A Fuzzy Logic Based Personalized Result Analysis Support for Student Performance Up-Gradation

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Abstract: *Education system conducts various competitive exam and analyze the result but there is no any provision for improvement of result analysis. The proposed research method uses a fuzzy logic based result analysis system which suggest the improvement is possible in performance of result. This method uses Mamdani Fuzzy inference system and Triangular and Trapezoidal membership functions for removing uncertainty and prediction of better results. When marks are analyzed through a classical method it represents two dimensional graphs only. Using this two dimensional graph it is quite difficult to predict range of result. In the proposed method using 36 Fuzzy rules output is categorized in 6 grades namely O, A+, A, B, C, D. and it is represented in 3D surface graph. This graph helps to increase the grade level of number of student by upgrading phase.*

Index Terms: *DNS (Discrete Numbers System), FIS (Fuzzy Inference System), Mamdani fuzzy, Triangular membership function, Trapezoidal membership function.*

I. INTRODUCTION

Integral part of any educational organization's course curriculum are Assessments [1, 2]. It is possible to judge cognitive skill of student through assessment. Many factors such as learning objectives, level of difficulty, psychophysical peculiarities of examiners are required for classification of test assignment [7]. A well thought out assessment [4] component plays a significant role in maintaining learner control, motivation and providing feedback for upgrading their result. Personalization [3] of assessment demand cut-off test which is designed to select student who get marks above a particular ability value which includes questions with varying difficulty level so as to get overall view about student's ability.

In today's education system number of competitive exams are conducted for further higher education to select eligible candidates. NEET, JEEE, MHT-CET, CPT are some of the exams/ test conducted on the basis of 12th class syllabus for further admission to professional courses. Assessment of these exams is a crucial job. In today's environment and prediction problems traditional result analysis often fail to make precise statement about input and outputs. [9,13] Fuzzy logic is a soft computing tool for solving problems with many inputs and predicts the future outputs with maximum possibilities. Fuzzy logic based method should be further investigated as alternatives and perhaps more appropriate methods to confront uncertain and complex problems.

NEET-UG:

NEET-UG is National Eligibility cum Entrance Test- for undergraduate course in medical field. As per regulation framed under the Indian Medical Council Act -1956 as amended in 2018 and the Dentist Act – 1948 as amended in 2018, admission in 100% seats of MBBS/BDS (and other Para medical sides) will be done through national eligibility test [16].

The students who qualify this exam are eligible for taking admission to degree courses in medical field such as M.B.B.S., B.D.S., B.A.M.S. and many more Para-medical courses. This exam will be conducted by central government's CBCS board all over India at one time.

This exam includes the syllabus of 11th and 12th science class for subject physics, chemistry and biology. Multiple choice questions are the pattern of this exam of 3 hours duration. NEET-UG Exam is having negative mark system i.e. one mark is deducted for wrong answer and each correct answer secures 4 marks. Candidate who appeared or passed 12th board exam and age between 17- 25 are eligible for attending this exam. To qualify this exam student must score 50 percentile of current merit list.

Latur is educational hub city in Maharashtra and renowned in India for its "**Latur-Pattern**" especially for 11th and 12th science class and other competitive exam preparation. Dayanand Science college is one of the reputed college in Latur city and famous for Latur pattern and its meritorious result all over the country. Near about 1500 candidates are taking admission to 11th science every year and appeared for 12th board exam. Out of which near about 50 % students are interested in taking admission to medical courses. Hence, they are interested in preparing for NEET exam. College is also arranging special coaching and faculty for these students. To qualify NEET exam and score more marks in the exam, college conducts practice test of students at every fortnight. These practice tests are conducted on topic wise syllabus and finally number of MOOC test are conducted on complete syllabus.

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Result is analyzed and rank is displayed for every test to motivate student. These ranks are calculated depending on subject, category, and total secured marks. The present system uses traditional excel sheet which uses DNS and result also displayed in DNS. Ranking system also uses the DNS format. The traditional system does not give justice to those students who lost their rank by few marks. Due to this student may lost their confidence and distract from study. To tackle this education problem, it is responsibility of education system to find the better solution on it. Also, to solve the uncertainty found in traditional result analysis system it is necessary to upgrade this system with a new soft computing tools. The proposed research paper gives a new model of soft computing tools for result analysis by considering this situation.

"Individual's result is just a count and cluster's result is a sign of changing world."

By referring above sentence in this method instead of focusing on individual student, group of students in particular range are considered to upgrade their grade to upper level. Proposed method is helpful to find the range of student who need subject wise more support from teacher for further preparation.

II. RESEARCH METHODOLOGY

The objective of this study is to propose effective and recommend technology for the students who trying for achieve their goal. In this experiment, the results of examination are analyzed and following hypothesis are trying to prove.

Hypothesis 1: Some students are having efficiency in gaining the knowledge in corresponding subject. But due to existing system of analysis they are unable to reach their goal. If Teacher can take specific efforts to improve the score in the respective subjects it is possible for student to reach their goal.

Hypothesis 2: For better understanding of subject teacher can took the help of ICT tools and animated topics for the respective subject.

Hypothesis 3: As Physics subject needs conceptual study teachers can take the help of multimedia teaching aids.

Hypothesis 4: Chemistry subject needs practice so teachers have to take some more efforts on writing practice and visualize the chemical reactions.

Hypothesis 5: Biology needs Repetitive Reading with practical work so teachers can give practical assignment and field studies in surrounding.

Hypothesis 6: It is possible to upgrade the range of student in Upper grade to achieve their goal.

Fuzzy logic is one of the soft computing tool to work on range of data. It helps to remove uncertainty in result. Fuzzy logic is not solution to the problem but it solves the problem with new method. Fuzzy Logic allows you to model complex dynamic systems in a more intuitive way [12].

In traditional learning in a classroom the parameters that define the characteristics of student can only be classified in exactly one category. However, a student can present behavior in different categories. Traditional learning environment faces multiple problems regarding the adaptation of learning process to the particular needs, features and context of each student. Due to this, students distract from their Aim. By reconstructing the various factors such as student factor, instructor factor, course factor, design factor, teaching factor it is possible to direct the student to improve score in respective exam [12]. Fuzzy logic can deal with such type of system as it gives educators and students the possibility of representing computationally by removing the lacuna what they have faced traditionally [13].

*Fuzzy Inference System***:**

A Fuzzy inference system is a way of mapping an input space to an output space using fuzzy logic. A fuzzy inference system tries to formalize the reasoning process of human language by means of fuzzy logic (i.e. by building fuzzy IF-THEN rules) [11].

Ex. "IF Action as an Input THEN Result as an Output". Or "If antecedent Then consequent"

Each inference stage or inference engine has its own set of rules or rule base. It combines certain input indicators into composite output indicator. In order to give better results, decisions or action fuzzy data is processed by fuzzy inference engine as shown below in fig. 1.

Fig. 1 Fuzzy System: For Proposed Model
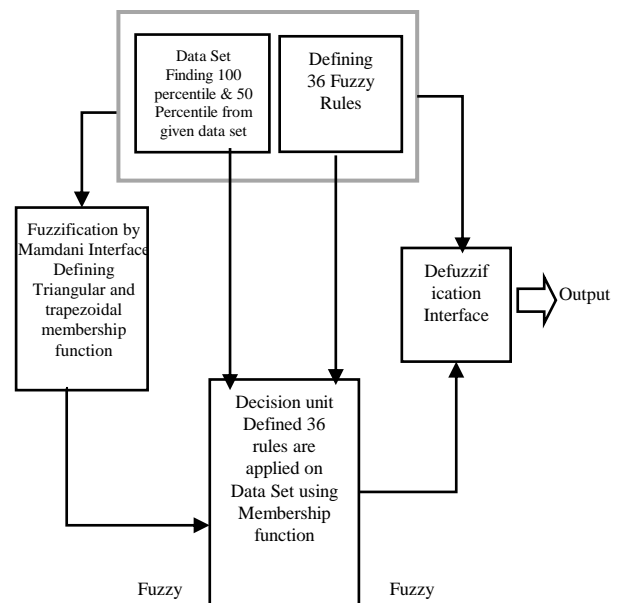
Proposed Research Model is categorized in following stages

1. Data Set & Finding 100 percentile and 50 percentile
2. Classifying input in 6 linguistic variables and applying membership function
3. Fuzzification
4. Decision Unit
5. Defuzzification

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A. Data set

For the analysis of NEET exam we consider data set of NEET practice test conducted for 12th class student. For experiment Marks of 260 Students are considered for Data analysis. The exam is of 720 marks out of which 360 marks are for biology which carries 90 questions. 180 marks for physics and chemistry for 45 questions each.

Data is classified as input and output for FIS in following way for different ranges of all subject for scored marks of one practice test as follows. For *input 3 linguistic variables* are used whose values are words like poor, weak, average, below average, satisfactory, excellent depending on range of marks. The range is between minimum considered mark and maximum considered mark (i.e. between 50 percentile and 100 percentile only eligible candidate). For output 6 linguistic variables are used whose values are Grades like D, C, B, A, A+, O depending on Trapezoidal membership values between 1 to 12. Following Table depicts Output in grade as per score range from 0 to 12.

Finding 100 percentile and 50 percentile:

According board rule we analyze only those students who qualifies the exam i.e. above 50 percentile of the (current) exam score. Maximum Marks per subject are found from the result in that particular test. For example, in physics maximum marks scored by student in that particular test is 133 and this is 100 percentile for the subject physics. And only those students who secured 50 percentile and above of that much mark are considered to be eligible. Hence maximum marks for physics is 133 and minimum marks 67. The following Table I shows subject wise maximum and minimum marks of physics, chemistry, Biology which are considered for the experiment.

Table-I Subject wise 100 percentile and 50 percentile marks

Subject name	Out of	Maximum marks/ 100 percentile	Minimum marks/ 50 percentile
Physics	360	133	67
Chemistry	180	140	70
Biology	180	145	72

B. Classifying input in 3 linguistic variables and applying membership function

Linguistic variables

Linguistic variable means a variable whose values are word or sentences in a natural or artificial language. A variable made up of number of words (linguistic term) with associated degrees of membership. It is mathematical representation of semantic concept that includes more than one term (fuzzy set). In proposed module student's score is considered as linguistic variable which has 6 linguistic values (linguistic terms) such as poor, weak, below average, average, satisfactory and excellent as shown in Table II.

Table-II Linguistic values (term) and their range of marks in each subject

Linguistic Values	Range of marks for physics	Range of marks for Chemistry	Ranges of marks for biology
Poor	67– 78	70 – 81	72 – 84
Weak	78 – 89	81 – 93	84 – 96
Below average	89 – 100	93 – 104	96 – 108
Average	100 – 111	104 – 115	108 – 120
Satisfactory	111 – 122	115 – 127	120 – 132
Excellent	122 – 133	127 – 140	132 – 145

Membership Functions:

A membership function for fuzzy set A on the universe of discourse X is defined as μ_A: X--> [0, 1] where each element of X is mapped to a value between 0 and 1. This value is called membership value of degree of membership qualifies grade of membership of element in X to the fuzzy set A. Membership function allows us to graphically represent a fuzzy set [10]. Membership function which we will use in practical section of research method are

Triangular Function: This function computes fuzzy membership values using triangular membership function which is defined by Lower limit **a**, an upper limit **b**, and a value **m** is a peak value, where **a<m<b** as shown in fig. (2)**.** The simplest membership function are formed using straight lines [10].

Trapezoidal Function: This function computes fuzzy membership values using trapezoidal membership function which is defined by a lower limit **a**, an upper limit **d**, a lower support limit **b**, and an upper support limit **c**, where **a < b < c < d** as shown in fig. (3)[10].
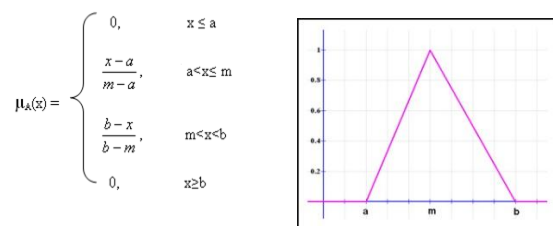
$$\mu_A(x) = \begin{cases} 0, & x \leq a \\ \dfrac{x-a}{m-a}, & a < x \leq m \\ \dfrac{b-x}{b-m}, & m < x < b \\ 0, & x \geq b \end{cases}$$

Fig 2: **Triangular Membership Function**

$$\mu_A(x) = \begin{cases} 0, & (x < a) \text{ or } (x > d) \\ \dfrac{x-a}{b-a}, & a \leq x \leq b \\ 1, & b \leq x \leq c \\ \dfrac{d-x}{d-c}, & c \leq x \leq d \end{cases}$$
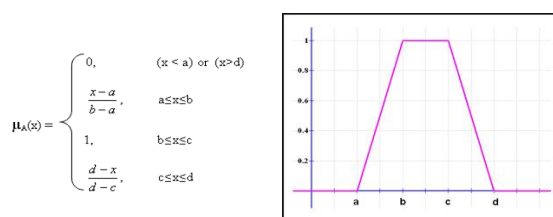

Fig 3: Trapezoidal Membership Function

C. FUZZIFICATION

Fuzzification is the process of changing a real scalar value into a fuzzy value. This is achieved with different types of fuzzifiers (membership functions). In other words it can says that Fuzzification module: transforms the system inputs, which are crisp numbers, into fuzzy sets. This is done by applying a fuzzification function. Linguistic variables are used to represent qualities spanning a particular spectrum [8].

For calculating spectrum for physics using triangular membership function, divide minimum to maximum marks in six group as per six linguistic term. For Each term again there is upper limit and lower limit. The value of m is in between two limit which is x. Same is applicable for chemistry and Biology also.

Applying Triangular Membership function for Physics score:

(i) $\mu_{poor}(x) = \frac{(x-67)}{(78-67)}$ Where $67<=x<=78$

(ii) $\mu_{weak}(x) = \frac{(x-78)}{(89-78)}$ Where $78<=x<=89$

(iii) $\mu_{belowaverage}(x) = \frac{(x-89)}{(100-89)}$ Where $89<=x<=100$

(iv) $\mu_{average}(x) = \frac{(x-100)}{(111-100)}$ Where $100<=x<=111$

(v) $\mu_{satisfactory}(x) = \frac{(x-111)}{(122-111)}$ Where $111<=x<=122$

(vi) $\mu_{excellent}(x) = \frac{(x-122)}{(133-122)}$ Where $122<=x<=133$

Each element of X is mapped to a value between 0 and 1 as shown in Table III

Table-III Membership value for linguistic value excellent using triangular member function

Value of x	$\mu_{excellent}(x)$
123	0.09
124	0.18
125	0.27
126	0.36
127	0.45
128	0.54
129	0.63
130	0.72
131	0.81
132	0.9
133	1

Applying Triangular Membership function for Chemistry score

(i) $\mu_{poor}(x) = \frac{(x-70)}{(75-70)}$ Where $70<=x<=81$

(ii) $\mu_{weak}(x) = \frac{(x-81)}{(87-81)}$ Where $81<=x<=93$

(iii) $\mu_{belowaverage}(x) = \frac{(x-93)}{(99-93)}$ Where $93<=x<=104$

(iv) $\mu_{average}(x) = \frac{(x-104)}{(110-104)}$ Where $104<=x<=115$

(v) $\mu_{satisfactory}(x) = \frac{(x-115)}{(122-115)}$ Where $115<=x<=127$

(vi) $\mu_{excellent}(x) = \frac{(x-127)}{(133-127)}$ Where $127<=x<=140$

Applying Triangular Membership function for Biology score

(i) $\mu_{poor}(x) = \frac{(x-72)}{(78-72)}$ Where $72<=x<=84$

(ii) $\mu_{weak}(x) = \frac{(x-84)}{(90-84)}$ Where $84<=x<=96$

(iii) $\mu_{belowaverage}(x) = \frac{(x-96)}{(102-96)}$ Where $96<=x<=108$

(iv) $\mu_{average}(x) = \frac{(x-108)}{(114-108)}$ Where $108<=x<=120$

(v) $\mu_{satisfactory}(x) = \frac{(x-120)}{(126-120)}$ Where $120<=x<=132$

(vi) $\mu_{excellent}(x) = \frac{(x-132)}{(138-132)}$ Where $132<=x<=145$

D. DECISION UNIT: APPLYING RULES AND EVALUATION OF RULES.

Fuzzy Rule Base:

For effective classification of learners which can also handle uncertain information fuzzy rule base is used. To facilitate experimental evaluation a rule base has been constructed which uses input and output fuzzy rules. The learner's scores were carefully monitored and recorded for analysis with respect to parameters for result prediction.

The membership of antecedent is usually called firing strength of rule to a given input value. Fuzzy system often has a set of fuzzy rules that represent the behavior of the system, known as fuzzy rule base. To obtain the fuzzy output of each rule, the Mamdani method is applied which propagate the degree of membership of antecedent of the rule to consequent of the rule [8].

Knowledge base: It stores IF-THEN rules provided by experts. For the proposed research work there are two inputs for each analysis i.e. to find analysis between Physics and chemistry we consider marks of physics and chemistry and divide these marks in 6 linguistic variables. The rules are formed by considering each linguistic value of one input with each linguistic value of another variable and obtain the output using If-Then rules. This is nothing but mapping between input spaces to output space using fuzzy logic. In this way we form 36 different rules as 6 inputs of physics mapped with 6 inputs of chemistry form 36 different combinations and they are nothing but 36 rules. Following Table IV shows the output of mapping Physics v/s Chemistry.

Table-IV   Mapping of output for Physics and Chemistry

Physics / Chemistry	Poor	Weak	Below Average	Average	Satis factory	Excellent
Poor	D	D	C	C	B	B
Weak	D	D	C	C	A	A
Below Average	C	C	B	B	A	A
Average	C	C	B	B	A	A+
Satisfactory	B	B	A	A	A+	A+
Excellent	B	A	A	A+	A+	O

From the table IV it is seen that 36 rules for a given input ranges are divided into 6 categories as shown below

O Grade: If score in physics is Excellent and score in chemistry is Excellent the result of the student fall in O grade.

A+ Grade: If score in physics is Average / Satisfactory / Excellent and score in chemistry is Satisfactory / Excellent / Average the result of the student fall in A+ grade.

A grade: If score in physics is satisfactory/ excellent and score in chemistry is weak / below average / average the result of the student fall in grade A.

And If score in physics is weak / below average/ average and score in chemistry is Satisfactory / excellent the result of the student fall in A grade.

B grade: Similarly, if score in physics is below average / average and score in chemistry is below average/average the result of the student fall in B grade. And physics is Satisfactory/ Excellent and score in chemistry is poor / weak the result of the student fall in B grade. Similarly, Physics is poor / weak and score in chemistry is satisfactory / excellent the result of the student fall in B grade.

D grade: If score in physics is poor/ weak and score in chemistry is poor / weak the result of the student fall in D grade.

C grade: Similarly, if score in physics is poor/ weak /below average / average and score in chemistry is poor / weak/ below average / average the result of the student fall in C grade.

F. DEFUZZIFICATION

Defuzzification module:

It transforms the fuzzy set obtained by the inference engine into a crisp value. It is the process that maps fuzzy set to crisp set [10]. Therefore, the defuzzification is to convert the information in vague into quantitative magnitudes. Several techniques are present in practice for defuzzification such as

- Defuzzification by calculating center of gravity or
- Defuzzification by calculating maximum [15].

Following Table depicts Output in grade as per score range between 0 and 12. The proposed model uses Mamdani interface and defuzzification by gravity center. In the proposed model Trapezoidal membership function is used for finding fuzzy set output category. Formula for trapezoidal membership function is

$$
\mu_A(x) = \begin{cases} 0, & (x < a) \ or \ (x > d) \\ \dfrac{x-a}{b-a}, & a \le x \le b \\ 1, & b \le x \le c \\ \dfrac{d-x}{d-c}, & c \le x \le d \end{cases}
$$

Where a and b are lower and upper limit respectively and *c* and *d* are lower support limit and upper support limit respectively. By considering values for each variable calculate membership value by Trapezoidal formula as shown in Table V.

Table-V Linguistic variable for grade and their respective range

Linguistic Variables Indicated in Grades	D	C	B	A	A+	O
Range	1-2	3-4	5-6	7-8	9-10	11-12

Table-VI Applying Trapezoidal membership function for output grade

$$
(i)\ \mu_D(x) = \begin{cases} = 0 \ \ x \le 0 \\ = 1 \ \ 1 \le x \le 2 \\ = 0 \ \ x \ge 3 \end{cases} \quad (ii)\ \mu_C(x) = \begin{cases} 0 \ if \ x \le 2 \\ 1 \ if \ 2 < x < 3 \\ 1 \ if \ 3 < x \le 4 \\ 0 \ if \ x > 4 \end{cases}
$$

$$
(iii)\ \mu_B(x) = \begin{cases} 0 \ if \ x \le 4 \\ 1 \ if \ 4 < x < 5 \\ 1 \ if \ 5 < x \le 6 \\ 0 \ if \ x \ge 6 \end{cases} \quad (iv)\ \mu_A(x) = \begin{cases} 0 \ if \ x \le 6 \\ 1 \ if \ 6 < x < 7 \\ 1 \ if \ 7 \le x \le 8 \\ 0 \ if \ x \ge 8 \end{cases}
$$

$$
(v)\ \mu_{A+}(x) = \begin{cases} 0 \ if \ x \le 8 \\ 1 \ if \ 8 < x < 9 \\ 1 \ if \ 9 \le x \le 10 \\ 0 \ if \ x \ge 10 \end{cases} \quad (vi)\ \mu_O(x) = \begin{cases} 0 \ if \ x \le 10 \\ 1 \ if \ 11 \le x \le 12 \\ 0 \ if \ x > 12 \end{cases}
$$

Each element of X is mapped to a value between 0 and 1 as shown in Table VII.

Table-VII Membership value for linguistic value grade O using trapezoidal member function

Value of x	$\mu_o(x)$
11.1	0.1
11.2	0.2
11.3	0.3
11.4	0.4
11.5	0.5
11.6	0.6
11.7	0.7
11.8	0.8
11.9	0.9
12	1

Grades are obtained by using the membership functions for e.g.

- Grade is obtained when membership value is like [10.1 10.5 11.5 11.9] as depicts in following fig (4),
- A+ Grade is Obtained when membership value is like [8.1 8.5 9.5 10].
- A Grade is Obtained when membership value is like [6.1 6.5 7.5 8].
- B Grade is Obtained when membership value is like [4.1 4.5 5.5 6].
- C Grade is Obtained when membership value is like [2.1 2.5 3.5 4].
- D Grade is Obtained when membership value is like [-2.16 -0.24 0.24 2.16].
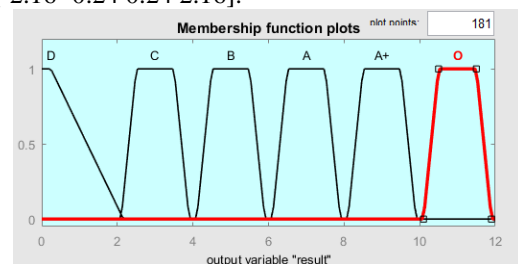

Fig. 4 showing different output grade in trapezoidal Membership form

In the most common technique, all of these trapezoids are then superimposed one upon another, forming a single geometric shape. Then the centroid of this shape, called the fuzzy centroid, is calculated. The x co-ordinate of the centroid is Defuzzifier value.

III. RESULT & DISCUSSION

Result analysis plays measure role in deciding the future of student. As in proposed work result analysis is done by using Physics, Chemistry, and Biology marks. When these marks are analyzed through a classical method it represents two dimensional graphs only. Using this two dimensional graph it is quite difficult to predict range of result. So proposed work uses FIS for analysis of results, which is helpful for predicting the following results:

1. Result is categorized in 6 grades depending on in combination of linguistic variables and its values which is shown in following table VIII.

Table -VIII Obtained grade and its prediction

Physics	Chemistry	Obtained Grade	Prediction
Average	Average	A	1 Students who secure A grade in Exam can be upgraded to A+ grade by taking extra efforts in subject where he/ she obtain average marks.
Average	Satisfactory	A	
Satisfactory	Average	A	2 After upgradation in grade i.e. A+ then it is possible to get the admission in private medical college.
Average	Excellent	A+	1. Students who secure A+ grade in Exam can be upgraded to O grade by taking extra efforts in subject where he/ she obtain average or satisfactory marks.
Satisfactory	Satisfactory	A+	
Satisfactory	Excellent	A+	2. After upgradation in grade i.e. O then it is possible to get the admission in Government medical college.
Excellent	Average	A+	3. After focusing on A+ grade student, It increase the count of O grade student. Ultimately it increases intake ratio to Government Medical College.
Excellent	Satisfactory	A+	
Excellent	Excellent	O	1. Students who secure O grade in Exam can get admission in Government Medical College. 2. Such students can be considered as Advanced Learners

1. Surface Graph dipicts a very clear and interactive representation of grade range. Surface graph is divided into 2 categories 1) Obtained Grade 2) Upgrade Phase as shown in given figure (). For better results analysis proposed reseatch method concentrate on 'Upgrade phase 5', Upgrade phase 4','upgrade phase 3' beteen grade O & A+, grade A+ & A, Grade A & B respectively. It is predicted that Outstanding grade student can easily get admission in government medical colleges, A+ grade student can get admission in private medical college, A grade student can get admission in paramedical courses. By taking some special efforts on student those in Upgrade phase 5, 4, 3 can be uplifted in upper grade like Outstanding, A+ and A grade.
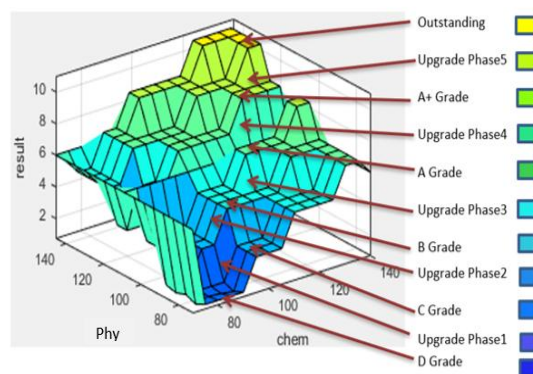

Fig 6. Surface Graph Physics and chemistry showing obtained grade and upgrade phase

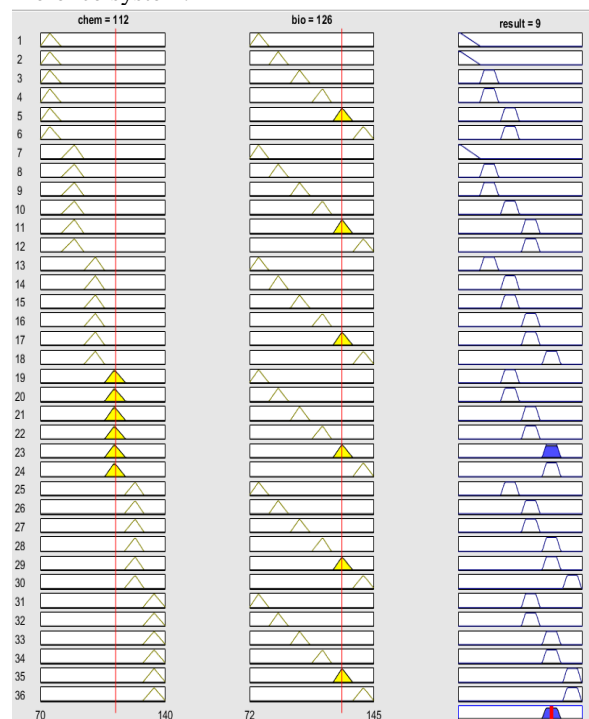2. Following is the discussion of Rule viewer of fuzzy inference system.

Fig. 5: Rule Viewer From Fuzzy Interference system for two input and one output.

Given discussion of surface graph is related to only Chemistry and Biology subject of NEET Exam, same way it is possible to find a result discussion with surface graph of Physics and chemistry, Physics and Biology as two inputs. This result discussion helps to take decision regarding spacial coaching to students, to make availability of experts in consulting subject.

IV. CONCLUSION

As a conclusion, the fuzzy evaluation method takes into account that there is need of modification in existing result analysis method which may distract to student from there predefined goal. Fuzzy logic evaluation method helps to analyze the result of student to promote and direct them on predefined goal.

1. From the Result obtained after analysis it is predicated that students from **grade B** are having efficiency in gaining the knowledge in corresponding subject. So Teacher can take efforts to improve the score in the respective subjects in which that student achieve less marks.

2. The students from **grade A and A+** are having more efficiency in gaining the knowledge in corresponding subject as well as understanding the subject. So Teacher can take some special efforts to improve the score and interest in the respective subjects in which that student achieve less marks.

3. Efforts means the mode of teaching method due to which student can easily grasp the concept of subject. For more understanding teacher can took the help of ICT tools and animated topics for the respective subject. If teacher deals the teaching method through multimedia (Audio visual information) then it is more easily understood by the student and student score more marks which automatically enhance the grade of the student.

4. FIS represent all the range of students with different color which is helpful for the teachers to find out the understanding level of the entire student in all subjects. Surface area graph shows some distinct color to show the grades and also shows some faded colors in between two grades which can be called as the **upgrade phase**.

5. Aim of this research topic is to use this upgraded phase range to upgrade the student in Upper grade to achieve their goal.

6. Using the result of FIS teacher can arrange remedial coaching for weaker students.

7. Using the result of FIS teacher can find out the advanced learners and can arrange Extra program for advanced learners.

8. As Physics subject needs conceptual study, Chemistry subject needs practice and Biology needs Repetitive Reading. Depending on this concept, teachers can give direction to the students to cover the weaker subject accordingly.

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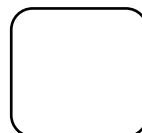
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