

Fuzzy Matrix Analysis of Students Information Gathering Attitude

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Abstract: Fuzzy matrices play an important role in the formulation and analysis of many classes of discrete structural models which are in physical, biological, medical, social and engineering sciences. The objective of this paper is to study the frequency of subject wise information gathering attitude of college students using fuzzy matrix technique.

Keywords: Knowledge management, Fuzzy matrix, CETD matrix, ATD matrix.

1. Introduction

Matrix theory was developed by W.B.Vasantha and V.Indira in the year 1998 to study the passenger transportation problem. They divided and defined four types of new matrices called Initial Raw Matrix, Average Time Dependent Data matrix (ATD), Refined Time Dependent Data matrix (RTD matrix) and Combined Effect Time Dependent Data matrix (CETD matrix) to study this problem. In the year 2003 the same technique was used by the first author to study the migrant labourers who were affected by HIV/AIDS. In 2004, W.B.Vasantha and A.Victor Devadoss used the technique to study the agriculture labourers. In 2001, S.Narayanamoorthy used this model to study the problem of silk weavers as bonded labourer and Dr.A.Kalaichelvi and S.Gnanamalar used to analyse the problems encountered by the coffee cultivators in kodai hills. Now we use the same model to study how frequently the college students are gathering information subject wise for their study.

2. Knowledge Management

Matrix theory was developed by W.B.Vasantha and V.Indira in the year 1998 to study the passenger transportation problem. They divided and defined four types of new matrices called Initial Raw Matrix, Average Time Dependent Data matrix (ATD), Refined Time Dependent Data matrix (RTD matrix) and Combined Effect Time Dependent Data matrix (CETD matrix) to study this problem. In the year 2003 the same technique was used by the first author to study the migrant labourers who were affected by HIV/AIDS. In 2004, W.B.Vasantha and A.Victor Devadoss used the technique to study the agriculture labourers. In 2001, S.Narayanamoorthy used this model to study the problem of silk weavers as bonded labourer and Dr.A.Kalaichelvi and S.Gnanamalar used to analyse the problems encountered by the coffee cultivators in kodai hills. Now we use the same model to study how frequently the college students are gathering information subject wise for their study.

2.1 Application of CETD Matrix

In order to study how frequently the college students are spending time for gathering subject wise information, a

linguistic questionnaire was given to them and the data was collected from both Arts and Science discipline students.

The student's information gathering attitude may be classified as;

- 1) Daily
- 2) In alternative days
- 3) Weekly once
- 4) Occasionally.

The above four attributes are taken as the rows of the matrix. Based on their discipline the respondents were grouped into two categories Arts and Science students. By taking the subject wise information gathering attitude of students as rows and the respondents of the two disciplines of the students are taken as columns, a 4×2 initial raw matrix called Time Dependent matrix (TD) was formed.

Table 1.1

Frequency/ Discipline	Arts students	Science students
Daily	105	183
Alternate days	39	39
Weekly once	20	22
Occasionally	21	15

The initial raw data matrix has been converted into the Average Time Dependent matrix (ATD) (a_{ij}) by dividing each entry with the total of the corresponding column.

Table 1.2

Frequency/ Discipline	Arts students	Science students
Daily	.57	.71
Alternate days	.21	.15
Weekly once	.10	.08
Occasionally	.11	.06

The average (μ_j) and standard deviation (σ_j) of every column were worked out as follows:

Average (μ_j)	.2475	.2475
Standard deviation (σ_j)	.1910988	.26768685

Using the average (μ_j), standard deviation (σ_j) and a parameter α from the interval $[0,1]$, a fuzzy matrix called the Refined Time Dependent matrix (RTD) was formed. The

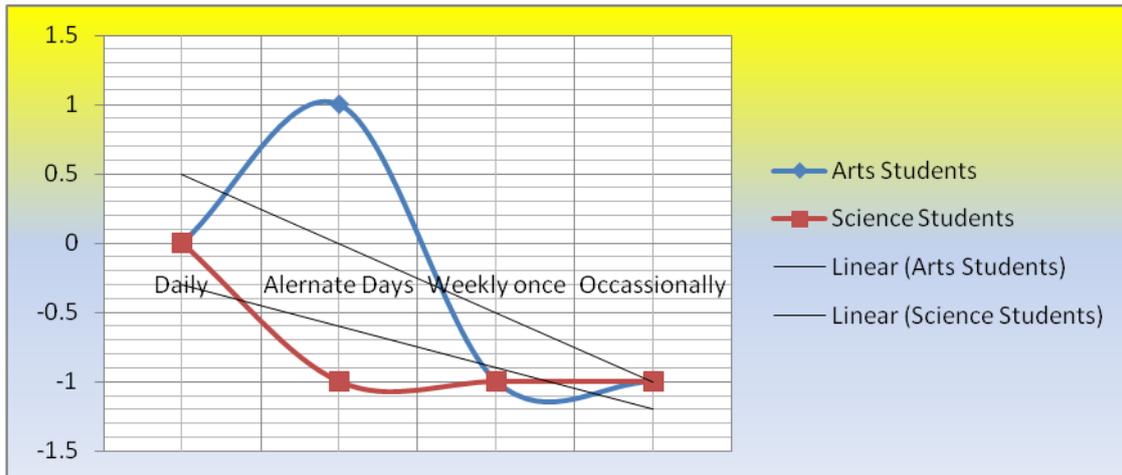
RTD matrix with entries e_{ij} , where $e_{ij} \in \{-1,0,1\}$ was formed using the formula,

$$\begin{pmatrix} 0 & 0 \\ 1 & -1 \\ -1 & -1 \\ -1 & -1 \end{pmatrix} \begin{pmatrix} 0 \\ 0 \\ -2 \\ -2 \end{pmatrix}$$

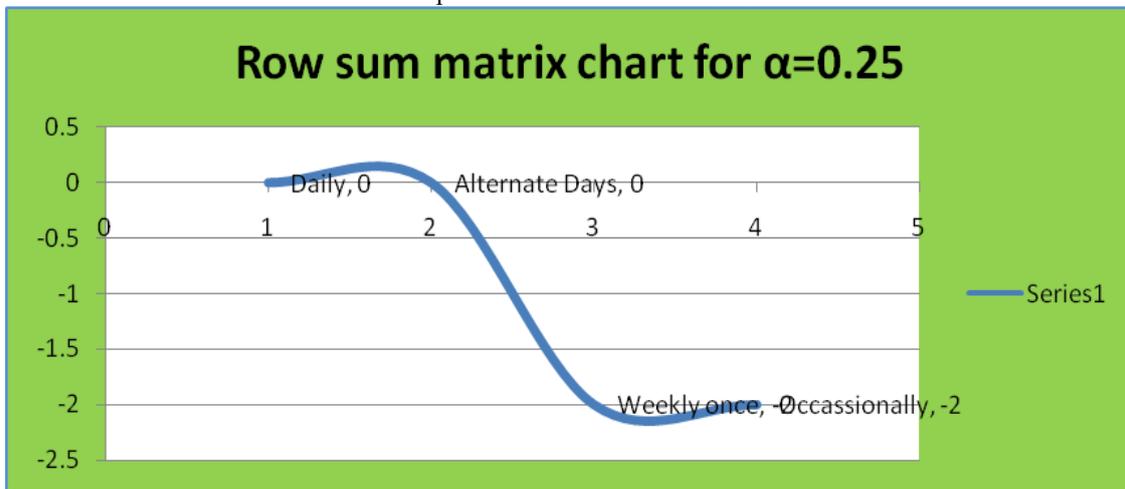
If $a_{ij} \leq \mu_j - \alpha \cdot \sigma_j$ then $e_{ij} = -1$
 else if $a_{ij} \notin \{\mu_j - \alpha \cdot \sigma_j, \mu_j + \alpha \cdot \sigma_j\}$ then $e_{ij} = 0$
 else if $a_{ij} \in \{\mu_j - \alpha \cdot \sigma_j, \mu_j + \alpha \cdot \sigma_j\}$ then $e_{ij} = 1$
 where a_{ij} 's are entries of Average Time Dependent matrix.

By varying the parameter $\sigma[0,1]$, any number of Refined Time Dependent Data matrices can be obtained. Three of such matrices obtained were as follows;

RTD Matrix for $\alpha = 0.25$
 Row Sum Matrix



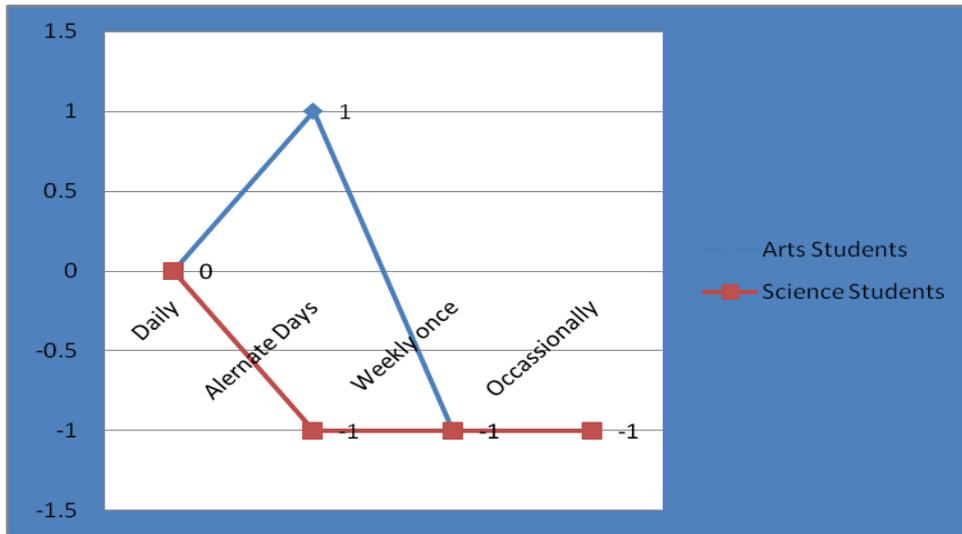
Graph of RTD matrix for $\alpha = 0.25$



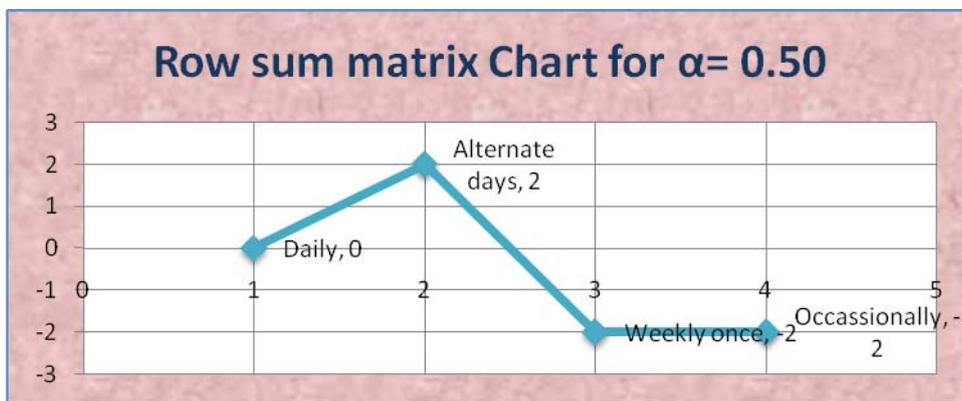
RTD Matrix for $\alpha = 0.50$

Row Sum Matrix

$$\begin{pmatrix} 0 & 0 \\ 1 & 1 \\ -1 & -1 \\ -1 & -1 \end{pmatrix} \begin{pmatrix} 0 \\ 2 \\ -2 \\ -2 \end{pmatrix}$$



Graph of RTD matrix for $\alpha = 0.50$

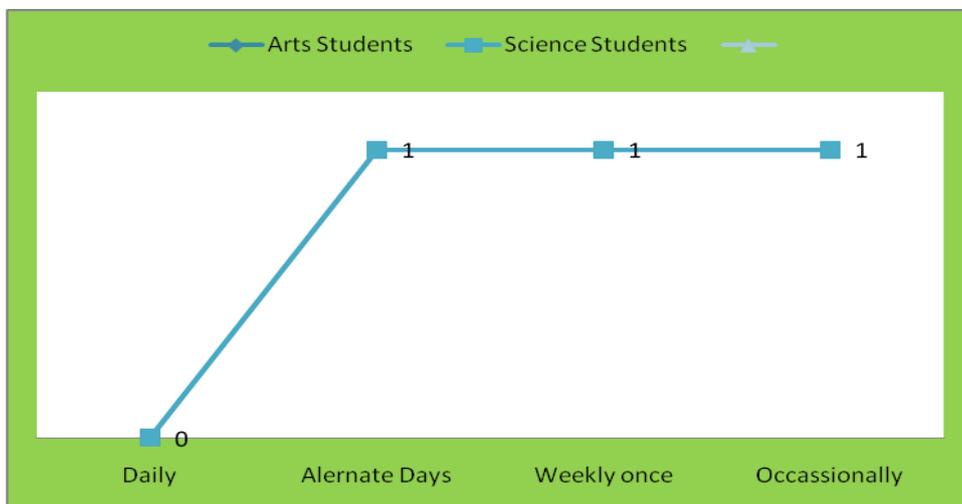


RTD Matrix for $\alpha = 0.75$

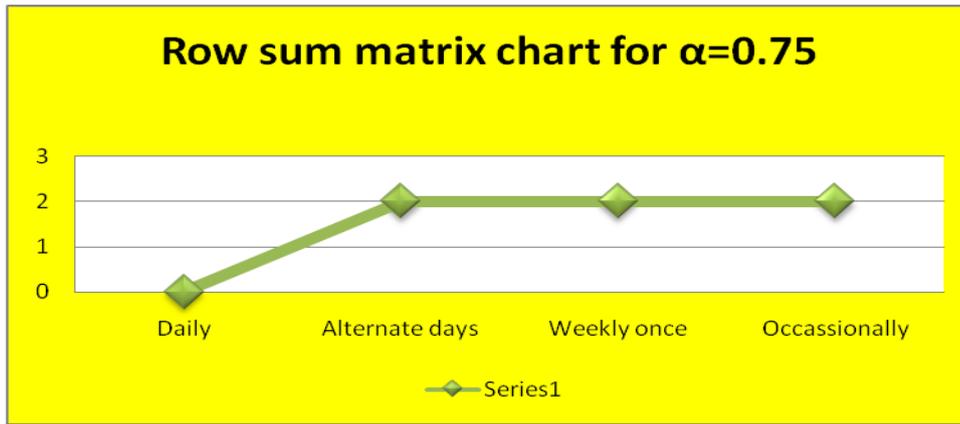
$$\begin{pmatrix} 0 & 0 \\ 1 & 1 \\ 1 & 1 \\ 1 & 1 \end{pmatrix}$$

Row Sum Matrix

$$\begin{pmatrix} 0 \\ 2 \\ 2 \\ 2 \end{pmatrix}$$

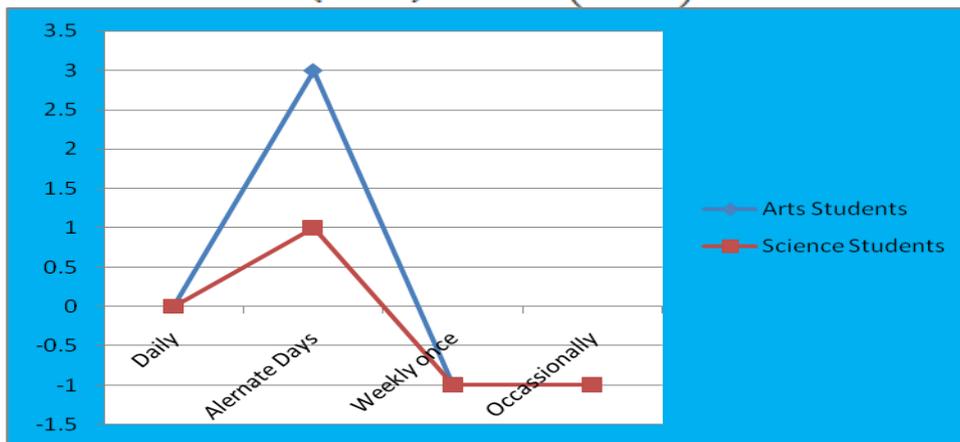


Graph of RTD matrix for $\alpha = 0.75$

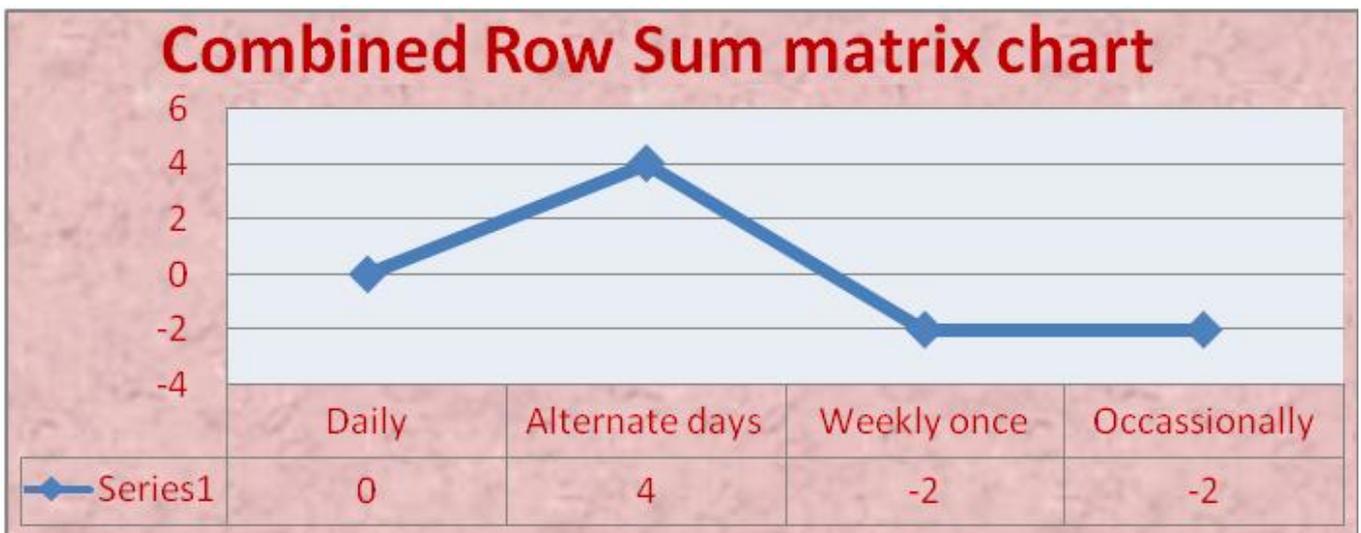


By combining all the three matrices, the Combined effect Time Dependent Data Matrix (CETD matrix), which gives the cumulative effect of all these entries, was obtained as follows;

CETD Matrix	Row Sum Matrix
$\begin{pmatrix} 0 & 0 \\ 3 & 1 \\ -1 & -1 \\ -1 & -1 \end{pmatrix}$	$\begin{pmatrix} 0 \\ 4 \\ -2 \\ -2 \end{pmatrix}$



Graph of CETD Matrix



3. Conclusion

The above discussion shows that for $\alpha = 0.25$ Arts students are spending time in alternative days for gathering information which will be useful for their study. The graph for $\alpha = 0.50$ shows that both disciplines of students are spending the same time for information gathering that is in alternative days only. From the graph of $\alpha=0.75$ also we infer that both discipline of students are collecting information in alternate days. Thus most of the students are spending time in alternative days only for gathering information subject wise for their study.

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