Forcast the Student Performance Using Neuro Fuzzy System

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***Abstract*- This work explores the prediction of students' success in campus interview. It allows prediction of students acquired knowledge based on more or less of their qualitative observations of the writing test and viva model. Sorting out and predicting students acquired knowledge using arithmetic and statistical techniques may not necessarily provide the best means to assess the knowledge and skills. The neural networks, that have effective learning algorithms, had been accessible to endorse the development of tuning fuzzy systems. A Neuro fuzzy neural network model effectively handles reasoning with correct data, and enables representation of student acquired knowledge. The Artificial neural network (ANN) is a multilayer perceptron (MLP) with one input layer, two hidden layers and one output layer and it was trained using a version of the flexible back propagation algorithm. The input data are the student's writing test and viva question results at the time of enrolling at the campus interview. The ability to predict student's results is of great help for the college management in order to take early action to avoid what is the best interview test of the student's education.**

***Index Terms*- Artificial Neural Network, Multilayer Perceptron, Back Propagation, Neuro Fuzzy system, Student Acquired Knowledge**

I. INTRODUCTION

Education is a process which accepts students from a low level of standing, pushes them through several stages of development and produces individuals qualified with certain abilities, skills and attributes who are fit for a job or a higher level in education. Predicting students educational performance is important for academic institutions. The strategic programs may be planned on improving or maintaining student's performance throughout their period of studies with in the institutions [1].

Accurately predicting student testing performance is useful in many different contexts in educational environments. Since the character of an educational foundation is primarily reflected in its research, training and the excellent students affect the character level of the testing method. Accurate prediction enables educational managers to improve student testing performance by providing students additional funding such as customized help and instruction resources. The answers of the prediction can also be used by lecturers to set the most suitable teaching actions for each group of pupils and cater them with further assistance tailored to their demands. Therefore, perfect prediction of student achievement is one path to heighten quality and provide better testing services. As a consequence, the ability to predict student testing performance is important for educational establishments.

Courses are essential elements of the process. Steps in the process are determined as the curriculum. Traditionally, the characteristics of the overall system have been defined by models that have been determined by the number of courses students have completed and grant point averages (GPA) they accumulated in them. This approach, nevertheless, doesn't insure that students have attained the qualifications needed for the after era. Educationalists have predetermined a new approach which relies on what the student learns rather than what he/she have been instructed. An act of assigning a qualitative or quantitative value or worth of student achievements is defined as the academic assessment. Assessment of the student's academic performance (SAP) is one of the most significant practices used for three main reasons: to decide to pass and fail in courses, to obtain an indication of the student's level of learning, and to provide information on the effectiveness of teaching [2].

Accurately predicting which students are best suited for Post graduate school program benefits the platforms, the students, and society at large. Standardized tests are used to forecast which students will be the most successful and obtain the greatest

benefit from a graduate education in disciplines ranging from medicine to the humanities and from physics to law. However, controversy remains about whether such tests effectively predict performance in graduate school. Studies of standardized test scores and subsequent success in graduate school over the past 80 years have often suffered from limited sample size and present mixed conclusions of variable reliability.

Many promising inventions were made through soft computing, which is the most prevalent research concept in computer science. This paper aims to predict the success rate of the students in interview, specifically in campus interview based on their Written and Viva exams.

The prediction accuracy is to be attained using a novel Back propagation Algorithm called Multilayer Perceptron in Artificial Neural Networks (ANNs). The criteria include the output value of student's testing, performance and the corresponding Neuro Fuzzy inference rule. The Neural Network training goal performance and error rate between the result values of this method.

II. LITERATURE REVIEW

Ajith Abraham ,et. al. presents the main concepts of Web usage mining and it's an assortment of practical applications. Further a novel plan of attack called "intelligent-miner" (I-Miner) is shown. I-Miner could optimize the simultaneous architecture of a fuzzy clustering algorithm to discover web data clusters and a fuzzy inference system to evaluate the Web site visitor trends. They offer an approach for effective Web site organization, business and funding services, network traffic flow analysis, personalization and so on [3].

Rosa Leonor Ulloa Cazarez ,et.al. Offered to find the figure, of course, needed based on the enrollment of the number of pupils. The previous method is statistical regression method. The magnitude of relative error (MRE) is high compared to the proposed method. The data set used for the experiment the course name is computer network engineering and the information Technology and Management Engineering. In the experimental results compared to the linear regression method the prediction of number of courses are better [4].

E. Sakthivel, et.al .proposed approach is a fuzzy inference system based on the fuzzy logic. This suggested approach is applied to analyze the student performance based on the test answers. The previous method is a classical method. In the experimental results two exam papers are holding for twenty students and using the classical method find the result and using the fuzzy logic find the solutions. Then compare the two results the fuzzy logic makes the accurate answers compared to the definitive method[5].

Shruthi S Jamsandekar et.al. proposed plan of attack they have performed falsification of the input data (students' marks) by producing a fuzzy inference system (FIS) subject wise, next each FIS output is passed to next level FIS with two inputs, outputs of the final FIS are performance value calculated based on all subject marks with/without lab marks. In the proposed approached a grouping of two membership function is taken out. The observational results are compared with conventional evaluation method, it assists in identifying students lying on overlapping section of two class distribution the results also could help educators to monitor the progress and offer sensible guidance to students to get better performance score [6].

Osman, et.al. can overcome distance education deficit through an analysis of logs kept in the learning management system. These logs make it possible to estimate the academic performance of a student attending to distance training. The instructor having such data can take precautions in order to prevent failure. They have worked, a mathematical model has been made by using Fuzzy Logic. In parliamentary law to heighten the success of the model, fuzzy logic rules has been optimized by using genetic algorithm [7].

Quang Hung Do and Jeng-Fung Chen, et.al. purpose of this study is to investigate the predictive ability of the hierarchical ANFIS and ANN. They used previous exam results and other elements, such as the positioning of the student's high school and the student's gender, as input variables, and predicted the student's expected performance. The simulation results of the two examples were then discussed and examined .These results demonstrate the potential of the hierarchical ANFIS model as a forecaster .It is that this study may be applied to aid in student admission processes and strengthen the service organization in educational institutions [8].

Ramjeet Singh Yadav, et. al. survey the applicability of K-means and FCM, SC, hybrid SC-FCM and

SCANFIS clustering methods to the new student's allocation problem, which allocates new students into some categories that consist of similar students and the number of pupils in each class not exceeding its maximum capability. The models were mixed with fuzzy logic techniques to analyze the students' answers [9].

Nidhi Arora, et al. proposed model allows prediction of students' educational performance based on some of their qualitative observations. Classifying and predicting students' educational performance using arithmetic and statistical techniques may not necessarily provide the best way to evaluate the human acquisition of knowledge and skills, but a fuzzy neural network model efficiently handles reasoning with imprecise information, and enables representation of student modeling in the linguistic form the same way the human teachers do. The model is developed and designed for MATLAB tool and advanced Java with student name, gender, age, education method, past performance, work status, study environment etc. for performance prediction of students [10].

III.METHODOLOGY

The Artificial Neural Network is a collection of simple processors connected together. Each processor can only perform a very straightforward mathematical task, but a large network of them has much greater capabilities and can do many things which one on its own can't the inspiration behind the Neural Net is the brain. The human brain consists of about 100 billion processing units connected together in just such a network. These processing units are called "Brain Cells" or "Neurons" and each one is a living cell. Before proceeding to discuss the operation of the Artificial Neural Network, it will help us if there pause to understand something of how the real one works.

Most people would consider the Back Propagation network to be the quintessential Neural Net. Actually, Back Propagation1,2,3 is the training or learning algorithm rather than the network itself.

The Software engineers have been tasked to develop large and composite programs in a cost efficient manner, so software engineers are facing many problems, without having a better knowledge in the field, such as late release of software, development teams beyond the budget, poor quality, user requirements are not completely supported by the software, difficult maintenance and unreliable software and lack of organized approach. Thus number of large size projects failed.

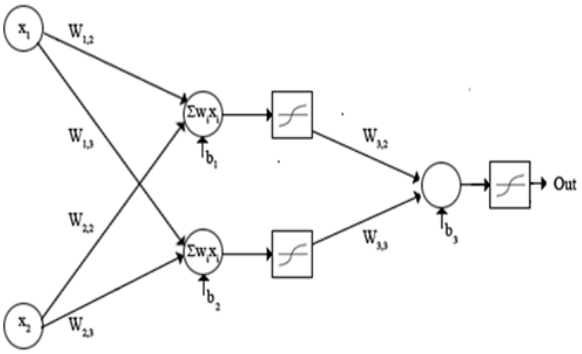

Fig1: Back Propagation Network

Back Propagation Network

The connection we're interested in is between neuron X (a hidden layer neuron) and neuron Y (an output neuron) and has the weight W_{XY}. The algorithm works like this:

1. First apply the inputs to the network and work out the output remember this initial output could be anything, as the initial weights were random numbers.
2. Next work out the error of neuron Y. The error is get in other words
   ErrorY=OutputY(1-OutputY) (TargetY – OutputY)
   The "Output (1-Output)" term is necessary in the equation because of the Sigmoid Function – if only using a threshold neuron it would just be (Target – Output).
3. Change the weight. Let $W^{+}XY$ be the new (trained) weight and W_{XY} be the initial weight.
   $W^{+}XY = W_{XY}^{+}$ (ErrorY x OutputX)
   Notice that it is the output of the connecting neuron (neuron X) and use (not Y). Here update all the weights in the output layer in this way.
4. Calculate the Errors for the hidden layer neurons. Unlike the output layer can't calculate these directly (because here don't have a Target), so the Back Propagate them from the output layer (hence the name of the algorithm). This is done by taking the Errors from the output neurons and running them back through the weights to get the hidden layer errors. For example, if neuron X is connected as shown to Y and Z then take the errors from X and Y to generate an error for X. ErrorX = Output X (1 - Output X)(ErrorY W_{XY}^{+}ErrorC W_{XY}) Again, the factor "Output (1 - Output)" is present because of the sigmoid squashing function.

5. Having acquired the Error for the hidden layer neurons now continue as in stage 3 to change the hidden layer weights. By repeating the above method can train a neural network of any number of layers.

IV. EXPERIMENTATION

From the past campus interview experiences a fact has been found, that those students who were good at viva could easily got through the interview than that of the others. To prove this fact, Forty samples who are studying their postgraduate programs in computer science, Bharathidasan University, Tiruchirappalli, India, were chosen to take up the experiment. Each student was examined for both written and viva tests. Individual Average scores of the students' comprised both written and viva had been updated in the dataset. The description of the dataset is described in Table 1. Initially the training model was built and the training data was inputted in MLP algorithm. The possible outcome of the training data was given in the output area. The network was then trained with the modeled samples. The obtained results were close to the expected result.

TABLE 1: DATA SET DESCRIPTION

Attributes	*Details*
Rno	Student Register Number
Course	Academic Course , MCA, M. Sc(CS), M.Sc (IT)
AWTS	Average Written Test Score
AVTS	Average Viva Test Score
Result	*Interview Result (Yes, No)*

V. RESULTS AND DISCUSSION

As it is explained above, the neuro fuzzy system model was designed, inputted and tested with the training model. Training Rules of the neuro fuzzy model are depicted in Table 2. Pictorial representation of table 2 is depicted in Fig 1. Then the original data set was imported on to the MLP network for simulation. As a result, MLP was able to predict the students' success rate in interviews as about good accuracy, which is depicted.

TABLE 2: MODEL TRAINING DATA FOR ACCURACY PREDICTION

Writing test	*Viva test*	*Prediction of Success*
50	50	0
60	60	0
70	90	1
80	80	1
90	90	1
90	60	0
80	60	0

FIG1. GRAPHICAL REPRESENTATION OF TRAINING DATASET

VI. CONCLUSION

In this paper, the prediction of students acquired knowledge performance model has been proposed using the Neuro Fuzzy System. The model may prove to play a significant role in testing the prediction of students who could get through the interviews based on their ability in viva test. Experiments and results revealed that the Multilayer Perceptron algorithm in Neuro Fuzzy system is able to produce a feasible accuracy. Moreover, the algorithm took less time to be trained and the test results are near to the expected ones. This adds to the capability of network in performing prediction more correctly. Further work can be performed for by comparing the accuracy of the proposed algorithm with other algorithms of ANN.

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