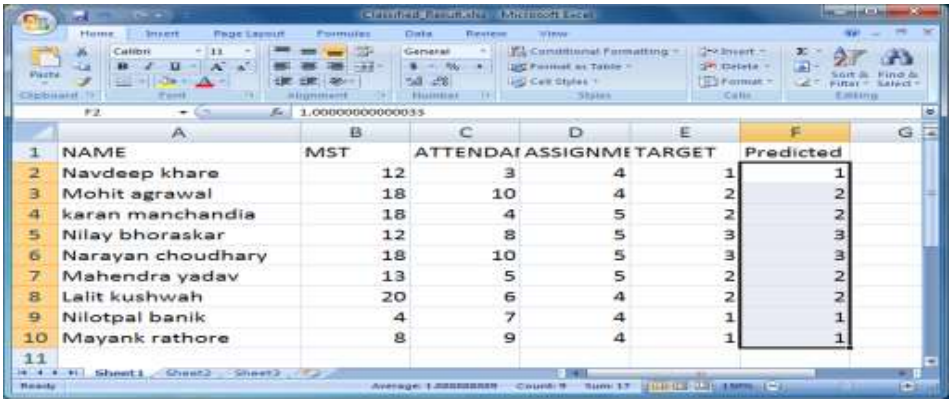


Figure: Classification Done

Figure: Exporting the file

A new column of results will be added to the old file. The predicted column shows the predicted value:



	A	B	C	D	E	F	G
1	NAME	MST	ATTENDAI	ASSIGNME	TARGET	Predicted	
2	Navdeep khare	12	3	4	1	1	
3	Mohit agrawal	18	10	4	2	2	
4	karan manchandia	18	4	5	2	2	
5	Nilay bhoraskar	12	8	5	3	3	
6	Narayan choudhary	18	10	5	3	3	
7	Mahendra yadav	13	5	5	2	2	
8	Lalit kushwah	20	6	4	2	2	
9	Nilotpal banik	4	7	4	1	1	
10	Mayank rathore	8	9	4	1	1	
11							

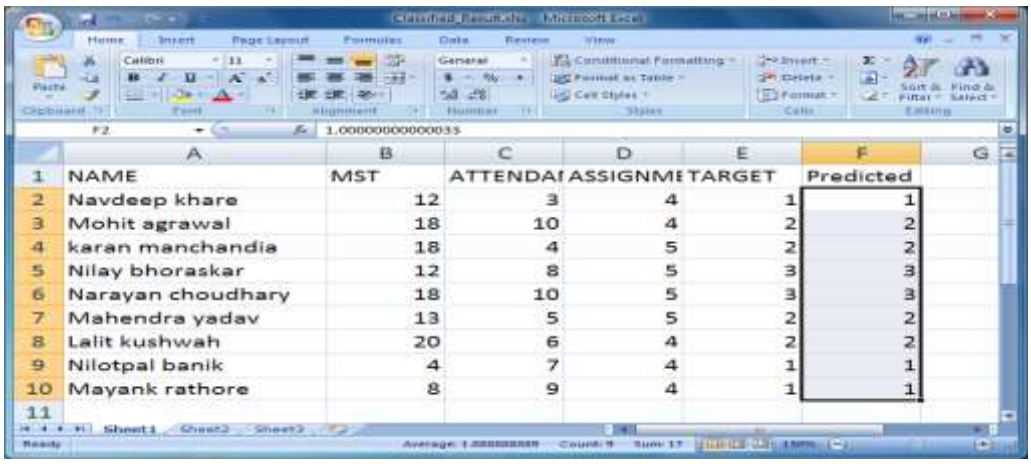
Figure: Result Screen

The proposed system will help in predicting the grades of the students and it will be very useful for the user(faculty,student) to evaluate students in a better way. It will also help in removing the feeling of partial evaluation among students. Thus the proposed system would be more transparent and efficient for student grades evaluation.

In this project we have researched into various research papers which uses various algorithms for different types of analysis under educational data mining. One more important result that is drawn from the project is EDM is uniquely positioned to provide solutions for difficult assessment problems, such as quantifying student learning, or the effectiveness of different teaching methods, while still causing only minimal impact on individual instructors. In situations where standardized testing is too difficult or invasive EDM may provide the key to better quantitative assessment.

ISSN: 2277-9655
Impact Factor: 4.116
CODEN: IJESS7

The output screen with predicted value is shown in figure below:



	A	B	C	D	E	F	G
1	NAME	MST	ATTENDAI	ASSIGNME	TARGET	Predicted	
2	Navdeep khare	12	3	4	1	1	
3	Mohit agrawal	18	10	4	2	2	
4	karan manchandia	18	4	5	2	2	
5	Nilay bhoraskar	12	8	5	3	3	
6	Narayan choudhary	18	10	5	3	3	
7	Mahendra yadav	13	5	5	2	2	
8	Lalit kushwah	20	6	4	2	2	
9	Nilotpal banik	4	7	4	1	1	
10	Mayank rathore	8	9	4	1	1	
11							

Figure: Output Screenshot

CONCLUSION

The conclusion reached is that we have create a system which would evaluate students' performance and thus classify students as best average and worst. In our project we have focused on various algorithms which could be used in various predictions in Educational Data Mining. When implemented on huge level it will be highly beneficial for organizations (especially colleges).

You can add more different features to this project like:

- Modification in proposed algorithm to increase efficiency of results.
- Integration of decision tree algorithm along with back propagation algorithm so as to get good efficiency as well as easy understanding.
- This system could be extended for evaluation of employees in various organizations.

REFERENCES

[1] Brijesh Kumar Baradwaj, Research Scholor, Singhaniya University, Rajasthan, India, Mining Education Data to Analyse student's Performance, (IJACSA) International Journal of Advanced Computer Science and Applications Vol. 2, No. 6, 2011 http://www.ijrte.org/attachments/File/v2i4/D0796092413.pdf

[2] Firstman Noah, BaahBarida, Taylor Onate Egerton, Evaluation of Student Performance Using Data Mining Over a Given Data Space, International Journal of Recent Technology and Engineering (IJRTE)ISSN: 2277-3878, Volume-2, Issue-4, September 2013 http://arxiv.org/ftp/arxiv/papers/1201/1201.3417.pdf

[3] AshwaniKharola, SwarnimaKunwar, Gopa B Choudhury, Institute of Technology Management, Defence Research & Development Organisation, Ministry of Defence, Government of India, Students Performance Evaluation: A fuzzy logic reasoning approach, PM world gernal volume IV issue IX-September 2015,www.pmworldjournal.net

[4] Vaneet Kumar, Dr. Vinod Sharma, Student's Examination Result Mining: A Predictive Approach, International Journal of Scientific & Engineering Research, Volume 3, Issue 11, November2012.

[5] Azwa Abdul Aziz, NurHafieza Ismail, Fadhilah Ahmad, Mining Students' Academic Performance, Journal of Theoretical and Applied Information Technology, 31st July 2013. Vol. 53 No.3

[6] Han and Camber, Data Mining: Concepts and Techniques, 2nd edition, Morgan Kaufmann Publishers.

[7] Deepa and Shivnandam, Introduction to Neural Networks Using Matlab 6.0, Tata Mcgrew Hills.

[8] C. Anuradha and T. Velmurugan, Bharathiar University, Coimbatore, India, A Comparative Analysis on the Evaluation of Classification Algorithms in the Prediction of Students Performance Indian Journal of Science and Technology, Vol 8(15), IPL057, July 2015.