A STUDY ON APPLICATION OF FUZZY ON REAL LIFE

Submitted by,

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What is fuzzy

“Fuzzy” is a term used to describe something that is not clear or well defined ,often characterized by a lack of sharp boundaries or distinct categories. It can refer to a variety of concepts , such as fuzzy logic that allows for degrees of truth rather than just true or false , or it can be used in everyday language to describe something that it unclear or imprecise. Fuzziness is often associated with uncertainty and vagueness.

Why only fuzzy

Fuzzy logic is well suited handling situations where the input data or conditions are not crisp and well-defined. It allows for the modeling of uncertainty and vagueness, making it effective in systems with uncertain variables.

METHOD OF OBTAINING IRDM

- By converting raw data into matrix

ATDM

-Through dividing each irdm entry by the length of the respective category intervals

RTDM

-Using mean and standard deviation

CETDM

-By combining RTDMS for values of $\alpha, 0 \leq \alpha \leq 1$

Social attributes causing divorce cases

- **AT_1- Extra Marital Relations:**
- **AT_2- Husband Unemployment**
- **AT_3- Lack of Communication**
- **AT_4- Arguing and Abusing**
- **AT_5-Quixotic Expectations**
- **AT_6- Couple without Kids**
- **AT_7- Lack of Affinity**
- **AT_8- Lack of Equality**
- **AT_9- Different Interests and Priorities**
- **AT_{10}- Inability to Resolve Conflicts**

Number of women responds based on their age groups

Age -Group	Number of Respondent
18-22	22
23-27	22
28-32	22
33-37	22
38-42	11
43-47	11
	110

IRDM of divorced women of the order 6 x 10

Age-Group	AT_1	AT_2	AT_3	AT_4	AT_5	AT_6	AT_7	AT_8	AT_9	AT_{10}
18-22	22	8	9	6	7	8	8	11	16	19
23-27	22	10	16	14	15	16	11	16	17	20
28-32	22	11	19	15	20	17	12	18	18	22
33-37	22	8	13	9	15	12	11	17	18	20
38-42	11	3	7	4	7	4	4	7	6	8
43-47	11	2	4	3	6	2	4	7	6	7

Age-Group	AT_1	AT_2	AT_3	AT_4	AT_5	AT_6	AT_7	AT_8	AT_9	AT_{10}
18-22	4.2	1.6	1.8	1.2	1.4	1.6	1.6	2.2	3.2	3.8
23-27	4.2	2.0	3.2	2.82.	3.0	3.2	2.2	3.2	3.4	4.0
28-32	4.2	2.2	3.8	3.0	4.0	3.4	2.4	3.6	3.6	4.4
33-37	4.2	1.6	2.6	1.8	3.0	2.4	2.2	3.4	3.6	4.0
38-42	2.2	0.6	1.4	0.8	1.4	O.8	0.8	1.4	1.2	1.6
43-47	2.2	0.4	0.8	0.6	1.2	0.4	0.8	1.4	1.2	1.4

Mean and Standard Deviation of the above average time dependent data matrix

Mean	3.53	1.4	2.26	1.7	2.33	1.96	1.66	2.53	2.7	3.2
Standard deviation	1.03	0.73	1.13	1.02	1.15	1.24	0.72	1.00	1.17	1.33

RTDM for $\propto = 0.2$

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

Row wise sum

$$\begin{bmatrix} -1 \\ 10 \\ 10 \\ 9 \\ -10 \\ -10 \end{bmatrix}$$

RTDM for $\propto = 0.35$

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

Row wise sum

$$\begin{bmatrix} 0 \\ 10 \\ 10 \\ 5 \\ -10 \\ -10 \end{bmatrix}$$

RTDM for $\propto = 0.5$

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

Row wise sum

$$\begin{bmatrix} 0 \\ 10 \\ 10 \\ 4 \\ -10 \\ -10 \end{bmatrix}$$

RTDM for $\propto = 0.65$

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

Row wise sum

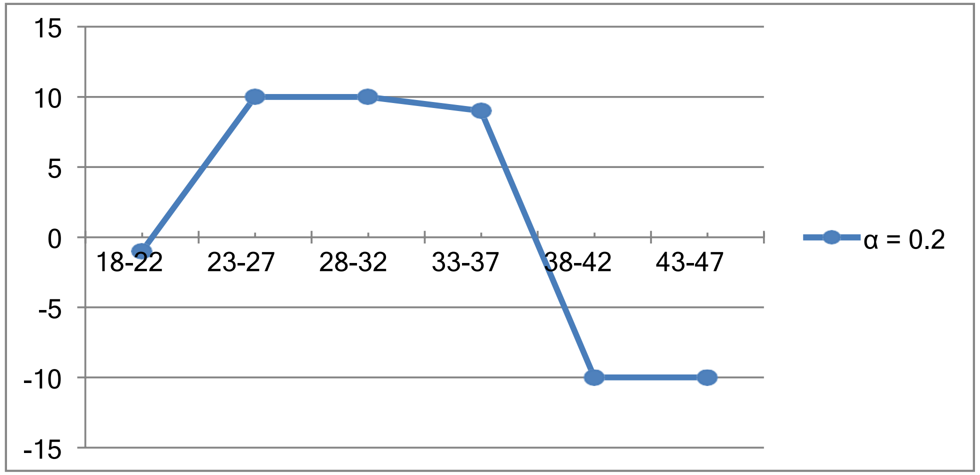
$$\begin{bmatrix} 0 \\ 7 \\ 10 \\ 2 \\ -10 \\ -10 \end{bmatrix}$$

RTDM for $\propto = 0.8$

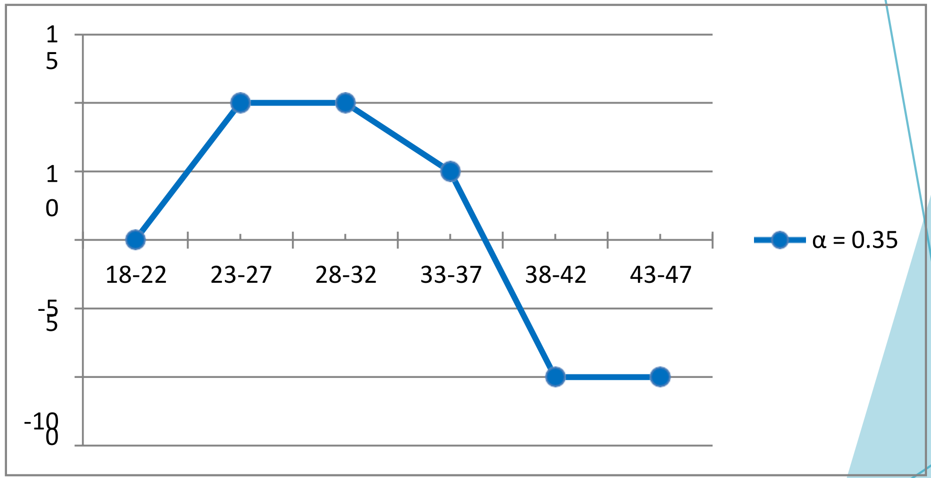
Row wise sum

$$\begin{bmatrix} 0 & 0 & 0 & 0 & -1 & 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 0 \\ -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 \\ -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 & -1 \end{bmatrix} \qquad \begin{bmatrix} -1 \\ 6 \\ 9 \\ 2 \\ -10 \\ -10 \end{bmatrix}$$

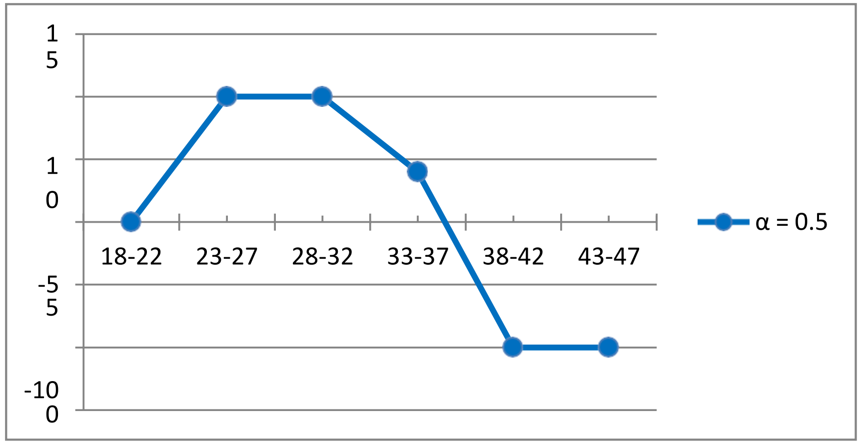
Plotting graph for different values of alpha



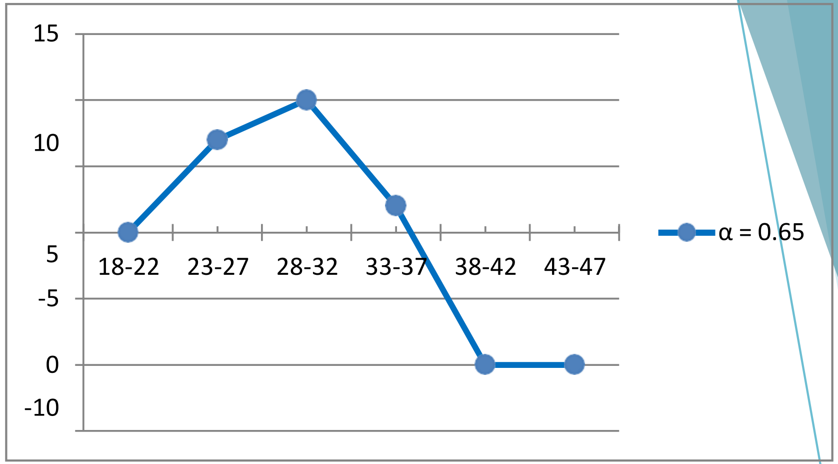
Age interval of divorced women for $\propto = 0.2$



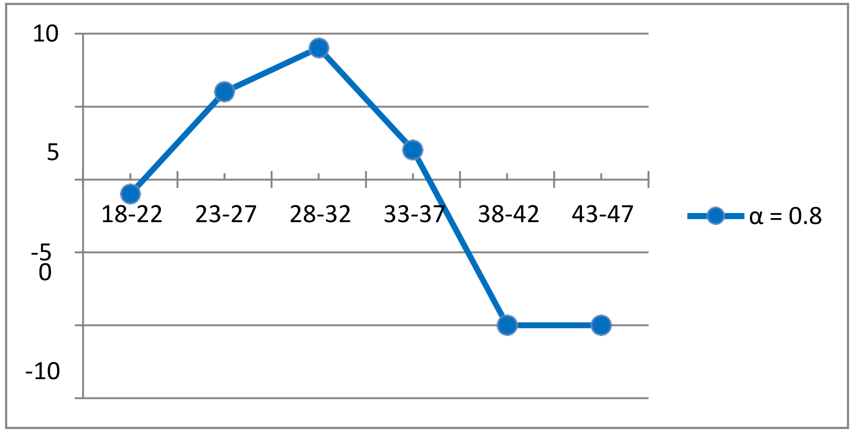
Age interval of divorced for $\propto = 0.35$



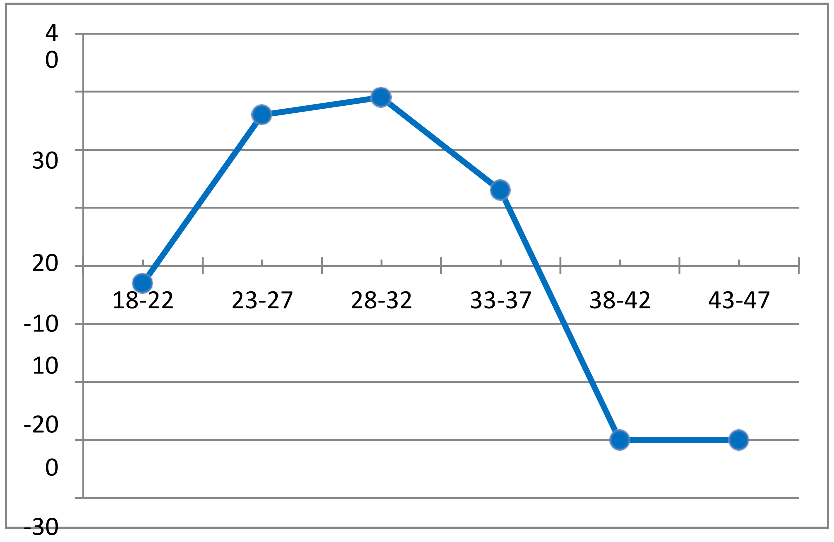
Age interval of divorced women for $\propto = 0.5$



Age interval of divorced women for $\propto = 0.65$



Age interval divorced women for $\propto = 0.8$



Maximum age group of suffered women for CETDM

FUZZY SOFT MATRIX THEORY AND ITS APPLICATION IN DECISION MAKING

FUZZY SOFT MATRICES

Fs- matrices which are representations of the fs- sets. This style of representation is useful for storing a soft set in a computer memory. The operations can be presented by the matrices which are very useful and convenient for the application.

A set off all fuzzy sets over *U* will be denoted by F(U). Γ_A, Γ_B, Γ_C,…,etc. and $\gamma_A, \gamma_B, \gamma_C$,….,etc. will be used for fs- sets and their fuzzy approximate functions, respectively.

$$\Gamma_A: E \to F(U) \text{ such that } \gamma_A(x) = \emptyset \text{ if } x \notin A$$

Here, γ_A is called fuzzy approximate function of the fs-set Γ_A, the value $\gamma_A(x)$ is a fuzzy set called x-element of the fs-set for all $x \in E$, and $\emptyset$ is the null fuzzy set. Thus, an fs-set Γ_A over U can be represented by the set of ordered pairs

$$\Gamma_A = \{(x, \gamma_A(x)): x \in E, \gamma_A(x) \in F(U)\}.$$

The sets of all fs-sets over U will be denoted by F S(U).

- A zero fs-matrix, denoted by [0].
- An A-universal fs-matrix, denoted by $[a_{ij}]$.
- A universal fs-matrix, denoted by [1].

- Union of $[a_{ij}]$ and $[b_{ij}]$, denoted $[a_{ij}]\tilde{\cup}[b_{ij}]$, if $c_{ij} = \max\{a_{ij}, b_{ij}\}$.
- Intersection of $[a_{ij}]$ and $[b_{ij}]$, denoted $[a_{ij}]\tilde{\cap}[b_{ij}]$, if $c_{ij} = \min\{a_{ij}, b_{ij}\}$.
- Complement of $[a_{ij}]$, denoted by $[a_{ij}]^{\circ}$, if $c_{ij} = 1 - a_{ij}$.

- $[a_{ij}] \tilde{\cap} [b_{ij}] = [b_{ij}] \tilde{\cap} [a_{ij}]$
- $[a_{ij}] \tilde{\cup} [b_{ij}] = [b_{ij}] \tilde{\cup} [a_{ij}]$

- $[a_{ij}] \tilde{\cap} [a_{ij}]^{\circ} = [0]$
- $[a_{ij}] \tilde{\cup} [a_{ij}]^{\circ} = [1]$

PRODUCTS OF fs- MATRICES

- And-Product

$$\wedge : FSM_{mxn} \times FSM_{mxn} \rightarrow FSM_{mxn2} \,,\; [a_{ij}] \wedge [b_{ik}] = [c_{ip}]$$

where , $c_{ip} = \min\{a_{ij} \,,\, b_{ik}\}$ such that $p = n(j - 1) + k$.

- Or- Product

$$\vee : FSM_{mxn} \times FSM_{mxn} \rightarrow FSM_{mxn2} \,,\; [a_{ij}] \vee [b_{ik}] = [c_{ip}]$$

Where, $c_{ip} = \max\{a_{ij}, b_{ik}\}$ such that $p = n(j - 1) + k$.

- And-Or Product

$$Z: FSM_{mxn} \times FSM_{mxn} \rightarrow FSM_{mxn2}, [a_{ij}] \; Z \; [b_{ik}] = [c_{ip}]$$

where ,$c_{ip} = \min\{a_{ij} \,,\, 1 - b_{ik}\}$ such that $p = n(j - 1) + k$.

- Or-Not Product

$$Y: FSM_{mxn} \times FSM_{mxn} \rightarrow FSM_{mxn2} \,, [a_{ij}] \; Y \; [b_{ik}] = [c_{ip}]$$

where, $c_{ip} = \max\{a_{ij} \,,\, 1 - b_{ik}\}$ such that $p = n(j - 1) + k$.

fs-Max-Min DECISION MAKING

$$Mm : FSM_{mxnx2} \rightarrow FSM_{mx1},\ Mm[c_{ip}] = [d_{i1}] = max_k\{t_{ik}\}]$$

Let $U = \{u_1, u_2, ..., u_m\}$ be an initial universe and $Mm[c_{ip}] = [d_{i1}]$. Then a subset of U can be obtained by using $[d_{i1}]$ as in the following way

$$opt[d_{i1}](U) = \{d_{i1}/u_i : u_i \in U,\ d_{i1} = 0\}$$

which is called an optimum fuzzy set on U.

Now, using definitions we can construct a FSMmDM method by the following algorithm.

Now, using definitions we can construct a FSMmDM method by the following algorithm.

Step 1: choose feasible subsets of the set of parameters,

Step 2: construct the fs-matrix for each set of parameters,

Step 3: find a convenient product of the fs-matrices,

Step 4: find a max-min decision fs-matrix,

Step 5: find an optimum fuzzy set on U.

We can define fs-min-max, fs-min-min and fs-max-max decision-making methods

which may be denoted by (FSmMDM), (FSmmDM), (FSMMDM), respectively.

REAL APPLICATION

Suppose the laptop trader has a laptop of unlike companies G = {g_1, g_2, g_3, g_4, g_5}. They can be categorized by a set of parameters Z = {z_1, z_2, z_3, z_4}. Here j = 1, 2, 3, 4 the constraints signify “Processor Speed”, “Battery Backup”, “Price” and “RAM/ROM” respectively

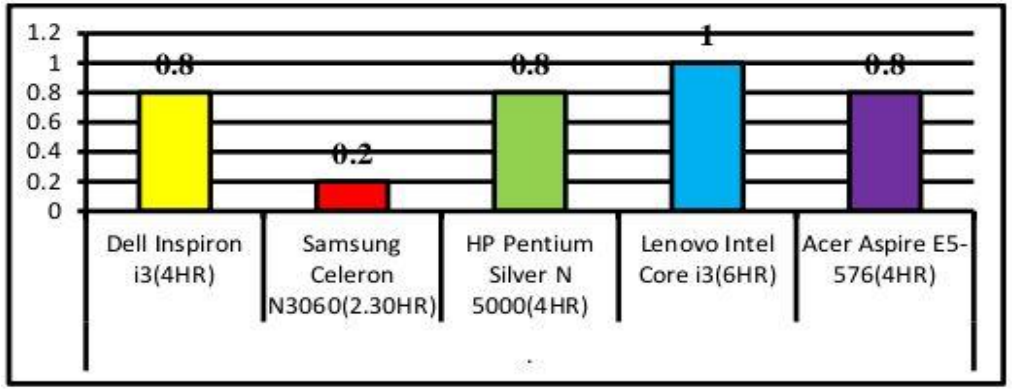
Example

Assume that two users reach at the shop of laptop trader to get laptop. Each user selects parameters according to their choice, now we choose a laptop with the help of FSMmDM depends on the sets of user’s parameters.

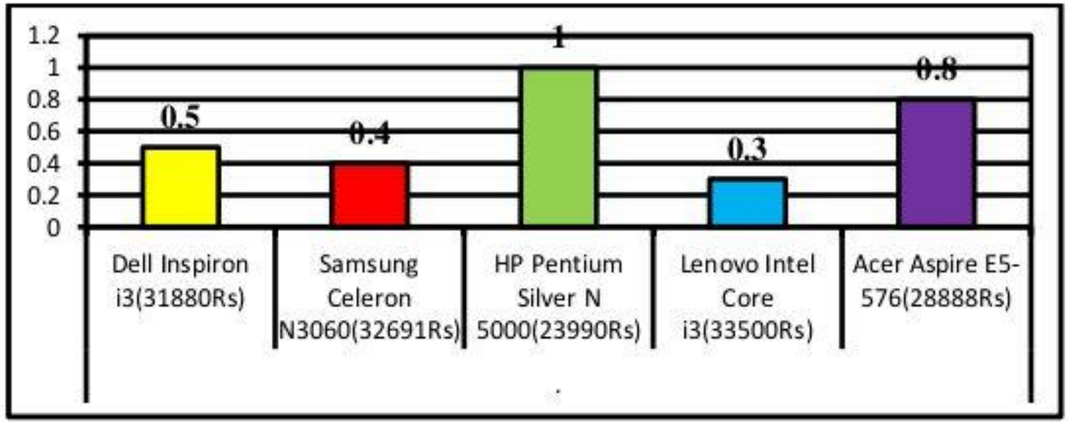
Let G = {g_1, g_2, g_3, g_4, g_5} is a universal set and Z = {z_1, z_2, z_3, z_4} collection of constraints.

Phase 1: User first, user second will select the collection of constraints according to their choice, P = {z_2, z_3, z_4} and Q = {z_1, z_3, z_4}, one-to-one

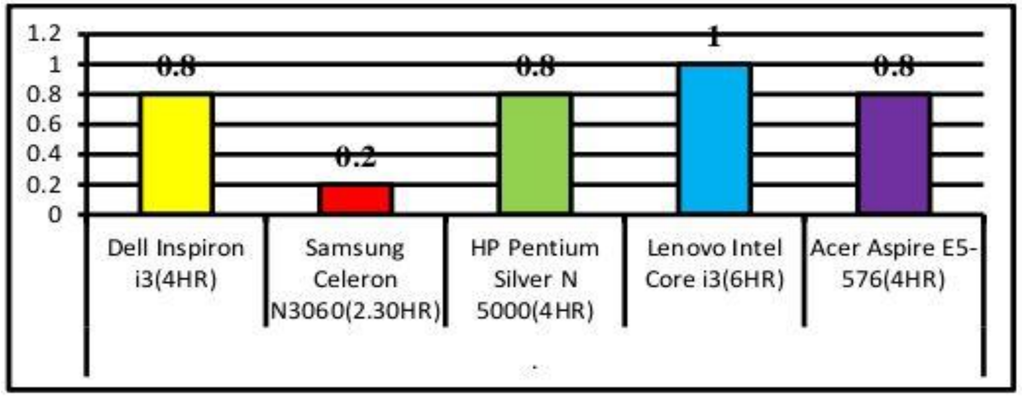
Phase 2: Now we compose these two FS-matrices with the help of bar diagram, these are based on user's parameters



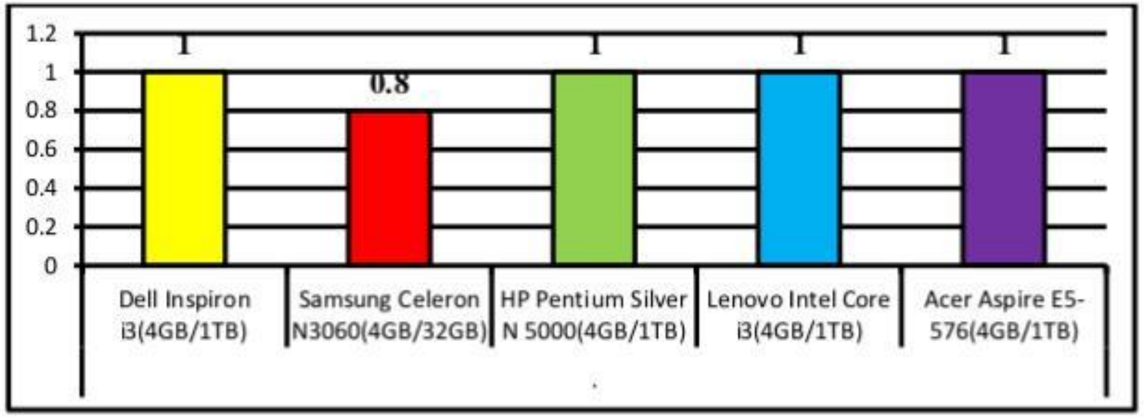
Processer Speed



Price



Battery Performance



RAM/ROM

Phase 3: These two FS-matrices $[x_{ij}]$ and $[\eta_{ik}]$ can multiply with the help of And Product

$$[\chi_{ij}] = \begin{bmatrix} 0 & 0.8 & 0.5 & 1 \\ 0 & 0.2 & 0.4 & 0.8 \\ 0 & 0.8 & 1 & 1 \\ 0 & 1 & 0.3 & 1 \\ 0 & 0.8 & 0.8 & 1 \end{bmatrix} \quad [\eta_{ik}] = \begin{bmatrix} 1 & 0 & 0.5 & 1 \\ 0.6 & 0 & 0.4 & 0.8 \\ 0.5 & 0 & 1 & 1 \\ 0.8 & 0 & 0.3 & 1 \\ 0.7 & 0 & 0.8 & 1 \end{bmatrix}$$

$$\begin{bmatrix} 0 & 0 & 0 & 0 & 0.8 & 0 & 0.5 & 0.8 & 0.5 & 0 & 0.5 & 0.5 & 1 & 0 & 0.5 & 1 \\ 0 & 0 & 0 & 0 & 0.2 & 0 & 0.2 & 0.2 & 0.4 & 0 & 0.4 & 0.4 & 0.6 & 0 & 0.4 & 0.8 \\ 0 & 0 & 0 & 0 & 0.5 & 0 & 0.8 & 0.8 & 0.5 & 0 & 1 & 1 & 0.5 & 0 & 1 & 1 \\ 0 & 0 & 0 & 0 & 0.8 & 0 & 0.3 & 1 & 0.3 & 0 & 0.3 & 0.3 & 0.8 & 0 & 0.3 & 1 \\ 0 & 0 & 0 & 0 & 0.7 & 0 & 0.8 & 0.8 & 0.7 & 0 & 0.8 & 0.8 & 0.7 & 0 & 0.8 & 1 \end{bmatrix}$$

Phase 4: We solve Mm ($[x_{ij}]$ $[\eta_{ik}]$) = [di1], and get di1 for every i {1, 2, 3, 4, 5}. Calculate d_{11}.

Subsequently i = 1, k {1, 2, 3, 4}.

d_{11} = max k {t1k} = max $\{t_{11}, t_{12}, t_{13}, t_{14}\}$

In this phase, we have to find t1k for all k {1, 2, 3, 4}. To determine, Now we calculate t_{11} and t12. I1 = {s: $c_{is} \neq 0$, 0 < s 4} =φ; for k = 1 and n = 4 and I2 = {s: $c_{is} \neq 0$; 4 < s 8} = {5, 7, 8} on behalf of k = 2, n = 4, Here after $t_{11} = 0$

$T_{12} = \min\{c_{15}, c_{17}, c_{18}\} = \min\{0.8, 0.5, 0.8\} = 0.5$

Similarly, we calculate as $t_{13} = 0.5$ and $t_{14} = 0.5$. Then.

$d_{11} = \max\{0.0, 0.5, 0.5, 0.5\} = 0.5$

$$Mm([\chi_{ij}] \wedge [\eta_{ik}]) = [d_{i1}] = \begin{bmatrix} 0.5 \\ 0.4 \\ 0.5 \\ 0.3 \\ 0.7 \end{bmatrix}$$

Similarly, we calculate d_{21}= 0.4, d_{31}= 0.5, d_{41} = 0.3 and d_{51} = 0.7. In the end, got the FS-max-min judgment fuzzy soft matrix in the form of one column.

Phase 5: At Last, Mm ($[x_{ij}]$ $[\eta_{ik}]$) permit us to calculate a finest fuzzy set on G.

(G) = $\{0.5/g_1, 0.7/g_5\}$.

Here g_5 is a best laptop to purchase for user first and user second according to their desires. In the same way, for any appropriate problems apply these products

An Adjustable Approach of FSMmDM Method in Automobile

Preliminaries

In the beginning, fuzzy soft matrices is given by fuzzy soft set here. This type technique is very useful for creating matrices as well as operating it in computer memory. Now, we show (H) as a group of every fuzzy set for H.

We show $\pi\alpha$, $\pi\beta$, $\pi\gamma$,…, etc. as fuzzy soft sets and $r\alpha$, $r\beta$, $r\gamma$,…, etc. show as a fuzzy predicted task of their fuzzy soft sets. H signify elementary universe here, S signifies assemblage of specification, $\alpha \in$ S, $r(t)$ ✭ t ∈ S. Here fuzzy soft set $\pi\alpha$ for H. Keep in your mind, FS (H) signifies assemblage of every FS-set for H.

Sample

Now alliance structure of $\pi\alpha$ shown below.

We use the concept of 3.2.1.2.

$T\alpha$ = {0.9/ (CR_1, t_2), 0.5/ (CR_2, t_2), 0.6/ (CR_3, t_2), 1/ (CR_4, t_2), 0.7/ (CR_5, t_2), 0.8/(CR_1,t_3), 0.1/(CR_2,t_3), 0.5/(CR_3,t_3), 1/(CR_4,t_3)}

FS-matrix $[K_{ab}]$ shown below.

$$[k_{ab}] = \begin{bmatrix} 0 & 0.9 & 0.8 & 0 \\ 0 & 0.5 & 0.1 & 0 \\ 0 & 0.6 & 0.5 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0.7 & 0 & 0 \end{bmatrix}$$

MEASURES OF FUZZINESS

It is function from power set P(X) to [0, +∞]. $\tilde{A}$ is fuzzy set, $\mu_{\tilde{A}}$ (x) its membership function. Measure of fuzziness d ($\tilde{A}$) satisfies these properties.

1) $d(\tilde{A}) = 0$ if $\tilde{A}$ is a crisp set in X.

2) $d(\tilde{A})$ is maximum if $\mu_{\tilde{A}}(x) = \frac{1}{2}$ $\forall$ $x \in X$.

3) $d(\tilde{A}) \geq d(\tilde{A}')$

FS-MAX-MIN SELECTION BUILDING APPROACH

Now, we get FS-max-min selection building (FSMmDM) approach to follow FS- max-min selection task.

APPLICATIONS

The owner of car agency have five different car signifies by H = {CR_1, CR_2, CR_3, CR_4, CR_5}. These cars are classified by the group of specification S = {t_1, t_2, t_3, t_4}.

Now b = 1, 2, 3, 4 the specification tb indicates high “CC (cubic centimeter capacity of combustion cylinder)”, best “Average”, “Cheap Price” and “Good-looking” respectively. We will solve this example

Husband and wife, reach at the car agency for purchasing car. Each partner preferred specification according their desire. We will buy car depend on the group of partners specification by using FSMmDM as shown below.

Suppose H = {CR_1, CR_2, CR_3, CR_4, CR_5} signifies universal set and S = {t_1, t_2, t_3, t_4} group of specification.

Phase 1: Husband and wife likes this type of group of specification, P = {t_1, t_3, t_4} and B = {t_2, t_3, t_4}.

Phase 2: Two FS-matrices are given, these have been established on specification. We get the mileage in cubic centimeter (CC) of all cars and assign membership value in figure 4.1

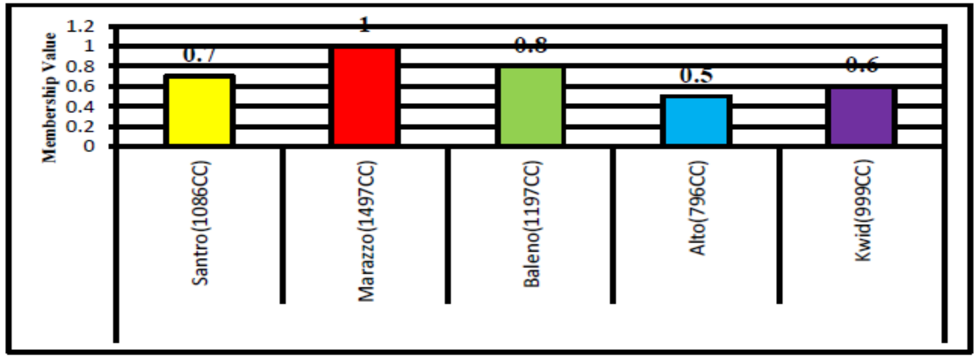


Fig: 4.1: Membership Value According To Their CC

We get the average in kilometer per hour (Km/h) of all cars and assign membership value in figure 4.2.2

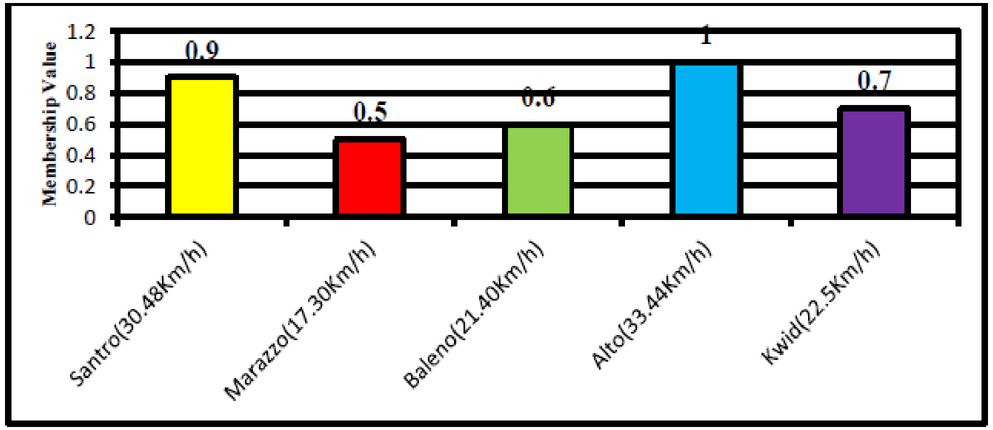


Fig: 4.2: Membership Value According To Their Average

We get the price of all cars in lacks and assign membership value in figure 4.3.

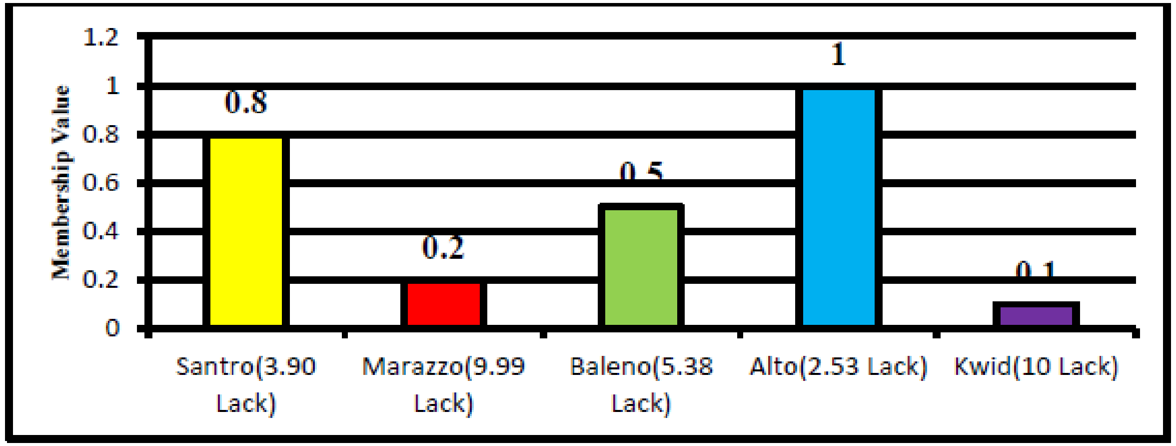


Fig: 4.3: Membership Value According To Their Price

We see the body structure and all function of all cars and assign membership value in figure 4.4.

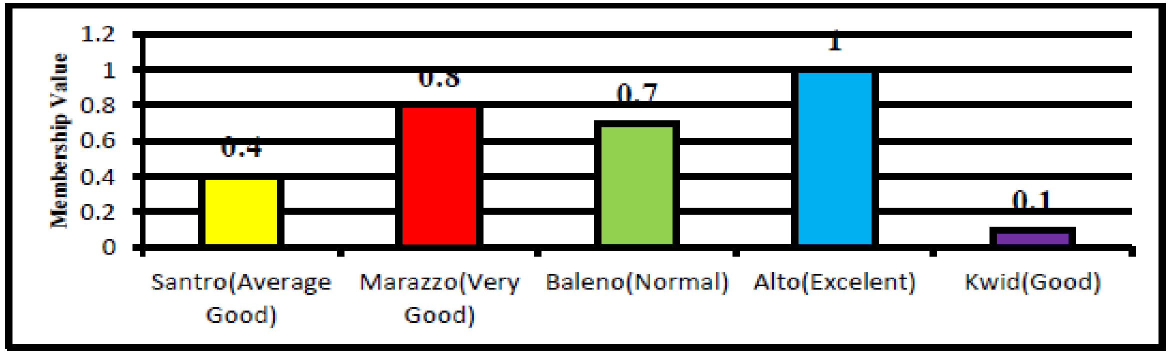


Fig: 4.4: Membership Value According To Their Good Look

Compose these two FS-matrices based on user first, user second choice in phase 1 and have taken the help of above bar diagram

$$[k_{ab}] = \begin{bmatrix} 0.7 & 0 & 0.8 & 0.4 \\ 1 & 0 & 0.2 & 0.8 \\ 0.8 & 0 & 0.5 & 0.7 \\ 0.5 & 0 & 1 & 1 \\ 0.6 & 0 & 0.1 & 0.1 \end{bmatrix} \quad [m_{ac}] = \begin{bmatrix} 0 & 0.9 & 0.8 & 0.4 \\ 0 & 0.5 & 0.2 & 0.8 \\ 0 & 0.6 & 0.5 & 0.7 \\ 0 & 1 & 1 & 1 \\ 0 & 0.7 & 0.1 & 0.1 \end{bmatrix}$$

Phase 3: Apply And-product on FS-matrices $[k_{ab}]$ and $[m_{ac}]$, as shown below

$$\begin{bmatrix} 0 & 0.7 & 0.7 & 0.4 & 0 & 0 & 0 & 0 & 0 & 0.8 & 0.8 & 0.4 & 0 & 0.4 & 0.4 & 0.4 \\ 0 & 0.5 & 0.2 & 0.8 & 0 & 0 & 0 & 0 & 0 & 0.2 & 0.2 & 0.2 & 0 & 0.5 & 0.2 & 0.8 \\ 0 & 0.6 & 0.5 & 0.7 & 0 & 0 & 0 & 0 & 0 & 0.5 & 0.5 & 0.5 & 0 & 0.6 & 0.5 & 0.7 \\ 0 & 0.5 & 0.5 & 0.5 & 0 & 0 & 0 & 0 & 0 & 1 & 1 & 1 & 0 & 1 & 1 & 1 \\ 0 & 0.6 & 0.1 & 0.1 & 0 & 0 & 0 & 0 & 0 & 0.1 & 0.1 & 0.1 & 0 & 0.1 & 0.1 & 0.1 \end{bmatrix}$$

Above, Apply And-product, for studying Husband and wife's selections.

A GENERALISED REAL-LIFE PROBLEM SOLVED BY UNI INT DECISION MAKING METHOD

Preliminaries

- Universal set-T
- Parameter set -H
- Power set of T-P(T)

Definition

The ordered pair of soft set F_{P1} over T is describing below.

$$F_{P1} = \{(h, f_{p1}(h)) : h \in H, f_{p1}(h) \in P(T)\},$$

Here $f_{P1} : H \to P(T)$, $F_{p1}(h) = \emptyset$ if $h \in P_1$.

Now, the fuzzy approximation function of F_{p1} is denoted by f_{p1}. The soft set can be obtained by solving $f_{p1}(h)$ and these are h-element of set. It is very important to remember that f_{p1} (h) may or may not give any arbitrary values. Thus, we will denote C (T) as a collection of soft set for T.

Below examples show that above theory works properly

Example

F_{P1} is soft set and tells the desire of students who wants to take rent room near their university. Let us assume that six rooms are available near to university on rent T = $\{t_1, t_2, t_3, t_4, t_5, t_6\}$ and H = $\{h_1, h_2, h_3, h_4, h_5\}$ indicates the collection of parameters. The parameters hi (1, 2, 3, 4, 5) shows as "Low Rent", "Near Institute", "Good Locality", "Accommodation Type", "Security" respectively. Hence, we select "Near Institute", "Accommodation Type", "Security" as soft set. Suppose, $P_1=\{h_2,h_4,h_5\}\subseteq H$ and $f_{p1}(h_2)=\{t_5,t_6\}$, $f_{p1}(h_4)=\{t_1,t_2,t_3\}$ and $f_{p1}(h_5)=T$.

Hence, the soft set F_{p1} as a set of order pairs define below

$$F_{p1}=\{(h_2,\{t_5, t_6\}), (h_4, \{t_1, t_2, t_3\}), (h_5, T)\}$$

UNI—INT JUDGEMENT BUILDING METHOD

Here, a Uni-int approach is built by ∧-product, ∧-product is built by the combination of Uni-int operators and Uni-int judgment function. On behalf of requirement of decision maker this process diminishes a set of its subset. So decision maker takes less number of requirements not more requirement.

In this section, suppose ∧(T) indicates the collection of all ∧ -product of soft set over T.

Rule 1 : Take beneficial subsets from a group of attributes.

Rule 2: Make the soft sets for every group of' attributes.

Rule 3: Obtain the multiplication of two soft sets.

Rule 4: Calculate the Uni-int judgment set for above And operation.

In the end, we get Uni-int decision set. By this method we obtain subset of the decision set. In the end we take a general problem and solve by Uni-int decision method.

Example

Suppose two friends (Ram and Shyam) want to take rent room who are studying in the same university. They met many brokers who showed total number of 45 rent rooms with different parameters in different location. Ram and Syam is decision maker here. They wish to choose any one rent room. It is a difficult task. So we use this method for decreasing the collection of rent room.

Suppose $T=\{t_{1,} t_2, t_3, \ldots\ldots t_{45}\}$ is the set of rent room. These rent rooms have different attributes as indicated by this set $H= \{h_1, h_2, h_{3,} \ldots\ldots . h_6\}$. Here $i=1,2,3\ldots\ldots 6$, h_i indicates "Low Rent", "Near Institute", "Good Locality", "Accommodation Type", "Security", "Transport Facilities" respectively.

So we solve above problem by Uni-Int decision making method.

Rule 1: $P_1= \{h_3, h_4, h_5, h_6\}$, $P_2=\{h_2, h_4, h_6\}$, these are the parameters(requirement) of decision maker(Ram and Syam) according to these parameters they want to choose a rent room.

Rule 2: Ram and Shyam sincerely see the facilities of all rent room. After seeing, every rent room is check according to own required attributes. $P_1, p_2 \subseteq H$, Ram and Shyam calculate two soft set according to their requirement which are given below

$$F_{P1} = \left\{ \begin{array}{l} (h_3, \{t_3, t_6, t_{12}, t_{20}, t_{27}, t_{30}, t_{31}, t_{35}, t_{38}, t_{40}, t_{42}, t_{43}, t_{44}\}, \\ (h_5, \{t_1, t_2, t_{12}, t_{14}, t_{17}, t_{22}, t_{24}, t_{27}, t_{29}, t_{32}, t_{35}, t_{37}, t_{41}, t_{42}\}), \\ (h_4, \{t_2, t_4, t_{12}, t_{17}, t_{18}, t_{20}, t_{21}, t_{23}, t_{27}, t_{31}, t_{35}, t_{41}, t_{43}, t_{45}\}), \\ (h_6, \{t_2, t_4, t_{11}, t_{12}, t_{16}, t_{19}, t_{23}, t_{27}, t_{28}, t_{33}, t_{35}, t_{40}, t_{44}, t_{45}\}) \end{array} \right\}$$

$$F_{p2} = \left\{ \begin{array}{l} (h_2, \{t_2, t_3, t_4, t_7, t_{14}, t_{20}, t_{22}, t_{25}, t_{27}, t_{33}, t_{32}, t_{36}, t_{40}, t_{43}, t_{45}\}, \\ (h_4, \{t_2, t_5, t_7, t_{11}, t_{12}, t_{30}, t_{14}, t_{21}, t_{29}, t_{31}, t_{32}, t_{35}, t_{36}, t_{44}, t_{45}\}), \\ (h_6, \{t_3, t_4, t_9, t_{10}, t_{11}, t_{14}, t_{15}, t_{18}, t_{21}, t_{23}, t_{27}, t_{36}, t_{44}, t_{45}\}), \end{array} \right\}$$

Rule 3: We calculate And-product ($F_{p1} \wedge F_{p2}$) of above soft sets.

$$
\left\{
\begin{array}{c}
((h_3,h_2),\{t_3,t_{20},t_{27},t_{40},t_{43}\}),\\
((h_3,h_4),\{t_{12},t_{31},t_{35},t_{44},\}),\\
((h_3,h_6),\{t_3,t_{27},t_{44},\}),\\
((h_4,h_2),\{t_2,t_4,t_{20},t_{27},t_{43},t_{45},\}),\\
((h_4,h_4),\{t_2,t_{12},t_{21},t_{31},t_{35},t_{45}\}),\\
((h_4,h_6),\{t_4,t_{18},t_{21},t_{23},t_{27},t_{45}\}),\\
((h_5,h_2),\{t_2,t_{14},t_{22},t_{27},t_{32}\}),\\
((h_5,h_4),\{t_2,t_{12},t_{14},t_{29},t_{32},t_{35}\}),\\
((h_5,h_6),\{t_{14},t_{27}\}),\\
((h_6,h_2),\{t_2,t_4,t_{27},t_{33},t_{40},t_{45}\}),\\
((h_6,h_4),\{t_2,t_{11},t_{12},t_{35},t_{44},t_{45}\}),\\
((h_6,h_6),\{t_4,t_{11},t_{23},t_{27},t_{44},t_{45}\}),
\end{array}
\right\}
$$

Rule 4: So, in the end we calculate $Uni_x\text{-}Int_y(F_{p1} \wedge F_{p2})$ and $Uni_y\text{-}Int_x(F_{p1} \wedge F_{p2})$ in this form

$Uni_x\text{-}Int_y(Fp1 \wedge Fp2)=$

Rule 4: So, in the end we calculate Uni_x-$Int_y(F_{p1} \wedge F_{p2})$ and Uni_y-$Int_x(F_{p1} \wedge F_{p2})$ in this form

Uni_x-$Int_y(Fp1 \wedge Fp2)=$

$$\left\{ \begin{array}{c} \cap \{\{t_3,t_{20},t_{27},t_{40},t_{43}\},\{t_{12},t_{31},t_{35},t_{44}\},\{t_3,t_{27},t_{44}\}\}, \\ \cap \{\{t_2,t_4,t_{20},t_{27},t_{43},t_{45}\},\{t_2,t_{12},t_{21},t_{31},t_{35},t_{45}\},\{t_4,t_{18},t_{21},t_{23},t_{27},t_{45}\}\}, \\ \cap \{\{t_2,t_{14},t_{22},t_{27},t_{32}\},\{t_2,t_{12},t_{14},t_{29},t_{32},t_{35}\},\{t_{14},t_{27}\}\}, \\ \cap \{\{t_2,t_4,t_{27},t_{33},t_{40},t_{45}\},\{t_2,t_{11},t_{12},t_{35},t_{44},t_{45}\},\{t_4,t_{11},t_{23},t_{27},t_{44},t_{45}\}\}, \end{array} \right\}$$

$=\cup\{\emptyset,\{t_{45}\},\{t_{14}\},\{t_{45}\}\}=\{t_{14},t_{45}\}$

$Uni_y\text{-}Int_x(Fp1 \wedge Fp2)$ =)=

$$\left\{\begin{array}{c} \cap\ \{\{t_3,t_{20},t_{27},t_{40},t_{43}\},\{t_2,t_4,t_{20},t_{27},t_{43},t_{45}\},\{t_2,t_{14},t_{22},t_{27},t_{32},\}, \\ \{t_2,t_4,t_{27},t_{33},t_{40},t_{45}\}\}, \\ \cap\ \{\{t_{12},t_{31},t_{35},t_{27},t_{44},\},\{t_2,t_{12},t_{21},t_{31},t_{35},t_{45}\},\{t_2,t_{12},t_{14},t_{29},t_{32},t_{35}\}\}, \\ \{t_2,t_{11},t_{12},t_{35},t_{44},t_{45}\}\}, \\ \cap\ \{\{t_3,t_{27},t_{44},\},\{t_4,t_{18},t_{21},t_{23},t_{27},t_{45}\},\{t_{14},t_{27}\}\}, \\ \{t_4,t_{11},t_{23},t_{27},t_{44},t_{45}\}\}, \end{array}\right\}$$

$=\cup\{\{t_{27}\},\{t_{12},t_{35}\},\{t_{27}\}\}=\{t_{12},t_{27},t_{35}\}$

Now, Ram and Shyam Can take any one rent room which is the element of Uni-Int Decision set.

$Uni\text{-}Int(F_{p1} \wedge F_{p2}) = Uni_x\text{-}Int_y(F_{p1} \wedge F_{p2})\ \ Uni_y\text{-}Int_x(F_{p1} \wedge F_{p2})$.

$=\{t_{14},t_{45}\}\cup\{t_{12},t_{27},t_{35}\}=\{t_{12},t_{14},t_{27},t_{35},t_{45}\}$.

Conclusion

- The divorces problem using fuzzy matrix method purpose is to find out the age interval of women affected by divorces problem .
- Fuzzy soft matrices in decision making method is provided an application for users to select a best laptop .
- An adjustable approach of FSM and DM method having the utilization in the field of automobile for buying car.
- Uni-Int decision making method is help to reduce the parameters like above room rent problem. Uni-Int method gives best results than other methods .