Expert system for evaluation of school

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Abstract-School evaluation system helps in selecting the best school for the parents or guardian based on some parameters. The evaluation will consist of key indicators of quality education ranging from input data such as infrastructure, Fees, teachers ,Past academic results etc. to outcome whether a particular school is good enough for a student or not. The rating system will be simple enough to be applied to any school but effective in terms of accurately representing the school's offering. This Decision support system helps in evaluation of a new or existing school.

Keywords—Decision Support System, Fuzzy Logic, School evaluation

I. INTRODUCTION

Fuzzy Logic is a problem-solving control system methodology that lends itself to implementation in systems ranging from simple, small, embedded micro-controllers to large, networked, multi-channel PC or workstation-based data acquisition and control systems. It can be implemented in hardware, software, or a combination of both. FL provides a simple way to arrive at a definite conclusion based upon vague, ambiguous, imprecise, noisy, or missing input information. FL's approach to control problems mimics how a person would make decisions, only much faster. Unlike the traditional, hard computing, soft computing accommodates the imprecision of the real world. The guiding principle of soft computing is: Exploit the tolerance for imprecision, uncertainty, and partial truth to achieve tractability, robustness, and low solution cost. Fuzzy Logic Toolbox software with MATLAB technical computing software as a tool for solving problems with fuzzy logic. Fuzzy logic is a fascinating area of research because it does a good job of trading off between significance and precision—something that humans have been managing for a very long time.

II. PROPOSED WORK

In the process of designing school evaluation system we have taken different parameters with their impact levels which are helpful for decision making process. We have chosen seven different like board, distance, communicational facilities ,fee structure, past results, teaching staff, infrastructure, which effect school evaluation system .These parameters with their impact levels are given in Table 1. We constructed rule base using 40 different rules with guidelines from experts. We gave them questionnaires regarding different set of input parameters from which they selected percentage recommended decision as yes and no.

DESIGN METHODOLOGY

The methodology of research is to use fuzzy logic methodologies to do evaluation of a school in software development. In fuzzy logic the evaluation can be done through using fuzzy logic based on if- then rules. The parameters such as board, distance, computational facilities, fee structure, past results, teaching staff and infrastructure are categorized into different levels like "poor", "average", "good", "fair", "very good", "excellent". These inputs are

represented by fuzzy sets to design fuzzy system. Membership functions are used to represent by the fuzzy sets. Sample membership function for the output of the system are shown in figure 1. Rules are formulated after representing inputs and output of fuzzy sets in membership fu nction. so we have added 40 rules. There are different cases:
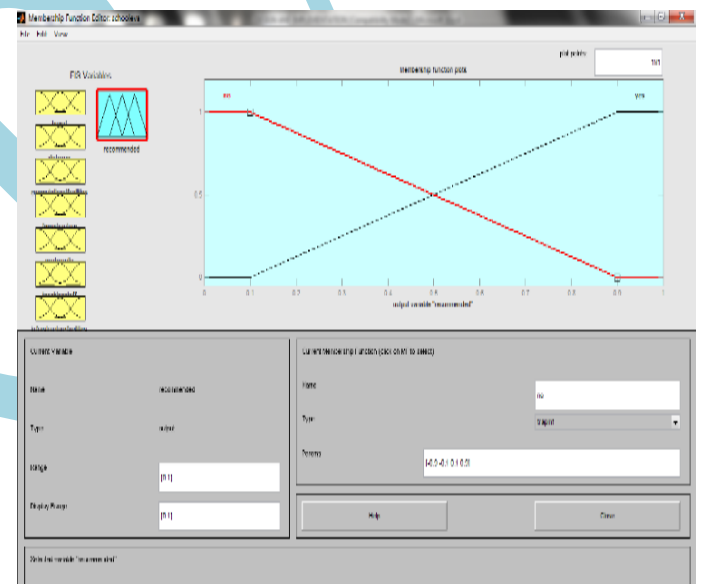

Figure 1: membership function for output

1. If (Board is Local) and (Distance is Very Near) and (Commutaional Facilities is Poor) and (Fee Structure is Low) and (Past results are Poor)and (Teaching Staff is Average) and (Infrastructure Facilities are Poor) Then (low score for school)

2.If (Board is Local) and (Distance is Near) and (Commutaional Facilities is Average) and (Fee Structure is Low) and (Past results are Good) and (Teaching Staff is Fair) and (Infrastructure Facilities are Fair) Then (Average score for school)

3.If (Board is International) and (Distance is Moderate) and (Communicational Facilities is Excellent) and (Fee Structure is Low) and (Past results are Excellent) and (Teaching Staff is Excellent) and (Infrastructure Facilities are Excellent) Then (good score for school)

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39. If (Board is National) and (Distance is Very Far) and (Commutaional Facilities is Good) and (Fee Structure is

Medium) and (Past results are Good) and (Teaching Staff is Very Good) and (Infrastructure Facilities are Very Good) Then (average score for school)

40. If (Board is International) and (Distance is near) and (Commutaional Facilities is excellent) and (Fee Structure is Medium) and (Past results are excellent) and (Teaching Staff is excellent) and (Infrastructure Facilities are good) Then (excellent score for school)

We used different types of membership functions for designing the fuzzy inference system in MATLAB. We used centroid defuzzification method. Gaussian function is used for all the input variables. Guassian function depends on two parameters, the width and c, the center of the curve. Following equations describe the Gaussian functions:

$$f(x,\sigma,c) = e^{\frac{-(x-c)^2}{2\sigma^2}}$$

Gaussian membership functions with actual parameters used for variables classified into different impact levels. The Equations are listed as:
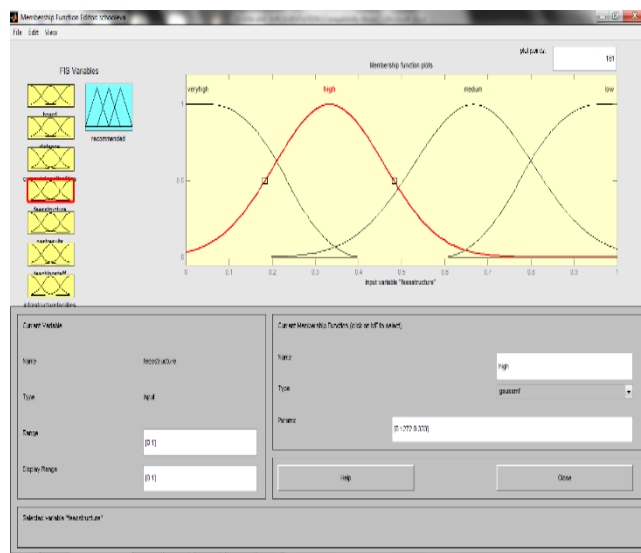

Figure 2: Gaussian membership function

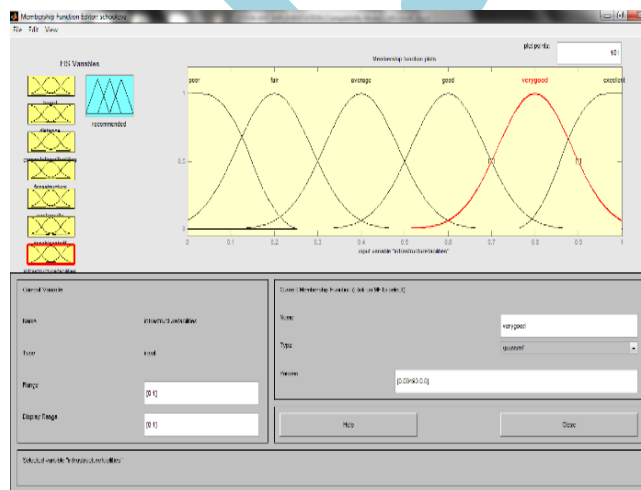$$f_{high}(x,0.1272,0.333) = e^{\frac{-(x-0.333)^2}{2(0.1272)^2}}$$

Figure 3: membership function

$$f_{verygood}(x,0.08493,0.8) = e^{\frac{-(x-0.8)^2}{2(0.08493)^2}}$$

III. IMPLEMENTAION

Fuzzy interference system as given in Figure 2 shows the mapping of inputs and outputs. The names of the processing methods and input can be changed.
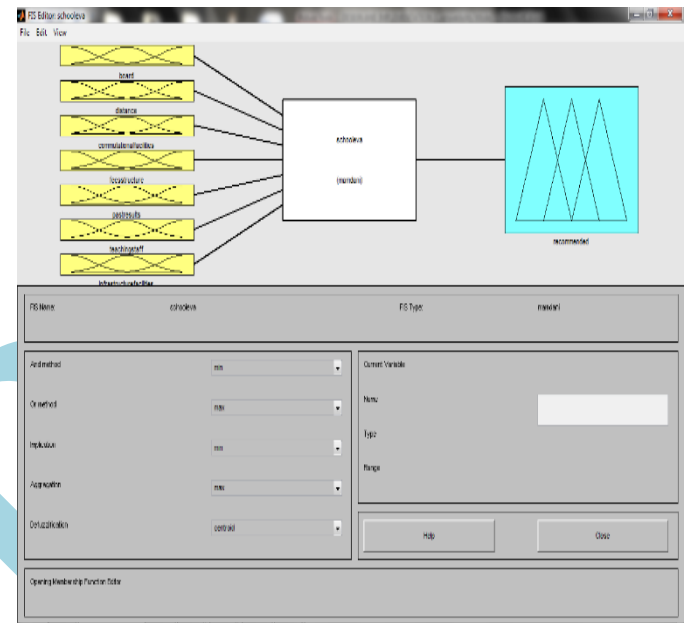

Figure4: Input and output Parameters

Membership function editor as given in figure 3 shows the input and output variables along with their ranges and chances of occurrences.
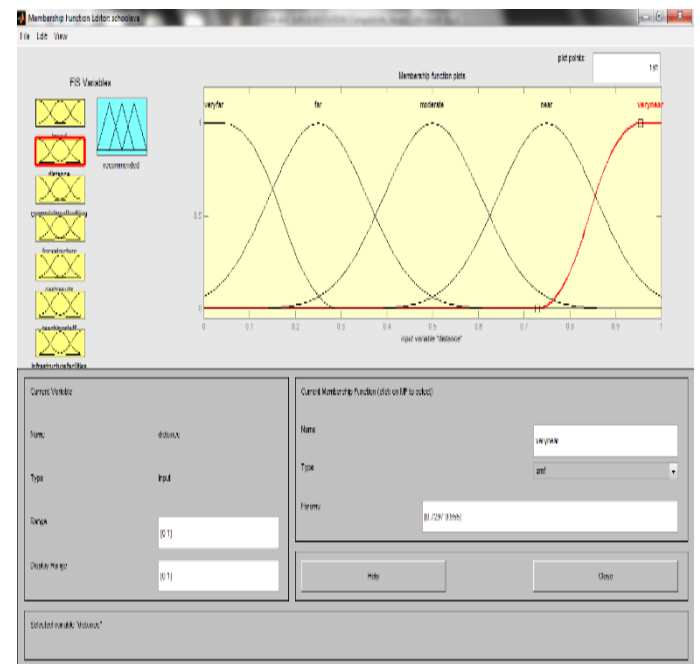

Figure5: Membership function editor in MATLAB

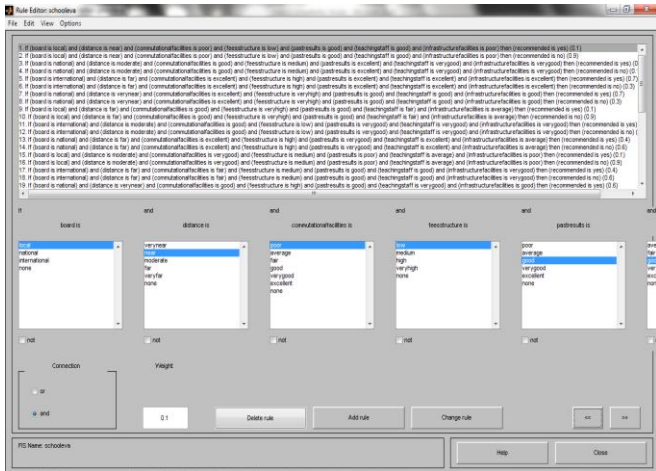The following figures show the surface viewer and rule viewer which helps to add, delete and change rules.

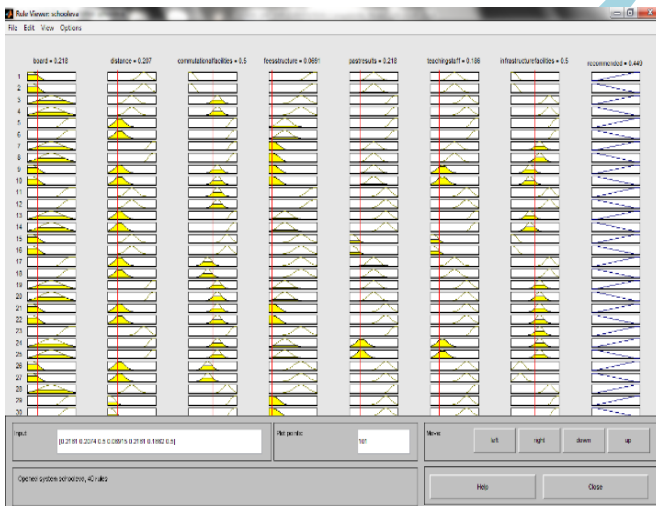Figure 6: Rule editor for different rules

Figure 7: Rule viewer for different rules

III. EXPERIMENTAL RESULTS

We can take different cases for different parameters. The different inputs for applicant 1 are shown in table 2.
Input for applicant I
Table 1: Input for applicant I

Parameters	Inputs
Board	Local
Distance	Very Near
Commutaional facilities	Poor
Fee structure	Low
Past results	Poor
Teaching staff	Average
Infrastructure facilities	Poor

In the following figure, input is provided for a sample case shown in GUI tool developed using MATLAB,the tool gives

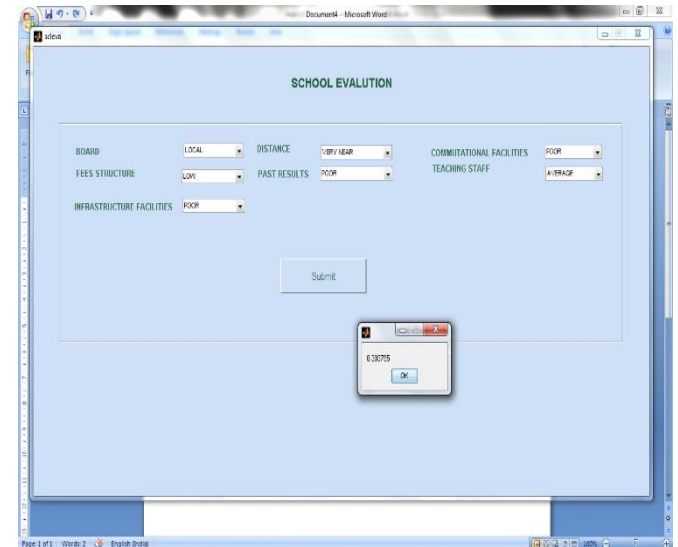the result as a applicant is 0.303795,which is low score for a school.

Figure 8: output screen for applicant 1

Table 2. Inputs for applicant 1I

Parameters	Inputs
Board	International
Distance	Near
Commutaionalal facilities	Excellent
Fee structure	Medium
Past results	Excellent
Teaching staff	Excellent
Infrastructure facilities	Excellent

In the following figure, input is provided for a sample case shown in GUI tool developed using MATLAB,the tool gives the result as an applicant is 0.596754, which is excellent score for a school.
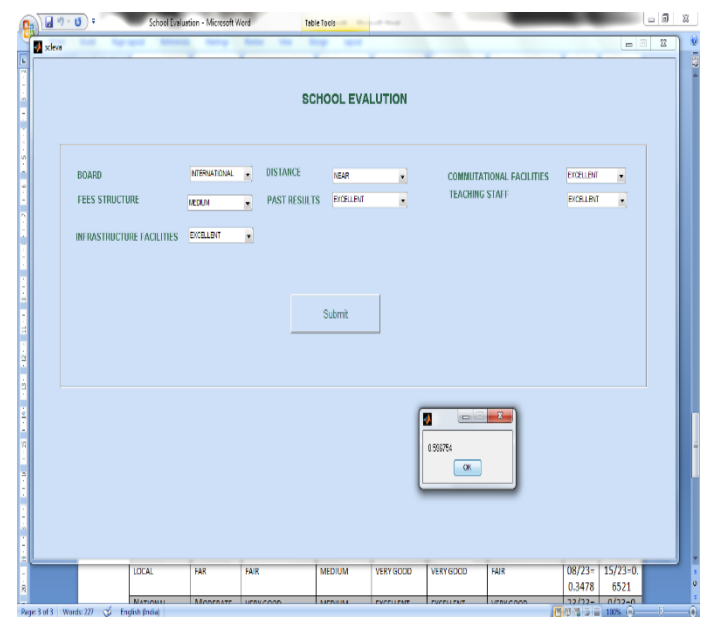

Figure 9: output screen for applicant 2

V. CONCLUSION

In this paper, we have considered school evaluation system using fuzzy logic. Fuzzy theory seeks to build a formal quantitative structure capable of emulating the imprecision of human knowledge. A simple GUI based application which is developed using MATLAB tool is very simple and easy to understand. The evaluation will consist of key indicators of quality education ranging from input data such as different parameters. From the different cases of two applicants in experimental results, it is very clear to analysis decision whether it is accepted or rejected according to different input parameters for particular applicant.

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