

# Estimation of Maximum Age Group of Old Age People affected by the Psychological Problems using CETD Matrix

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**Abstract:** Indian population is graying. An old person who can retard the aging process to some extent and reduce associated physical and psychological problems if he continues to be physically active and mentally alert. Knowing the maximum age at which they are going to suffer will help them a lot to overcome from their problems. The comprehensive study of this article is to find out the maximum age group of old age people affected by the psychological problem in Chennai using CETD matrix.

**Keywords:** ATD Matrix, RTD Matrix, CETD Matrix, Old age people, Old age home.

## 1.INTRODUCTION

In 1998, W.B.Vasanth and V.Indira developed the matrix theory to study the passenger transportation problem. To study this problem they defined four types of matrices called Initial Raw Data Matrix, Average Time Dependent Data matrix (ATD Matrix), Refined Time Dependent Data matrix (RTD Matrix) and Combined Effective Time Dependent Data (CETD) matrix. This paper is organized into four sections. The application of the CETD matrix was described in section 2. In section 3, the Psychological problems of the old age people were discussed. In section 4, the peak age group of old age people suffered by psychological problems was found out using CETD matrix. We derived the conclusion in the final section.

## 2.PRELIMINARIES

### 2.1 The method of application of CETD matrix.

We give a very simple but a very effective technique on the collected data.

#### 2.1.1 Average Time Dependent (ATD) matrix

Raw data transform it into a raw time dependent data matrix by taking along the rows the age group and along the columns psychological problems using the raw data matrix we make it into the Average Time Dependent Data (ATD) matrix ( $a_{ij}$ ) by dividing each entry of the raw data matrix by the number of years i.e., the time period. This matrix represents a data, which is totally uniform. At the third stage we find the average and Standard Deviation (S.D) of every column in the ATD matrix. Refined Time Dependent (RTD) matrix Using the average  $\mu_j$  of each  $j^{\text{th}}$  column and  $\sigma_j$  the S.D of the each  $j^{\text{th}}$  column we chose a parameter  $\alpha$  from the interval  $[0,1]$  and the Refined time dependent Matrix (RTD matrix), Using the formula

If  $a_{ij} \leq (\mu_j - \alpha * \sigma_j)$  then  $e_{ij} = -1$  else  
if  $a_{ij} \in (\mu_j - \alpha * \sigma_j, \mu_j + \alpha * \sigma_j)$  then  $e_{ij} = 0$  else  
if  $a_{ij} \geq (\mu_j + \alpha * \sigma_j)$  then  $e_{ij} = 1$

We redefine the ATD matrix into the refined time dependent fuzzy matrix for here the entries are -1, 0 or 1. Now the row sum of this matrix gives the maximum age group.

#### 2.1.2 Combined Effective Time Dependent Data (CETD) matrix

We also combine the above RTD matrices by varying the  $\alpha \in [0,1]$ , so that we get the Combined Effective Time Dependent Data (CETD) matrix. The row sum is obtained for CETD matrix and conclusions are derived based on the row sums. All these are represented by graphs and graphs play a vital role in exhibiting the data by the simplest means, which can be even understood by a layman.

### 2.1.3 Method of calculation of CETD matrix is as follows:

Step 1. Construct the raw data matrix by taking along the rows the age group and along the columns psychological problems of the old age people.

Step 2. Average Time Dependent (ATD) matrix

Transform the raw data into a raw time dependent data matrix( $a_{ij}$ ) by dividing each entry of the raw data matrix by the number of years. This matrix represents a data which is totally uniform.

Step 3. Average and Standard deviation(S.D)

Find the average( $\mu_j$ ) and Standard Deviation( $\sigma_j$ ) of every column in the ATD matrix.

Step 4. Refined Time Dependent (RTD) matrix

Using the average  $\mu_j$  of each  $j^{\text{th}}$  column and S.D  $\sigma_j$  of each  $j^{\text{th}}$  column, chose a parameter  $\alpha$  from the interval  $[0,1]$  and form the Refined Time Dependent Matrix(RTD matrix), using the formula

$$e_{ij} = \begin{cases} -1, & \text{if } a_{ij} \leq (\mu_j - (\alpha \times \sigma_j)) \\ 0, & \text{if } a_{ij} \in (\mu_j - (\alpha \times \sigma_j), (\mu_j + (\alpha \times \sigma_j))) \\ 1, & \text{if } a_{ij} \geq (\mu_j + (\alpha \times \sigma_j)) \end{cases}$$

Step 5. Obtain the row sum which gives the maximum age group.

Step 6. Obtained the Combined Effective Time Dependent Data(CETD) matrix.

Combine the above RTD matrices by varying the  $\alpha \in [0,1]$ , to get the CETD matrix.

Step 7. Obtain the row sum of the CETD matrix. Represent everything in graphs, since graphs play a vital role in exhibiting the data by the simplest means.

### 3. DESCRIPTION OF THE PROBLEM:

The survey was conducted in various old age homes in Chennai (Adambakkam, Chrompet, Mylapore & Mugalivakkam). We framed a linguistic questionnaire and administered the same to 150 old age people living under different difficult circumstances. Based on our interviews, the listed are the psychological problems suffered by the old age people:

A<sub>1</sub> – Depression

A<sub>2</sub> – Isolation

A<sub>3</sub> – Lack of reason to Live

A<sub>4</sub> – Fear

A<sub>5</sub> – Disrespect

We analyze these problems using fuzzy matrix, where the problems are taken as the columns of the initial raw data matrix and the age group in years 61 – 63, 64 – 70, 71 – 75, 76 – 80 are the rows of the matrix.

#### 3.1 Estimation of maximum age group of old age people affected by the psychological problems.

Table 1: Initial raw data matrix of order 4×6

	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>
61 – 63	8	6	2	4	8
64 – 70	20	22	10	25	18
71 – 75	12	11	10	6	7
76 – 80	6	10	12	8	9

Table 2: ATD matrix of order 4×6

	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	A <sub>4</sub>	A <sub>5</sub>
61 – 63	2	1.5	0.5	1	2
64 – 70	2.86	3.14	1.43	3.57	2.57
71 – 75	2.4	2.2	2	1.2	1.4
76 – 80	1.2	2	2.4	1.6	1.8

Table 3: Average and S.D of the above given ATD matrix

Average	2.12	2.21	1.58	1.84	1.94
S.D	0.7	0.69	0.82	1.18	0.49

RTD matrix for  $\alpha = 0.1$

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

row sum matrix

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

RTD matrix for  $\alpha = 0.3$

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

row sum matrix

$$\begin{bmatrix} -3 \\ 4 \\ 0 \\ -1 \end{bmatrix}$$

RTD matrix for  $\alpha = 0.5$

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

row sum matrix

$$\begin{bmatrix} -3 \\ 4 \\ -1 \\ 0 \end{bmatrix}$$

RTD matrix for  $\alpha = 0.7$

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

row sum matrix

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

RTD matrix for  $\alpha = 0.9$

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

row sum matrix

$$\begin{bmatrix} -1 \\ 4 \\ -1 \\ 0 \end{bmatrix}$$

Fig 1: Depicting maximum age group of old age people for  $\alpha = 0.1$

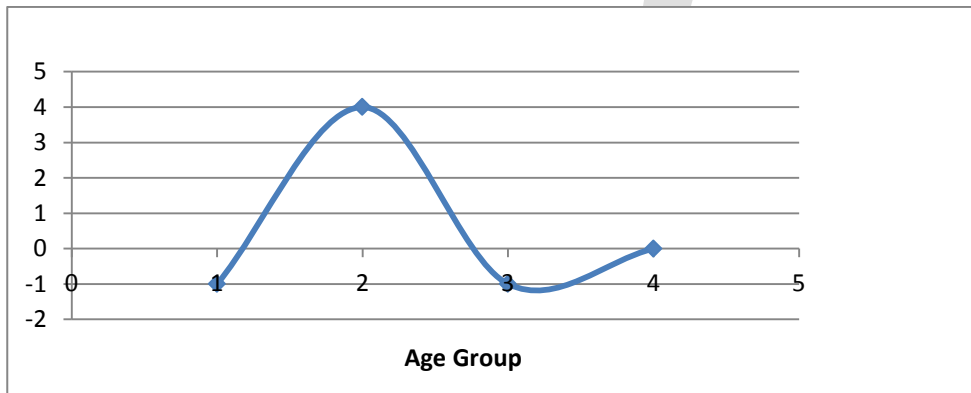


Fig 2: Depicting maximum age group of old age people for  $\alpha = 0.3$

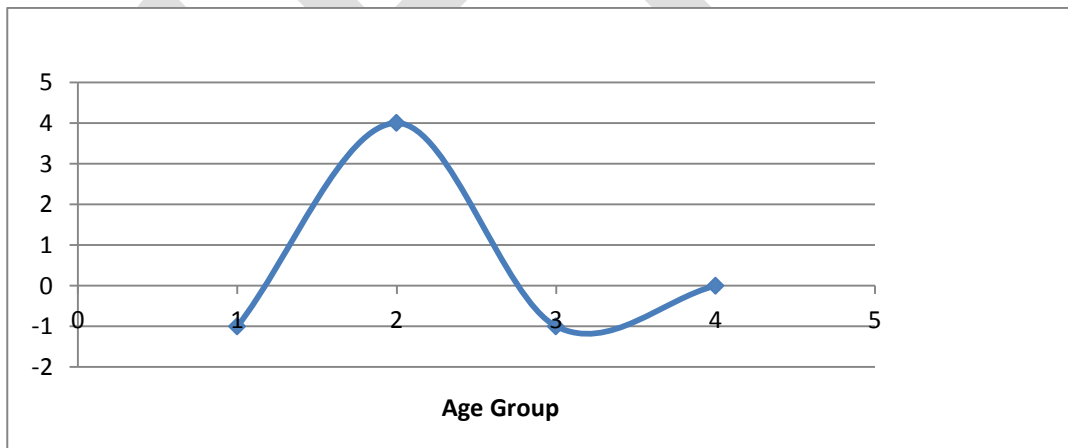


Fig 3: Depicting maximum age group of old age people for  $\alpha = 0.5$

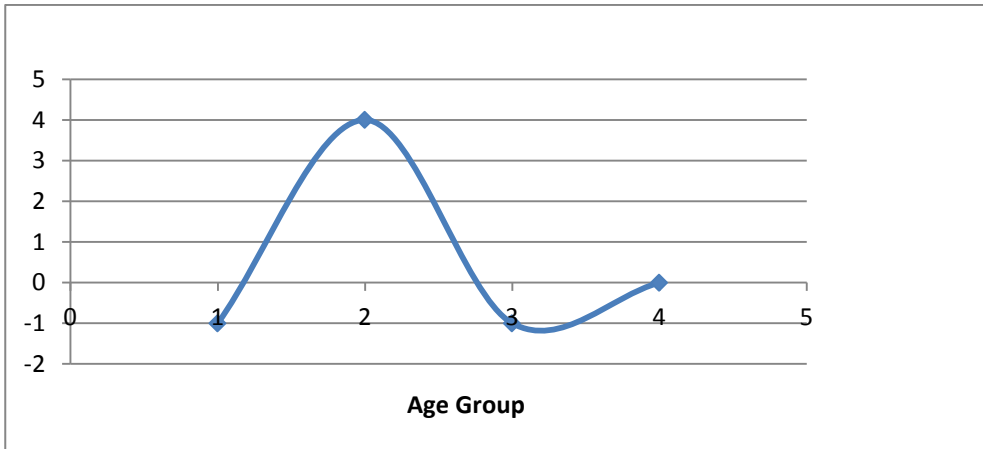


Fig 4: Depicting maximum age group of old age people for  $\alpha = 0.7$

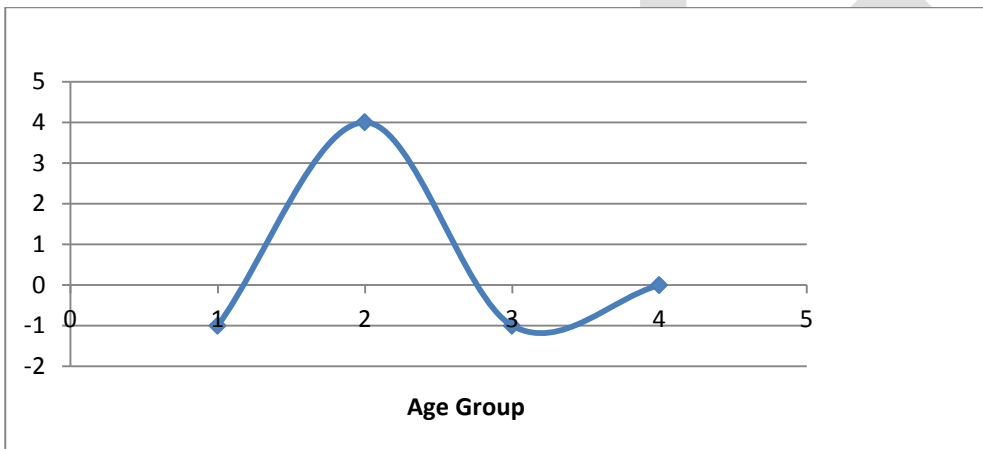
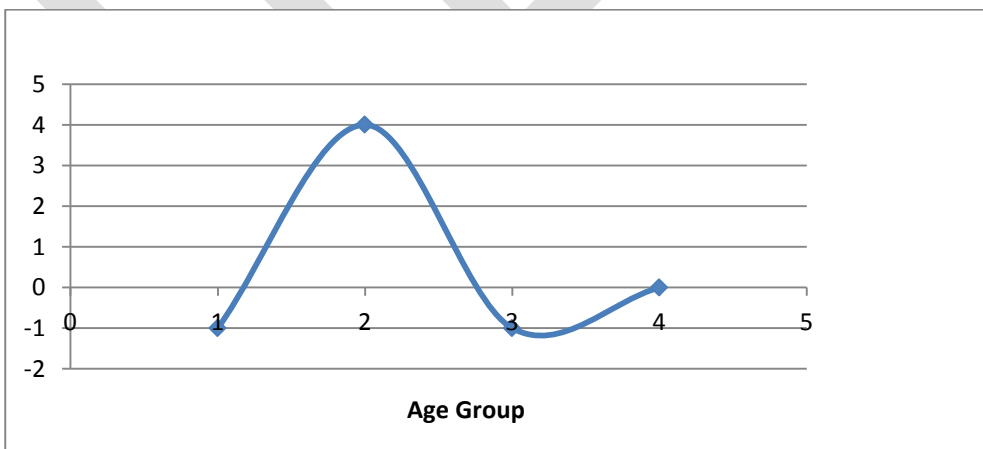


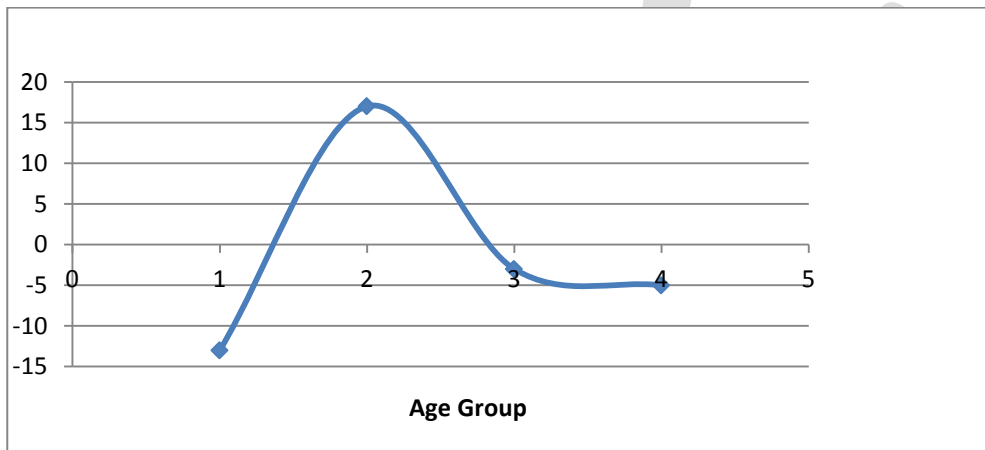
Fig 5: Depicting maximum age group of old age people for  $\alpha = 0.9$



The CETD matrix

$$\begin{bmatrix} -1 & -4 & -5 & -4 & 1 \\ 4 & 4 & -1 & 5 & 5 \\ 2 & 0 & 3 & -3 & -5 \\ -5 & -2 & 4 & -1 & -1 \end{bmatrix} \quad \begin{bmatrix} -13 \\ 17 \\ -3 \\ -5 \end{bmatrix}$$

Fig 6: Depicting maximum age group of old age people for CETD matrix



#### 4.CONCLUSION

From the above CETD matrix analysis we found that 64 -70 is the maximum age group affected by psychological problems. Old people get angst for petty issues, they feel isolated and get depression. After retirement they will manage some years, but during 64 – 70 they suffer a lot and they were in a confused state, to decide whether to go to an old age home or stay with their children. After this period they have a clear idea to decide about their life.

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