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Village Students Academic Performance – A Fuzzy Approach

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ABSTRACT: The parental income and the academic status of the parents have an impact on the academic performance of the students from rural background. The problems and the rectification are discussed with the help of fuzzy inference rule.

KEYWORDS: Fuzzy inference, academic performance.

I. INTRODUCTION

Concern about materially deprived students from villages having poor academic performance in their school studies is an urgent need of any society. When we are considering the economical level of parents (/students), even if the parents are educated, students having lack of financial support affect their performance in the schools. Some students drop out of their studies. In this aspect, we analyze the reasons for the students performance in relation to their parents income by using fuzzy rule.

In this paper we discuss about this using the time dependent data matrix. Here the estimation of academic performance of the 75 students were taken from PURA(Providing Urban facilities to Rural Areas) villages in Pudukkottai and Thanjavur districts and finally project the Combined RTD matrix by graph.

II. DATA MATRIX

"A fuzzy matrix is a matrix with elements having values in the fuzzy interval". In this article, the unit interval [0, 1] and the interval [. 1, 1] are called fuzzy intervals [3].

In order to analyze the relation between Students Academic Performance(SAP) and their Parents Income(PI) year wise in the following manner. Initially, the raw data matrix was formed row wise taken as PI and column wise SAP to observe the patterns of students growth.

Table 1: Initial Raw data Matrix of order 4X4

SAP / PI /Month	Poor	Average	Good	Excellent
RP	10	8	11	15
RI	5	25	18	25
LP	25	10	15	5
LI	9	24	25	17

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Table 2: Average Time dependent matrix of order 4X4

SAP / PI/ Month	Poor	Average	Good	Excellent
RP	0.20	0.12	0.16	0.25
RI	0.10	0.37	0.26	0.42
LP	0.51	0.15	0.22	0.08
LI	0.18	0.36	0.36	0.85

Table 3: Average and Standard deviation of Table 2

AVG	0.2475	0.25	0.25	0.4
SD	0.180254	0.133417	0.084063	0.330555

R – Rich, P – Poor, L – Literal, I – Illiteral, AVG – Average, SD – Standard Deviation

The Refined Time Dependent (RTD) matrix was formed with the entries e_{ij} , where e_{ij} belongs to the set {-1, 0, 1} by using the following formula:

If $a_{ij} \le (\mu_j - \alpha * \sigma_j)$ then $e_{ij} = -1$

else if $a_{ij} \in (\mu_j - \alpha * \sigma_j , \mu_j + \alpha * \sigma_j)$ then $e_{ij} = -1$

else if $a_{ij} \ge (\mu_j + \alpha * \sigma_j)$ then $e_{ij} = 1$, where a_{ij} 's are entries of Average Time Dependent Matrix.

The kinds of RTD matrix can be formed by different values of $\alpha \in [0, 1]$. Some of the α values are taken into the matrices such as 0.25, 0.5 and 0.75.

Matrix I : $\alpha = 0.25$

$$\begin{bmatrix} -1 & -1 & -1 & 0 \\ -1 & 1 & 0 & 1 \\ 1 & -1 & -1 & -1 \\ -1 & 1 & 1 & 0 \end{bmatrix}$$

Row Sum

$$\begin{bmatrix} -3 \\ 1 \\ -2 \\ 1 \end{bmatrix}$$

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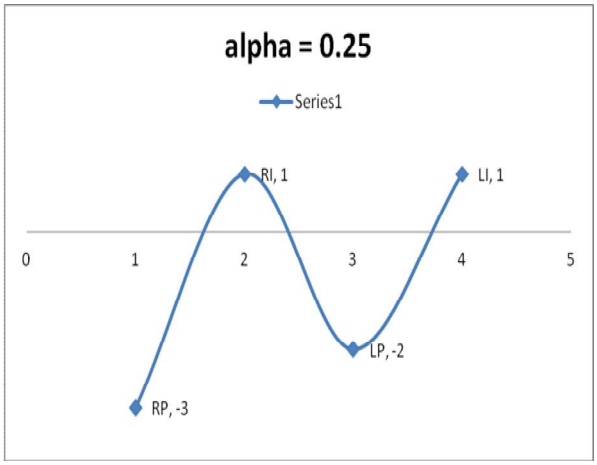
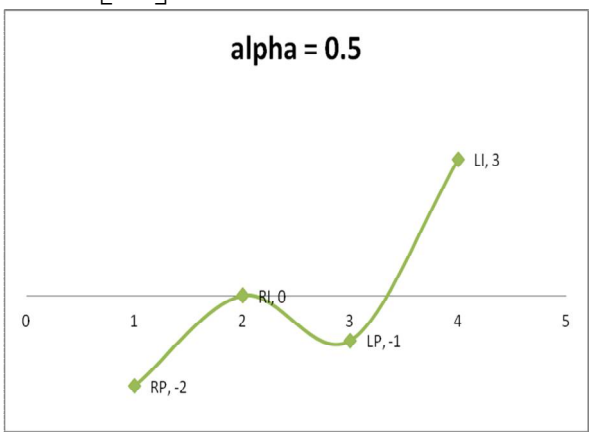


Matrix II : $\alpha = 0.5$

$$\begin{bmatrix} 0 & -1 & -1 & 0 \\ -1 & 1 & 0 & 0 \\ 1 & -1 & 0 & -1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$$

Row Sum

$$\begin{bmatrix} -2 \\ 0 \\ -1 \\ 3 \end{bmatrix}$$



Matrix III : $\alpha = 0.75$

$$\begin{bmatrix} 0 & -1 & -1 & 0 \\ -1 & 1 & 0 & 0 \\ 1 & 0 & 0 & -1 \\ 0 & 1 & 1 & 1 \end{bmatrix}$$

Row Sum

$$\begin{bmatrix} -2 \\ 0 \\ 0 \\ 3 \end{bmatrix}$$

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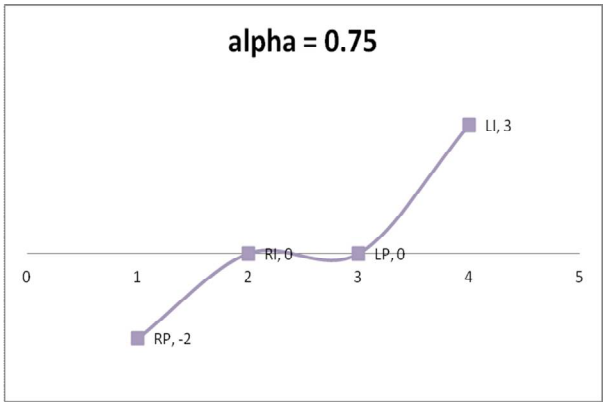
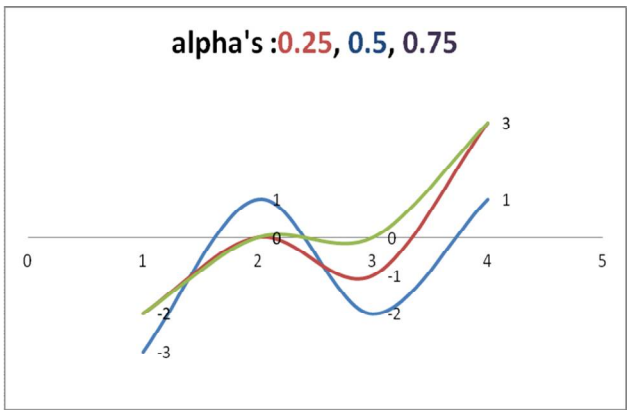


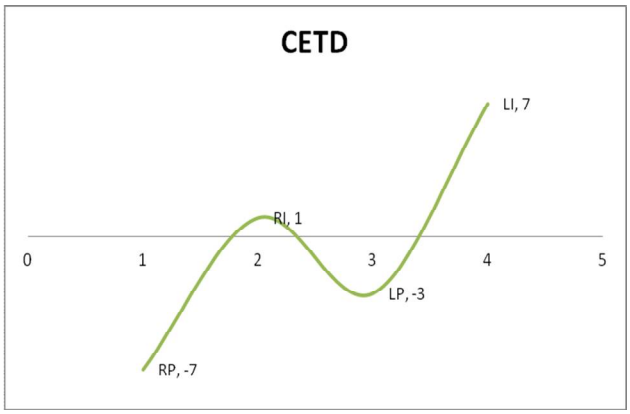
The Combined Effect Time dependent Data (CETD) Matrix

Row Sum

$$\begin{bmatrix} -1 & -3 & -3 & 0 \\ -3 & 3 & 0 & 1 \\ 3 & -2 & -1 & -3 \\ -1 & 3 & 3 & 2 \end{bmatrix} \qquad \begin{bmatrix} -7 \\ 1 \\ -3 \\ 7 \end{bmatrix}$$



Finally the CETD graph can be drawn by the above graph



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III. CONCLUSION

The graph shows the students performance related to their family income level and also it projects the measures to be taken among the children to overcome

1. By making awareness through the National Social Services.
2. Both Parents and Students should learn the government facilities like scholarship, etc.
3. Government and private sector school teachers should teach the importance of leadership to the students community.
4. Each and every panchayat board can help the students from low level income based families by getting fund from various organizations.

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