

# FUZZY MODEL FOR THE KNOWLEDGE GATHERING ATTITUDE OF RESEARCHERS

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**Abstract :** A fuzzy matrix is a matrix with elements having values in the fuzzy interval. 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 this paper we propose a model to study how frequently the research scholars of some universities of Uttar Pradesh visiting libraries for their research work.

**Keywords:** Fuzzy Logic, Knowledge Management, TD matrix, CETD Matrix

## 1. INTRODUCTION

Fuzzy logic refers to a logical system that generalizes the classic dual logic to reason under uncertainty. Fuzzy logic is used in computer system. It is approximate reasoning based on the collection of theories and technologies that use fuzzy sets, these are classes of objects without sharp boundaries where membership is a matter of degree.

Fuzzy logic can be utilized in two diverse manner. The first way is close view, because it is based on multivalent logic, focuses on approximate reasoning. Even though, fuzzy logic is based on multivalent logic, it has some contradiction with conventional multivalent logic system, e.g. Lukasiewicz's logic. Likewise, the conceptions that made fuzzy logic effectual in the approximate reasoning are also not the customary system with multiple values. These are linguistic variable, canonical form, fuzzy rule, fuzzy graph and fuzzy quantifiers.

The second way is broad view, which is almost equivalent to fuzzy set theory. In this sense, fuzzy logic serves chiefly as a device for fuzzy control, analysis of vagueness in natural language and various other application domains.

The purpose of this article is to study the frequency of research scientists at a number of Uttar Pradesh universities.

## 2. LITERATURE REVIEW

In the year 2000 matrix theory was developed by W.B. Vasantha and V. Indira [5] to study the predicament of passenger transport. To study this hitch, they alienated and delineated four types of novel matrices called Initial Raw Matrix, Average Time Dependent Data Matrix (ATD), Combined Effect Time Dependent Data Matrix (CETD). matrix) and Refined Time Dependent Data Matrix (RTD Matrix),.

In 2004 W.B. Vasantha and A. Victor Devadoss [3] done a study on agricultural workers. In 2012, S.Narayanamoorthy used this model to study silk weavers as bonded laborer and Dr. A.Kalaichelvi & S.Gnanamalar [4] analyzed the trouble encountered by coffee growers in the hills of Kodai.

## 3. KNOWLEDGE MANAGEMENT

Knowledge management is the explicit and systematic management of vital knowledge and its associated processes of creation, organization, diffusion, use and exploitation. Identification of knowledge as a recognized field of principal investigation for business use, in addition to academic research, has spurred continuing demand for information system.

Knowledge is the complete deployment of information as well as data, coupled with the potential of people's skills, ideas, competences, intuitions, commitments and motivations.

Knowledge is stored in the individual brain or encoded in organizational processes, documents, products, services, facilities and systems. Knowledge is the basis for, and the driver of the current global economy.

To study the knowledge gathering attitude of research scholars, a survey is carried out in some universities of Uttar Pradesh. The data was gathered from around 400 research scholars from three universities namely Dr. A.P.J. Abdul Kalam Technical University, Lucknow, Integral University, Lucknow and Babu Banarasi Das University, Lucknow. The data was gathered by using linguistic questionnaire and this was transformed into a fuzzy data.

**3. APPLICATION OF COMBINED EFFECT TIME DEPENDENT DATA (CETD) MATRIX**

In order to study how many hours research scholars spend time in library per week, a linguistic questionnaire was given to research scholars and the data was collected from three universities of Uttar Pradesh.

The time spent by the research scholars are classified as

- 1. Less than 5 hours
- 2. 5-10 hours
- 3. 10-15 hours
- 4. 15-20 hours

The above attributes are taken as the rows of the matrix. Based on their universities the respondents were grouped into three categories Dr. A.P.J. Abdul Kalam Technical University, Lucknow, Integral University, Lucknow and Babu Banarasi Das University, Lucknow.

By taking the time spent by the research scholars as rows and the respondents of the scholars of the three universities are taken as columns, a 4x3 initial raw matrix called Time Dependent Matrix (TD matrix) was formed.

The initial raw data matrix has been converted into the Average Time Dependent Matrix (ATD) (a<sub>ij</sub>) by dividing each entry with the width of the respective class interval.

Table 1: ATD Matrix

Hours/week	AKT U	IU	BBDU
0-5	2.8	5.6	8.8
5-10	3.8	5.2	6.4
10-15	3	2	1.8
15-20	3.2	3.2	4

The average ( $\mu_j$ ) and standard deviation ( $\sigma_j$ ) of every column were worked out as follows:

Table 2: Average and standard deviation

Average ( $\mu_j$ )	2.133	2.67	3.4
Standard deviation ( $\sigma_j$ )	.8845	1.886	3.111

Using the average, standard deviation and a parameter from the interval [0, 1], a fuzzy matrix called the Refined Time Dependent matrix (RTD) was formed. The Refined Time Dependent matrix with entries e<sub>ij</sub>, where e<sub>ij</sub> belongs to {-1,0,1}, was produced using the following formula:

If  $a_{ij} < (\mu_j - \alpha * \sigma_j)$  then e<sub>ij</sub>=-1

Else if  $a_{ij} \in (\mu_j - \alpha * \sigma_j, \mu_j + \alpha * \sigma_j)$  then e<sub>ij</sub>=0

Else if  $a_{ij} \in (\mu_j + \alpha * \sigma_j, \mu_j + \alpha * \sigma_j)$  then e<sub>ij</sub>=1

Where a<sub>ij</sub>'s are entries of Average Time Dependent Matrix.

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

RTD Matrix for " = 0.25      Row Sum Matrix

$$\begin{bmatrix} -1 & 1 & 1 \\ 1 & 1 & 1 \\ -1 & -1 & 0 \\ -1 & -1 & 0 \end{bmatrix} \quad \begin{bmatrix} 1 \\ 2 \\ -2 \\ -2 \end{bmatrix}$$

RTD Matrix for " $\alpha = .50$       Row Sum Matrix

$$\begin{bmatrix} -1 & 1 & 1 \\ 1 & 1 & 1 \\ -1 & -1 & -1 \\ 0 & -1 & 1 \end{bmatrix} \quad \begin{bmatrix} 1 \\ 3 \\ -3 \\ 0 \end{bmatrix}$$

RTD Matrix for " $\alpha = .75$       Row sum Matrix

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

By combining all these 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

$$\begin{bmatrix} -3 & 3 & 3 \\ 3 & 3 & 3 \\ -2 & -3 & -2 \\ -1 & -2 & 1 \end{bmatrix} \quad \begin{bmatrix} 6 \\ 10 \\ -7 \\ -2 \end{bmatrix}$$

#### 4. COMPUTATION RESULTS

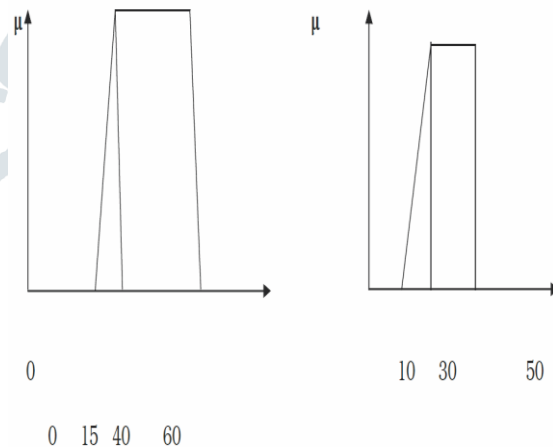
From the above fuzzy matrix analysis, it is observed that the maximum number of hours the research scholars spending time in library has not changed with the change in the value of the parameter from 0 to 1. The mathematical inference is that most of the research scholars spending 5-10 hours time in library per week. The combined Effect Time Dependent data matrix also confirms the same result. The analysis also reveals that the research scholars visit to library is negative for 10-15 hours per week. It shows the lack of interest of them to visit library because of the modernization of information gathering e-resources. So they can easily get required information from internet and other available e-resources.

#### 5 DECISION MAKING IN A FUZZY

#### ENVIRONMENT

Decision making is a process of problem solving which results in an action. It is a choice between various ways of getting an end accomplished. Decision making plays an important role in business, finance, management, economics, social and political science, engineering and computer science, biology and medicine. It is a complex process due to factors like imperfect and inaccurate information, subjectivity, linguistics which tend to be presented in real-life situations to lesser or greater degree. These factors indicate that a decision-making process takes place in a fuzzy environment. According to Bellman-Zadeh[8] approach, decision making is defined as intersection of goals and constraints described by fuzzy sets. This method of Evaluation of Learning Performance is used in this section to find out whether arts scholars or science scholars using internet highly for which purpose.

In order to study the purpose of internet usage of research scholars, a linguistic questionnaire was given to research scholars and the data was collected from three universities of Uttar Pradesh. The data was collected from both Arts and Science scholars. Highly is a linguistic label described separately for Arts (HA) and Science (HS) scholars in below figure correspondingly, using part of trapezoidal numbers on the universe [0, 65] of scores.



The trapezoidal fuzzy number A is defined on R by

$$\mu_A(x) = \begin{cases} \frac{x-a_1}{b_1-a_1} & \text{for } a_1 \leq x \leq b_1 \\ 1 & \text{for } b_1 \leq x \leq b_2 \\ \frac{x-a_2}{b_2-a_2} & \text{for } b_2 \leq x \leq a_2 \\ 0 & \text{otherwise} \end{cases}$$

Using the above formula, the membership function for Arts scholars is defined as

$$\mu_A(x) = \begin{cases} 0 & \text{for } 0 \leq x \leq 10 \\ \frac{x-10}{20} & \text{for } 10 \leq x \leq 30 \\ 1 & \text{for } 30 \leq x \leq 50 \end{cases}$$

The membership function for science scholars is

$$\mu_S(x) = \begin{cases} 0 & \text{for } 0 \leq x \leq 15 \\ \frac{x-15}{25} & \text{for } 15 \leq x \leq 40 \\ 1 & \text{for } 40 \leq x \leq 65 \end{cases}$$

The 22 number of research scholars using internet for the purpose of entertainment in Arts branch has grade of membership .6 while the same number of scores in Science category has grade of membership of only .28.

Six alternatives are taken as the purpose of using internet denoted as a1, a2, a3, a4, a5, a6, where a1 = For education, a2 = Project, a3 = Communication, a4 = To update subject knowledge, a5 = To collect review of literature. The students' responses are presented in the table below.

Table 3: Responses of Arts and Science scholars

S.No	Purpose	Arts	Science
1.	Education	23	25
2.	Project	40	60
3.	Communication	19	29
4.	To collect Review of Literature	14	25
5.	To update subject knowledge	15	22
6.	Entertainment	22	8

The set of alternatives is A alt = {a1, a2, a3, a4, a5, a6}.

Substituting the research scholars' response scores in  $\mu_A(x)$  and  $\mu_S(x)$  gives the degrees of membership values corresponding to their scores.

They are shown in the following table:

Table 4: Scholars' degrees of response

S.No	Purpose	Arts	Science
1.	Education (a1)	.65	.4
2.	Project(a2)	1	1
3.	Communication(a3)	.45	.56
4.	To collect Review of Literature(a4)	.2	.4
5.	To update subject knowledge(a5)	.25	.28
6.	Entertainment(a6)	.6	0

The degrees of response, attached to each alternative, produce the fuzzy sets of response in Arts and Science branch which form the objectives or aspects of the problem.

No.2, pp. 89- 98, 2012.

Highly using internet in Arts =  $G_1 =$  $\{(a_1,.65),(a_2,1),(a_3,.45),(a_4,.6),(a_5,.25),(a_6,.2)\},$ High usage of internet in Science =  $G =$  $\{(a_1,.4),(a_2,1),(a_3,.56),(a_4,.6),(a_5,.28),(a_6,.4)\}.$ F or decision making models with n goals  $G_i$ ,  $i = 1, 2, \dots, n$  and m constraints  $C_j$ ,  $j = 1, 2, \dots, m$ , thedecision is  $D = G_1 \cap G_2 \cap G_3 \cap \dots \cap G_n \cap C_1$  $\cap \dots \cap C_m$ . Using the above formula  $D = G_1 \cap$  $G_2 = \{(a_1,.65), (a_2,1),(a_3,.56), (a_4,.6),(a_5,.28),(a_6,.4)\}.$ 

Hence the conclusion is a<sub>2</sub>, hat is both Arts and Science research scholars using internet mainly for the purpose of preparing project only. It is also inferred that both of them are using internet maximum for education related purpose only.

## 6. CONCLUSION

Fuzzy matrices play an important role in designing fuzzy models that are developed for the purpose of solving social, economical problems and real life problems. This paper designs a fuzzy model for finding the knowledge gathering attitude of researcher scholars. A graphical representation of numerical results shows the clear view of the result. This model can be used to measure any type of psychometric domain in future. Further research in this field will give fruitful results. So far many researchers have used the fuzzy model, "Evaluation of learning performance", to determine the efficiency of a teacher, student or any institution. Based on this model, the purpose of using internet by research scholars were analyzed by defining separate membership values for Arts and Science scholars.

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