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STUDENT PREDICTION SYSTEM FOR PLACEMENT TRAINING USING FUZZY INFERENCE SYSTEM

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Abstract

Proposed student prediction system is most vital approach which may be used to differentiate the student data/information on the basis of the student performance. Managing placement and training records in any larger organization is quite difficult as the student number are high; in such condition differentiation and classification on different categories becomes tedious. Proposed fuzzy inference system will classify the student data with ease and will be helpful to many educational organizations. There are lots of classification algorithms and statistical base technique which may be taken as good assets for classify the student data set in the education field. In this paper, Fuzzy Inference system has been applied to predict student performance which will help to identify performance of the students and also provides an opportunity to improve to performance. For instance, here we will classify the student's data set for placement and non-placement classes.

Keywords:

Classification, Fuzzy Inference System, MATLAB

1. INTRODUCTION

Student prediction system is most important approach as it classifies large set of student data is very difficult so many organizations suffer from this problem and this would be serious concern. If we are going to classify large set of data set of student on excel sheet it will take lot of time and if we use any programming language, it is also very difficult to code for many conditions and classify big data set. This is the serious issue which frequently occurs during classification of student big data set or predicting them for desire purpose. Fuzzy expert system may provide very easy way to classify large set of student data set or we can predict large set of students as well as individual student also. Fuzzy provide a good platform for making conditions or rules and we can easily implement this technique by using fuzzy inference system.

2. LITERATURE SURVEY

Many systems and numerous algorithm exists which produce to constructs classification model for student prediction such as Hidayah et.al [1] where researcher used ANFIS techniques with Fuzzy logic toolbox for classify the students on the basis of their academic performance. They attempted and mapped the conditions according to created rules for removing difficulty for classifies the students. Devi et al. [2] used Neuro-Fuzzy inference system with hybrid learning algorithm to advance the prophecy based on the conservative replica using questioner. They created some rules on the basis of their parameters. Malaise [3] used multi agent data mining technique for predicting student performance. In that paper, researcher induced performance of the students based on their performance and predicts accuracy as well by using multiple techniques such as Adaboost, C4.5 algorithm. Qiu and Sapiro [4] done learning transformation for clustering and classification. They worked on low-rank transformation for sub space clustering and classification. Researcher transformed high-dimensional data space into low dimensional subspace like Sharma [5] proposed a literature survey using data mining. Data mining technique has been used by many researchers for extracting information within the large set of data. Barrak and Razgan [6] used data mining technique to predict students final GPA in educational based on their grades in previous courses. They collected the students' performance data based on their past performance. In that data their CGPA and their grades are mentioned of all courses they collected data of female students in that total students were 236 and then applied tree algorithm for inventing the classification rules. Padav and Pal [7] collected data from VBS purvanchal university Uttar Pradesh and they collected the data of 90 students which were from MCA department and researcher apply some algorithm on that data for classification. Kashy et al. [8] predict the student performance using of data mining methods with the educational web based system on the basis of student CGPA. Khan et al. [9] predicts the final grade of the secondary school students which has proven effective classification system. Researcher classifies the student's marks and grades in different subjects using data mining techniques. These data mining technique are classification, prediction, Decision Tree and J48. Talwar and Kumar [10] discussed machine learning methodology in artificial intelligence. Researcher also discussed about learning concept like pattern recognition and different machine learning algorithms such as naive basis classifier, trees, SVM, nearest method, discriminant analysis and more. Researcher consults the concepts of these machine learning algorithm that these algorithm how much efficient for classification as well as evaluation also.

3. FUZZY INFERENCE SYSTEM

3.1 FUZZY SYSTEM

Fuzzy logic is basically a logic which provides the simple recognition of truth and false values these values represent in propositions same here with the fuzzy logic, propositions can be represented with truthfulness and falsehood values. Just simple take an example of truth and false such as there is a statement, today is sunny, it might be 100% true if there are no clouds so we cannot say it is 100% correct but it may be 80% correct or true if it is hazy and if it rains all day so it is clear that it is 0% true. The idea of fuzzy logic is an approach to computing degree of truth rather than true or false (1 or 0) Boolean logic. Fuzzy logic is an extension of multi valued logic of propositional values into a set of membership degree it is known as membership function which

maps the predicates into fuzzy sets or ordered set of fuzzy pairs called fuzzy relation. Let us take an example of fuzzy logic of slowest, slow, fast, fastest. In an every problem in fuzzy logic must represent the fuzzy sets. So we will define the range for these possibilities range should be like this for Slowest - [0.0 − 0.25], Slow - [0.25 − 0.50], Fast - [0.50 − 0.75] and Fastest - [0.75 − 1.00].

Fuzzy Logic is a logic which is used in data mining it gives approximate result rather than exact result. Basically fuzzy is an extension of crisp set there were some limitation in crisp for removing them one new method were invented which was fuzzy. Fuzzy is not work on probability it is work on uncertainty. Fuzzy logic is a way to represent linguistic variable and subjective attributes or variables of the real world in computing. Basically fuzzy provides uncertainty behavior not probability.

Uncertainty in fuzzy logic it represents by two ways first one is stochastic uncertainty and lexical uncertainty. In the fuzzy logic we use linguistic variable. A linguistic variable associate with word and it can be any sentences by using belief functions which is known by membership function. For making a fuzzy system use fuzzy inference system and create some rules on the basis of given parameters rules should be like this If and Then, shown in Fig.1

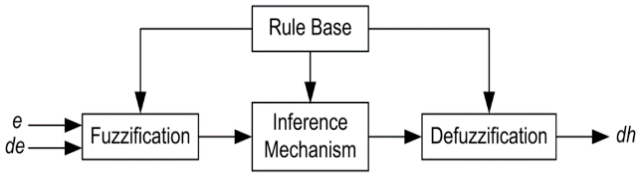

Fig.1. Fuzzy logic basic diagram

3.2 FUZZY MEMBERSHIP FUNCTION

Membership function in fuzzy logic play important role because fuzzy set is a simplification of the pointer function in classical sets. It represents the degree of truth values. Often degree of truth can have mystified with probabilities. Membership function in fuzzy logic play important role because fuzzy set is a simplification of the pointer function in classical sets. It represents the degree of truth values. Often degree of truth can have mystified with probabilities. Membership function can be representing by many types such as Triangular Membership Function, Trapezoidal Membership Function, Gaussian Membership Function and Generalized Bell Membership Function, shown in Fig.2.

3.3 FUZZY RULE

Rules in fuzzy logic represent like a condition on the basis of rule it will give result whether result can be true or false. Rules write in the form of condition such as IF THEN, shown in Fig.3.

3.4 FUZZY INFERENCE SYSTEM

Fuzzy Inference System or FIS is a method of mapping some inputs space to an output space using Fuzzy Logic. It provides the very simple platform which can use easily. Fuzzy inference system provide making inputs and membership function and corresponding we can get output, shown in Fig.4.

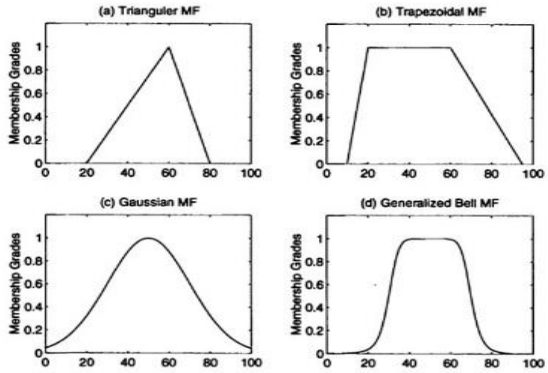

Fig.2. Fuzzy Membership Function

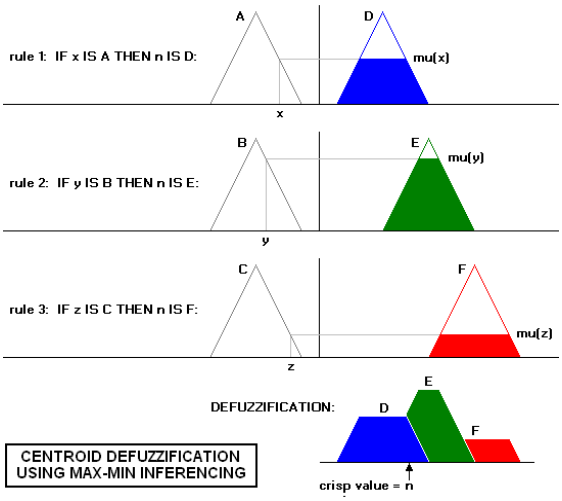

Fig.3. Rules representation in fuzzy logic

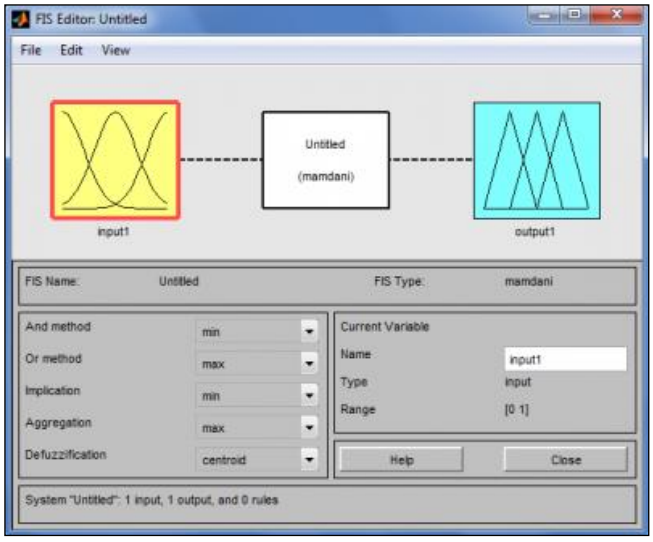

Fig.4. Fuzzy Inference system

3.5 DEFUZZIFICATION

During the defuzzification membership function defined over input variable which applied on their actual values that's why the degree of each rule argument determined

3.6 MATLAB TOOLBOX

MATLAB is basically a tool which is very easy to use and it is a computer program that combines computations visualization power that makes very easier to use for engineers. MATLAB is a managerial program and in the MATLAB tool box we can also write scripts and commands also like other programming languages. MATLAB tool provides some most important predefined functions and commands which is very useful in perspective of user point of view. MATLAB environment provide some techniques such as managing variables, import and export data, perform calculations, generate plots, generate surface and we can develop and manage files also, shown in Fig.5.

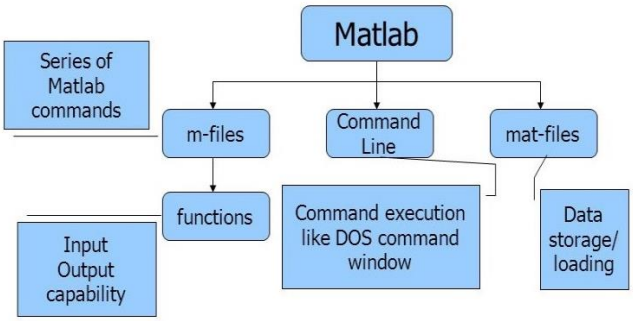

Fig.5. Basic function diagram of MATLAB

The main objective of this project is to classify large set of student data set using fuzzy logic and predicting student for placement training whether the student is eligible or not for placement training. As we discussed above we are taking two classes for final year student, classes are placement training and non-placement training. For the placement training those students will eligible those will get good marks or good CGPA in exam and remaining student will go for extra classes to improve their performance. From this approach we can predict all students in few times, if we want to classify all students on excel sheet so it will take lot of time, so these approaches are much better compare to other and it will help you.

This proposal may also able to judge the performance of the student continuously. The main advantage of this system is to improve accuracy and speed of the student by conducting an exam and decide some criteria to pass that exam if student fails in exam than some important classes or training will provide to the student it will help to student to improve itself. The advantage of the system is the accuracy of the prediction and speed of the result provided. So the fuzzy system provides the easy way to classify several numbers of student data set. By making a fuzzy inference system and create some rules which will predict the student for pre-defined classes such as placement training and non-placement training, shown in Fig.6.

For this system we collected 31 sample data set of M.Tech computer science student from our organization. In this data set put student registration number, name, 10th marks, 12th marks, B.Tech cgpa, M.Tech cgpa and number of backlogs. For classifying data set we skip some part of data set like registration number as well as name also here we take only academic marks and current backlog only and created more than 500 rules for predicting student performance for placement training on the basis of certain parameters. For example, if (10^{th} marks is poor) and (12^{th} marks is poor) and (B.Tech cgpa is poor) and (M.Tech cgpa is poor) and (backlog is less than 2) then (output is NO). From this fuzzy system can classify thousands number of student's dataset.

The main step of fuzzy based student prediction system is creating membership function for each input (10^{th} marks, 12^{th} marks, B.Tech CGPA, M.Tech CGPA, and number of backlogs) and creates output in terms of eligibility corresponding inputs. This fuzzy inference system is implemented in MATLAB tool box which is open source tool. And generated GUI interface which is like a page on which can calculate individual student result and predict his/her for placement training. The Fig.7 of membership function of each input given under as follows

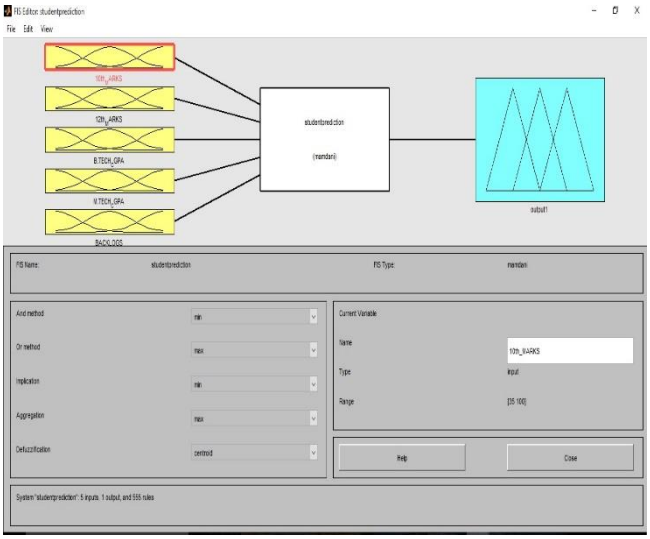

Fig.6. Fuzzy Inference System of each Input.

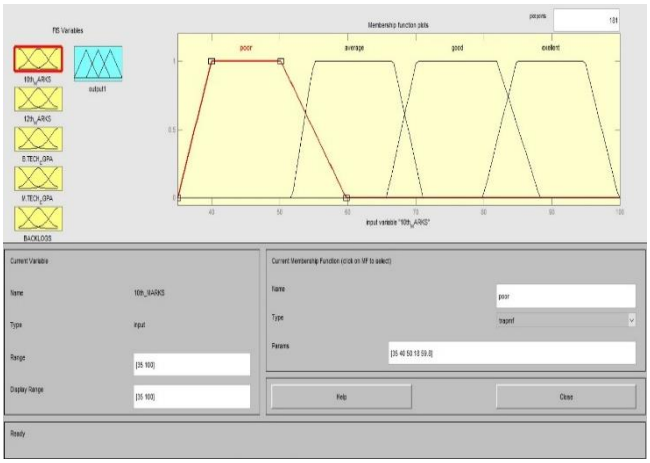

Fig.7. Membership function – (10^{th} marks)

The range of each membership functions for each input is defining by given Table.1.

Table.1. Input and Output Member Functions Range

Inputs	Number of Membership Function
10^{th} Marks	4
12^{th} Marks	4

B.Tech CGPA	4
M.Tech CGPA	4
Number of Backlogs	2
10th Input MF & 12th Input MF	**Range**
Poor	[35,40,50.18,59.8]
Average	[51, 55.4, 66.7, 77.1]
Good	[65.7,70, 81.4, 88.3]
Very Good	[79.86, 84.86, 94.86, 99.86]
B.Tech Input MF & M.Tech Input MF	**Range**
Poor	[4,4.5,5,5.5]
Average	[5.5,5.6,5.77,6.7]
Good	[6.564, 6.8, 7.41, 7.73]
Very Good	[7, 7.5, 8,10]
Backlog MF	**Range**
Less than 2	[-1, 0, 1, 2.985]
More than 2	[2.15,2.849, 6,6]
Output MF	**Range**
Eligible	[0,2.1,4,4]
Not-Eligible	[0.0318, 0.0318, 0.0318, 2]

Name	Registration No	10th Marks	12th Marks	B.Tech CGPA	M.Tech CGPA	NO. OF Backlogs	RESULT	OUTPUT
Ravi	11400000	59.06	60	5.6	7.32	0	0.68	NOT ELIGIBLE
Gaurav	11400005	70	80	7	7.62	0	2.4377	ELIGIBLE
Rahul	11400006	59	45	6	6.5	2	0.7324	NOT ELIGIBLE
Siva	11409563	80	65	6.75	7.2	1	2.2592	ELIGIBLE
Noor	11409576	72	71	6.5	6.2	0	2.3734	ELIGIBLE
Riya Khan	11405236	50	65	6.1	7.3	3	0.68	NOT ELIGIBLE
saajan khan	11407654	75	57	7.2	6.1	0	2.166	ELIGIBLE
Rakesh	11402356	54	74	6.2	7.8	1	0.7323	NOT ELIGIBLE
saajan khan	11409657	64	45	7.5	7	2	0.7324	NOT ELIGIBLE
Kamal Kant	11402540	52	59	6	6.5	0	0.7008	NOT ELIGIBLE
diya sharma	11402030	75	71	7.6	8.2	0	2.4731	ELIGIBLE
Harsh singh jeet	11405323	62	43	6.2	6.8	2	0.7324	NOT ELIGIBLE
Tina raut	11426353	82	74	6.9	7.8	0	2.4693	ELIGIBLE
Deepti gogna	11204575	74	69	8.5	8.6	0	2.3734	ELIGIBLE
Gagan singh	11421532	63	62	7.2	6.2	0	2.166	ELIGIBLE
Harshpreet singh	11425832	87	85	8.2	Null	0	2.166	ELIGIBLE
Deepak rajput	11409575	62	68	7.5	6.8	0	2.4377	ELIGIBLE
Ekta singh	11457584	72	53	7.2	6.1	1	1.9185	NOT ELIGIBLE
Fatma Gul	11452010	59	62	6.8	7.5	0	2.3625	ELIGIBLE
rani kaul	11502345	76	78	9	8.2	0	2.2606	ELIGIBLE
Sanjana singh	11405575	56	57	6.7	7.4	3	0.68	NOT ELIGIBLE
Gitika Mahajan	11405212	59	68	7.1	7.2	2	2.2505	ELIGIBLE
Rahil sen	11507545	67	59	7.5	7.2	1	2.4323	ELIGIBLE
Harsh singh jeet	11402689	70	67	7.3	7.8	0	2.3563	ELIGIBLE
Deepak Jadon	11457540	80	74	6.7	7	0	2.1913	ELIGIBLE
Kundan Kapil	11435210	57	52	6.1	7.8	1	0.68	NOT ELIGIBLE
Jeet maan	11475142	50	53	7.8	7.1	2	0.7324	NOT ELIGIBLE
Gyan singh	11421042	45	56	6.2	7.8	0	0.68	NOT ELIGIBLE
Prag sharma	11402513	81	74	5.8	7.2	2	0.7324	NOT ELIGIBLE

Fig.8. Output of classified student dataset results

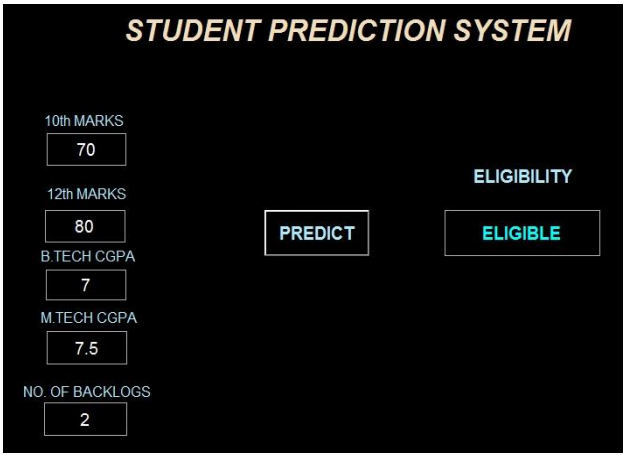

Fig.9. Output of Classified Individual student result on GUI.

In Fig.8, each input (10th marks, 12th marks, B.Tech CGPA, M.Tech CGPA, and number of backlogs) and output values which came by evaluating or classifying data set and finally it produces the output in the form of student is eligible for placement training or not it clearly showing in the last column and show a value for each student if value is greater than 2.1 than student is eligible for placement training otherwise he/she is not eligible for placement training and Fig.9 shows the GUI interface of student predicting system.

4. CONCLUSION

This system easily predicts and analyzes lot of student data set for predefined classes by using fuzzy logic which will definitely be a good asset to organization to analyze the information of huge number of student information and data sets. Future studies are required to investigate new hybrid models of fuzzy classification algorithms to improve the performance of prediction system.

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