

A Fuzzy Based Inference System to Adjudge Career Preference



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Abstract: To evaluate students performance in choosing career opportunities at educational intuitions is a strenuous process. To guide students and to drive them towards their openings, they are tested on their study skills in the areas of aptitude, verbal and reasoning using Fuzzy Base Inference System (FBIS). Based on the performance a student can opt for placement, higher studies or appear for competitive exams. This paper provides a complete data of students performance by analyzing the concepts on the attributes of time taken and the number of questions attempted by student in aptitude and verbal components. Generally students performance is evaluated using statistical method but in this paper we use mathematical method to analyze the performance of students. Since this analysis include the performance of a student on the time taken in solving the problems. This method enables a student to understand the area in which he or she has to strengthen. FBIS gives us appropriate data on each parameter, thus help us give the student special attention in the specific area. As verbal, Quantitive Aptitude and Time taken in solving the questions is equally important in acquiring maximum score, FBIS plays a major role in enhancing the score level of the students.

Keywords: Fuzzy logic, Performance, FBIS, Decision Making.

I. INTRODUCTION

Numeric values play a significant role in evaluating the outcome of academics. Classical assessment is based on the variation in the outcome of the students performance with a “Fuzzy rule based expert system which evaluates the overall performance of the students using fuzzy logic[2].The association rule mining to investigate the performance of the students and to enhance the quality of education in the educational institutions” [4].

II. FUZZY BASED LOGICAL THINKING

The FBIS model to assessment the students performance given quantative, verbal question answers and time as input parameters. Fig. 2 represents the design of the Mamdani FBIS[5],[6].

As maintained within the parameters, Quants, Verbal and Time as shown in fig.1. The return values of the system are taken as performance of student in exam. Hence, it is a very helpful to analyze the student study skills to design a FBIS. The procedure for the event of the FBIS performance model involves the subsequent ways:

- Fuzzification of Membership Functions(MFs) for parameters and return variables.
- Finding of application rule base.
- Defuzzification of Performance Assessment for students.

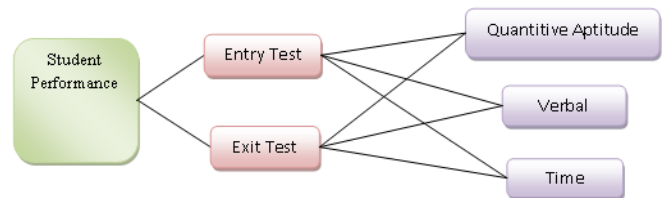


Fig. 1.Student Performance

academic process and do not show any variation. Assessing the outcome of the students in education is done using various parameters. “Fuzzy logic theory emerged during the twentieth century and, from the beginning of the twenty-first century, was predicted to be applied extensively in many fields”[1],[9]. “One of the applications of the fuzzy logic theory is the measurement and evaluation in education. In this context, the aim of this paper is to define the impact of the fuzzy logic theory on the measurement of students performance”[7]. The benefit of fuzzy logic designs permits further adjustable design of assessment [10]. clear difference from existing performance criteria. Assessing and mesurering has a prominant role in the

A. Fuzzification of MFs for parameters and return variables

The FBIS design is the identification of parameters, return values. The most important parameters are Quants, Verbal and Time. Suppose select of more number of parameters to the system inputs to the system needs additional range of govern [8] and hence the complexity increases. The parameters and result values are taken within the style of linguistic format. For example, Quants={L, M, H}, Verbal={L, M, H}, Time={less, average, high}. The result values equally divided into performance = {poor, medium, good}. Triangular MF is used to normalize the classical parameters due to its simplicity and computational efficiency. It is described mathematically within the manner [8]:

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$$\text{triangle}(t;l,m,n) = \begin{cases} 0, & t < l \\ \frac{t-l}{m-l}, & l \leq t \leq m \\ \frac{n-t}{n-m}, & m \leq t \leq n \\ 0, & n < t \end{cases} \quad (1)$$

$$\text{triangle}(t;l,m,n) = \max\left(\min\left(\frac{t-l}{m-l}, \frac{n-t}{n-m}\right), 0\right) \quad (2)$$

where t is that the vary of the input parameters and l,m,n are the parameters of the linguistic value. This triangular MF as described in the above expressions (1) and (2) change the linguistic values lies between 0 to 1. The MFs of parameters and result values are delineating in fig. 3 and fig. 4.

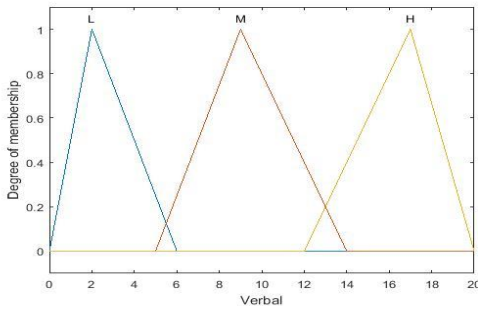


Fig. 3.1 MF of Quants

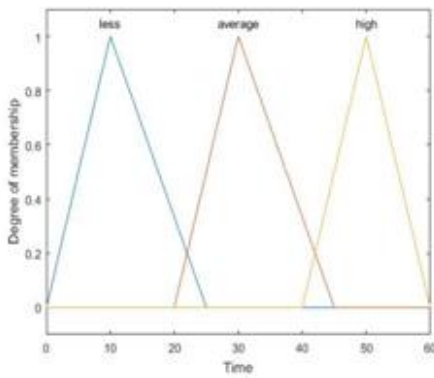
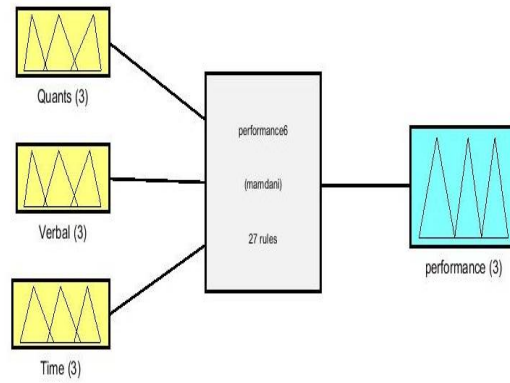


Fig. 3.3 MF of Time

B. Finding of application rule base

The rules finding parameters and return value MFs that will be used in logical thinking method. These rules are linguistic and also are entitled “IF-THEN” govern [6],[10]. In FBIS, it has three parameters Quants, Verbal and Time has three MFs. The FBIS is meant for analyze the student study skills and it have three parameters as Quants, Verbal and Time. So the fuzzy system has twenty seven govern [4].

The proposed fuzzy design is based on Mamdani FBIS design and Max-Min logical thinking was applied.



System performance6: 3 inputs, 1 outputs, 27 rules

Fig. 2. Determination of Student Performance using FBIS

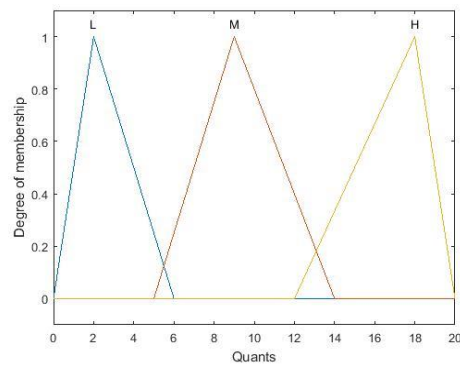


Fig.3.2 MF of Verbal

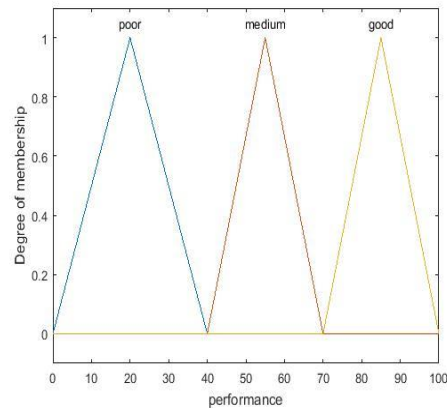


Fig. 4.MF of output of FIS

Fig. 3,4. Graphical representation of MF of parameters and return value of FIS

We use a “centroid” (center of Area) technique for defuzzification process. The classical value is calculated as below (Equation 3)[9].

$$z^* = \frac{\int \mu_A(z) \times z \times dz}{\int \mu_A(z) \times dz} \quad (3)$$

Where $\mu_A(z)$ are the summation result values of MF.

Table I: Student Performance Result

Results of Student Performance									
Entry Test					Exit Test				
QUANTITATIVE APTITUDE (20)	VERBAL APTITUDE (20)	Time (min)	Marks (100)	FIS Output	QUANTITATIVE APTITUDE (20)	VERBAL APTITUDE (20)	Time (min)	Marks (100)	FIS Output
6	8	46	35	55	9	7	58	40	55
7	11	23	45	64.8534	15	13	59	70	85
10	5	55	38	20	5	5	44	25	26.3339

4	6	22	25	55	10	10	59	50	55
9	9	34	45	55	5	7	56	30	20
9	8	45	43	55	14	12	59	65	85
5	12	41	43	42.1498	14	10	59	60	85
8	8	4	40	85	11	7	51	45	55
9	9	43	45	55	12	5	55	43	20
11	12	39	58	55	11	8	56	48	55
6	4	37	25	55	13	10	48	58	68.7458
10	14	45	60	85	5	4	10	23	20
13	5	60	45	50	5	6	60	28	50
11	4	32	38	55	7	7	46	35	55
11	9	54	50	55	17	13	57	75	85
7	5	52	30	20	10	7	56	43	55
11	7	58	45	55	15	11	57	65	85
12	11	51	58	55	8	6	44	35	55
5	5	4	25	20	7	4	29	28	55
6	12	48	45	55	5	5	17	25	20
6	8	53	35	55	4	3	22	18	35
10	11	49	53	55	5	6	51	28	20
4	7	7	28	55	5	6	41	28	42.1498
12	8	59	50	55	11	11	56	55	55
12	9	58	53	55	7	2	24	23	55
6	8	2	35	85	9	11	56	50	55
9	4	13	33	55	13	14	57	68	85
12	9	47	53	55	7	4	59	28	20
11	8	53	48	55	6	10	54	40	55
8	7	43	38	55	10	6	49	40	55

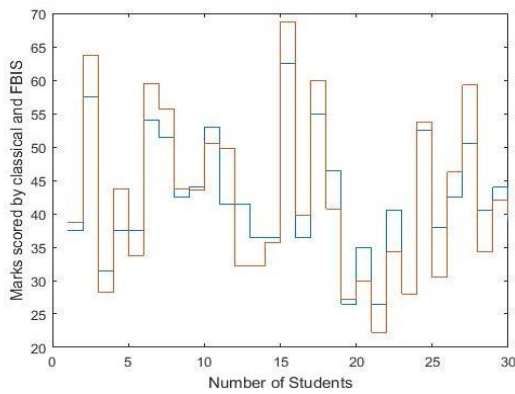


Fig. 5: Stairs plots marks both classical and FBIS

III. RESULTS AND DISCUSSION

Evaluation on the outcome of the student is done using two methodologies, the standard and FBIS method. In Standard method the outcome is compared based on the performance of the student but in FBIS method the comparison is done with the performance based on the time taken in accomplishing the task. The sampling is done using 30 students and the variations is indicated in fig.5 stairs graph, the blue line shows the students score and the marks of both entry and exit test in classical approach, and the red line shows the students score in FBIS approach. In the graph, the variation of score in classical method and FBIS method are shown in red and blue lines. The outcome is based on the performance and time taken. This system of assessment sets a path to relevant profession.

The simulation results of FBIS method compared with the classical method and the results is shown in the table1. To conducts the experiment 30 students were selected from final year engineering course of different branches, SRM Institute of Science and Technology, Chennai, India.

IV. CONCLUSION

The FBIS method and classical method in education is used to show variation in the outcome. Mathematical rule is applied to evaluate classical method but FBIS is applied for much flexibility while evaluating students performance. This method also helps the students to explore their aptitude skills to the maximum and enable then to find the path for their desired goal.

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