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Personality Index- An Analysis Using Combined Effect Quantity Matrix

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Abstract- **The notion of fuzzy set systems from the observation made by Zadeh (1965) [8] is that more often than in, the classes of objects encountered in the real physical world do not have precisely defined criteria of membership.In 1998,W.B.VasanthaKandsamy[7] cleared a pathway by establishing Fuzzy matrix which elements having values in the fuzzy interval. In this Paper We Used Initial Raw quantity Matrix(IRQ Matrix),Average Quantity Dependent Matrix(AQD matrix),Refined Quantity Dependent Matrix(RQD Matrix) and Combined Effect Quantity Dependent Matrix(CEQD Matrix) to know the best personality from the values of Personality Development Index proposed by Kaliappan and Karthikeyan (1997) [2]which was used to assess self awareness, self confidence, emotional adjustment and stress coping ability.**

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INTRODUCTION

Fuzzy set theory, which was first proposed by the researcher Zadeh (1965)[8], has become a very important tool to solve problems and it provides an appropriate framework for representing vague concepts by allowing partial membership. The different properties of the notions of union, intersection and its complement in the given context of fuzzy sets were established. This notion appears to be particularly useful in applications involving pattern classification and other related problems. Many complicated problems in Economics, Science, Engineering, technology, medical sciences, social sciences and many other fields involve uncertain data. All the problems cannot be solved using classical mathematical methods. In classical mathematics, a mathematical tool of an object is formulated and the notion of the accurate solution of this model is determined. Because of that, the mathematical model is very difficult and the exact solution cannot be found. To overcome these difficulties fuzzification is required.

A fuzzy matrix is a matrix with elements having values in the fuzzy interval. Fuzzy Matrix theory also plays a vital role in the field of Decision Making. Decision Making is a most important scientific, social and economic endeavor. In classical crisp decision making theories, decisions are made under conditions of certainty but in real life situations this is not possible which gives rise to fuzzy decision making theories. Applications of the theory of fuzzy matrices are of fundamental importance in the formulation and analysis of many classes of discrete structural models which arise in physical, biological, medical, social and engineering sciences.

In the year 1998 Fuzzy matrix theory was developed by W.B.Vasantha[7] and V.Indira to study the passenger transportation problem. To study this 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). The same technique was used by the first author to study the migrant laborers who were affected by HIV/AIDS in the year 2003. In 2004, W.B.Vasantha and A.Victor Devadoss used to study the agriculture laborers. In 2017, Dr.D.Radhika et.al[4,5] used fuzzy matrix in the field of aqua culture by choosing the appropriate feed, in which the uncertain information gathered by experimentally using Azolla microphyla as a feed to the fishes Cyprinus Carpio. The application of Fuzzy matrix to the prediction of biological values has been attempted previously in many cases of health care issues like cancer and also nutrition is investigated by R.Umarani and H.Lokman Sithic[3].

This paper devoted to know the best personality from the CEQD matrix values of Personality Development Index proposed by Kaliappan and Karthikeyan (1997) [2]which was used to assess self awareness, self confidence, emotional adjustment and stress coping ability.

2. BASIC CONCEPT OF FUZZY MATRIX THEORY:

We say [0,1] denotes the unit interval. We say $x \in [0,1]$ if $0 \leq x \leq 1$. We also call unit interval as a Fuzzy interval. We say [a,b] is a Fuzzy sub interval of the Fuzzy interval [0,1] if $0 \leq a \leq b \leq 1$: we denote this by [a,b] sub-section of [0,1]. We also use the convention of calling [-1,1] to be also a Fuzzy interval, $x \in [-1,1]$ if $-1 \leq x \leq 1$. Thus we have {x/ $x \in [0,1]$ i.e.$0 \leq x \leq 1$} is uncountable; hence [0,1] is a infinite set as [0,1] is an uncountable set. Let X be any universal set. The characteristic function maps elements of X to elements of the set to elements

of the set {0,1}, which is formally expressed by XA: X[0,1]. Set A is defined by its characteristics function XA.

Initial Raw Quantity Matrix (IRQ Matrix)
This matrix contains the values of given data.

Average Quantity Dependent Matrix (AQD Matrix)
Raw data is transformed into Initial raw quantity dependent data matrix by taking along the rows the experimental values of the chemical parameters and along the columns. We may it into the Average Quantity Dependent Data (AQD) matrix by dividing each entry of the raw data matrix by the percentage difference in given water chemicals. This matrix represents a data, which is totally uniform.

Refined Quantity Dependent Matrix (RQD Matrix)

Using the average μ_j and the standard deviation σ_j of each j^{th} column and by choosing a parameter α from the interval [0, 1]. We can form the Refined Quantity Dependent Matrix using the conditions,

If

$$\begin{cases} a_{ij} \le (\mu_i - \alpha*\sigma_j) & ; \quad e_{ij} = -1 \\ a_{ij} \in (\mu_i - \alpha*\sigma_j,\ \mu_i + \alpha*\sigma_j) & ; \quad e_{ij} = 0 \\ a_{ij} \ge (\mu_i - \alpha*\sigma_j) & ; \quad e_{ij} = 1, \end{cases}$$

Where e_{ij} 's are entries of Average Quantity Dependent Matrix. This matrix is also at times turned as a the Fuzzy Matrix as the entries 1, 0 & -1

Combined Effect Quantity Matrix (CEQD Matrix)
It is the matrix whose entries are the cumulative values of the corresponding entries of the RQD Fuzzy matrix for different values of α choses in [0, 1].

3. METHODOLOGY - FUZZY MATRIX MODEL:

This is a five stage process. In first stage, the raw data of the problem at hand is converted or transformed into a Average Quantity dependent Matrix [AQD Matrix]. In the second stage, after obtaining the Average Quantity dependent Matrix, next have to find Average and Standard Deviation.

In the third stage, using the Average Technique, to convert the AQD Matrix into a Fuzzy Matrix with entries eij , where eij ∈ {-1,0,1}. We call this matrix as the Fuzzy Matrix or Refined quantity data matrix (RQD-Matrix). At the same time we calculate Row sum matrix for RQD Matrices.

At the fourth stage, we get the Combined Effect Quantity Dependent Data Matrix (CEQD-Matrix), which was the cumulative effect of the all these entries of RQD Matrices.

In the Final stage we obtain the Row sum of the CEQD Matrix along the Y-axis and time scale along X-axis. These graphs are understandable even by a simple man. Hence this method is very effective.

4. RESULT AND DISCUSSION:

Personality Development Index(PDI) was especially developed to measure the 10 dynamic areas of personality. They are:

- P1 - Social Concern, P2 - Emotional Adjustment,P3 - Assertiveness, P4 - Value and Culture
- P5 - Leadership,P6 - Communication,P7 - Self-awareness, P8 - Self-confidence
- P9 - Interpersonal Relationship,P10 - Stress Coping Ability

Table 1: Raw Data Matrix

S.No.	Subject	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	A.M.G	72	69	76	63	70	90	60	80	74	93
2	S.J	71	59	76	80	77	87	73	80	83	95
3	C.S.K	49	73	68	65	63	43	70	53	68	49
4	T.T	63	76	58	65	73	60	73	71	62	63
5	R.T.S.N	69	69	76	54	66	76	70	76	71	83
6	R.L	68	71	78	80	73	90	73	80	80	82
7	J.S	66	74	68	51	70	77	63	80	74	71
8	A.F	52	63	76	54	66	73	73	80	80	76
9	G.S	75	71	86	86	80	80	83	80	83	80
10	S.K.M	60	60	74	80	67	83	87	70	77	87

AQD Matrix:
We divide the entries of the Initial Raw Data Matrix (IRQ Matrix) by its maximum values.

Stage 1: In this stage in order to obtain an unbiased uniform effect on each and every data so collected we transform this initial Matrix into an Average Quantity dependent Data Matrix (AQD-Matrix).

To convert AQD Matrix, Every row of the raw data matrix is divided by 100.

AQD data matrix

S.No.	Subject	P1	P2	P3	P4	P5	P6	P7	P8	P9	P10
1	A.M.G	0.72	0.69	0.76	0.63	0.70	0.90	0.60	0.80	0.74	0.93
2	S.J	0.71	0.59	0.76	0.80	0.77	0.87	0.73	0.80	0.83	0.95
3	C.S.K	0.49	0.73	0.68	0.65	0.63	0.43	0.70	0.53	0.68	0.49
4	T.T	0.63	0.76	0.58	0.65	0.73	0.60	0.73	0.71	0.62	0.63
5	R.T.S.N	0.69	0.69	0.76	0.54	0.66	0.76	0.70	0.76	0.71	0.83
6	R.L	0.68	0.71	0.78	0.80	0.73	0.90	0.73	0.80	0.80	0.82
7	J.S	0.66	0.74	0.68	0.51	0.70	0.77	0.63	0.80	0.74	0.71
8	A.F	0.52	0.63	0.76	0.54	0.66	0.73	0.73	0.80	0.80	0.76
9	G.S	0.75	0.71	0.86	0.86	0.80	0.80	0.83	0.80	0.83	0.80
10	S.K.M	0.60	0.60	0.74	0.80	0.67	0.83	0.87	0.70	0.77	0.87

Stage 2: Now we have to find the Average and Standard Deviation of the above AQD Matrix of each column.

Average	0.645	0.685	0.736	0.678	0.705	0.759	0.725	0.75	0.752	0.779
Standard Deviation	0.085797	0.058926	0.074714	0.128219	0.053177	0.146549	0.080312	0.086667	0.068118	0.139797

Stage 3: At the third stage, the Average or Mean and the Standard Deviation(SD) of every column in the AQD Matrix are determined using the average of μj of each jth column and σj , the SD of each jth column , a parameter α from the interval [0,1] is chosen and the Refined Quantity dependent Data Matrix (RQD-Matrix) formed . Calculate RQD Fuzzy Matrix for different α- values that is randomly chosen between [0,1] based on the values Average and Standard Deviation tables and also Row Sum Matrix. i.e. sum the row values of the founded Fuzzy Matrices.

RQD 1 or Fuzzy 1 (i.e.) α = 0.25 (randomly chosen based on the average and SD values)

RQD 1 Matrix for α = 0.25 Row sum matrix

1 0 1 -1 0 1 -1 1 0 1	3
1 -1 1 1 1 1 0 1 1 1	7
-1 1 -1 -1 -1 -1 -1 -1 -1 -1	-8
0 1 -1 -1 1 -1 0 -1 -1 -1	-4
1 0 1 -1 -1 0 -1 0 -1 1	-1
1 1 1 1 1 1 0 1 1 1	9
0 1 -1 -1 0 0 -1 1 0 -1	-2
-1 -1 1 -1 -1 1 0 0 1 0	-1
1 1 1 1 1 1 1 1 1 0	9
-1 -1 0 1 -1 1 1 -1 1 1	1

RQD 2 Matrix for α = 0.50 Row sum matrix

1 0 0 0 0 1 -1 1 0 1	3
1 -1 0 1 1 1 0 1 1 1	6
-1 1 -1 0 -1 -1 0 -1 -1 -1	-6
0 1 -1 0 1 -1 0 -1 -1 -1	-3
1 0 0 -1 -1 0 0 0 -1 0	-2
0 1 1 1 1 1 0 1 1 0	7
0 1 -1 -1 0 0 -1 1 0 -1	-2
-1 -1 0 -1 -1 0 0 1 1 0	-2
1 1 1 1 1 0 1 1 1 0	8
-1 -1 0 1 -1 1 1 -1 0 1	0

RQD 3 Matrix for α = 0.75 Row sum matrix

1 0 0 0 0 1 -1 0 0 1	2
1 -1 0 1 1 1 0 0 1 1	5
-1 1 -1 0 -1 -1 0 -1 -1 -1	-6
0 1 -1 0 0 -1 0 0 -1 -1	-3
0 0 0 -1 -1 0 0 0 0 0	-2
0 0 0 1 0 1 0 0 1 0	3
0 1 -1 -1 0 0 -1 0 0 0	-2
-1 -1 0 -1 -1 0 0 0 1 0	-3
1 0 1 1 1 0 1 0 1 0	6
0 -1 0 1 -1 0 1 0 0 0	0

The α- values is different for every Fuzzy Matrix but the Average i.e μj and SD value of σj is same for all Fuzzies.

Stage 5:

At the final stage using Fuzzies obtained Combined Effect Quantity dependent Data Matrix (CEQD-Matrix) which gives the Cumulative effect of all these entries. i.e. we have to add the above different α- values Fuzzies together. This gives the following CEQD-Matrix and also CEQD Row Matrix.

CEQD Matrix Row sum matrix

3 0 1 -1 0 3 -3 2 0 3	8
3 -3 1 3 3 3 0 2 3 3	18
-3 3 -3 -1 -3 -3 -1 -3 -3 -3	-20
0 3 -3 -1 2 -3 0 -2 -3 -3	-10
2 0 1 -3 -3 0 -1 0 -2 1	-5
1 2 2 3 2 3 0 2 3 1	19
0 3 -3 -3 0 0 -3 2 0 -2	-6
-3 -3 1 -3 -3 0 0 2 3 0	-6
3 2 3 3 3 1 3 2 3 0	23
-2 -3 0 3 -3 2 3 -2 1 2	1

The AQD Matrix, Average and SD, Fuzzy or RQD Matrices, CEQD-Matrix and Row Sum Matrices are all obtained. Next the chart has been drawn using the above matrix values. The plot of graphical charts displays between the Personality Index and the Row matrices of Fuzzies of different α-values.

Comparison Chart for RQD Matrix:

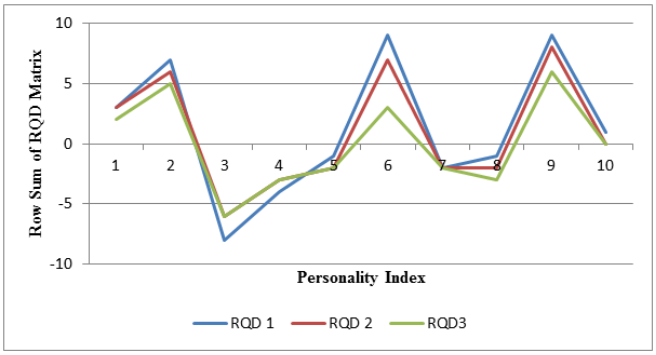

Fig.1. Depicting maximum personality index with RQD row sum matrix

Comparison Chart for CEQD Matrix:

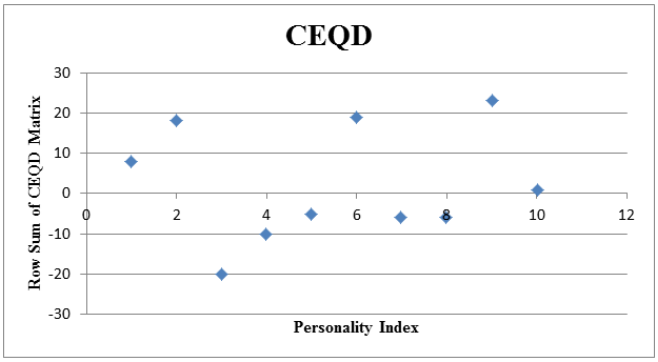

Fig.2. Depicting maximum personality index with CEQD row sum matrix

5. CONCLUSION:

From the CEQD Matrix values we conclude that Subject G.S has the stable personality development index in all criteria.

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