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Fuzzy Soft Matrix Theory and its Multi Criteria Decision Making on Radio Frequency

Research Article*

J.Jon Arockiaraj[1] and S.Madhanraj

1 Department of Mathematics, St. Joseph's College of Arts & Science, Manjakuppam, Cuddalore (Tamil Nadu), India.

Abstract: In this paper, we have to discussed about the fuzzy square matrix and its theory with some basic results. The study of this paper is based on the Multi Criteria Decision Making Problem with Suitable examples.

Keywords: Fuzzy soft Matrices, fuzzy Matrix, t-norm operator.

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1. Introduction

In real life there are so much of complicated problems in medical field, economical field, social field, industrial field etc, which involve that the data are unable to determined the character because, there are various type of problems. Such problems are dealing with the help of the mathematical theories. In this paper, we have to deal the problems by "Fuzzy soft set theory this, we generalize the concept of fuzzy soft Matrix and we wish to find the fuzzy matrices with appropriate results and examples. The fuzzy soft matrices which were a matrix representation of the fuzzy soft sets and computed a max-min decision making method. We have also discuss some proposition. The concept of soft set theory" having the parametric tools for using with uncertainties. Finally we construct the Algorithm of multi criteria Decision making based on t-norm operators and we find the fuzzy soft matrix problems with examples.

2. Definitions And Preliminaries

Definition 2.1 (Fuzzy soft matrix theory)**.** *A fuzzy soft matrix is a matrix which elements from [0, 1], where [0, 1] is called a unit interval.*

Definition 2.2. *A fuzzy soft matrix is a matrix which is denoted by A. ie.,* $A = [a_{ij}]_{m\times n}$ *where* $a_{ij} \in [0,\ 1]$ $\quad 1 \le i \le m$ *and* $1 \le j \le n$.

Example 2.3.

$$\begin{bmatrix} a_{11} & a_{12} \\ a_{21} & a_{22} \end{bmatrix} = \begin{bmatrix} 0.5 & 0.3 \\ 0.7 & 1 \end{bmatrix}$$

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Example for solving the fuzzy matrix

$$A = \begin{pmatrix} 0.2 & 0.6 & 0.1 \\ 0.4 & 0.7 & 0.9 \\ 0.3 & 0.5 & 0.8 \end{pmatrix}$$

We classify the determinant $|A|$ as given by,

$$\begin{aligned} |A| &= a_{11}A_{11} + a_{12}A_{12} + a_{13}A_{13} \\ &= 0.2\begin{vmatrix} 0.7 & 0.9 \\ 0.5 & 0.8 \end{vmatrix} + 0.6\begin{vmatrix} 0.4 & 0.9 \\ 0.3 & 0.8 \end{vmatrix} + 0.1\begin{vmatrix} 0.4 & 0.7 \\ 0.3 & 0.5 \end{vmatrix} \\ &= 0.2(0.7 + 0.5) + 0.6(0.4 + 0.3) + 0.1(0.4 + 0.3) \\ &= 0.2(0.7) + 0.6(0.4) + 0.1(0.4) \\ &= 0.2 + 0.4 + 0.1 \\ &= 0.4 \end{aligned}$$

This can be classified that same way of the determinant can be obtained by expanding along any row (or) any column.

Definition 2.4 (Soft set)**.** *Let V be a starting universe, $P(V)$ be the power set of V, E be the set of all parameter and $A \leq E$. A soft set (f_A, E) on the universe V is determined by the set of order pairs $(f_A, E) = \{(e, f_A, (e) : e \in E.f_A(e) \in p(w)\}$ where $f_A : E \to P(V) \in f_A(e) = \varphi$ if $e \notin A$. Here f_A is known as the approximate function of the soft set (f_A, E). The set $f_A(e)$ be an e-approximate value see which contains of related objects of the parameter $e \in E$.*

Example 2.5. *Let V= $\{v_1, v_2, v_3, v_4\}$ be a set of four basis and E=$\{$blue (e_1), yellow (e_2), green $(e_3)\}$ be a set as parameters. If A=$\{e_1, e_2\} \leq E$ and is, f_A (e_1)=$\{v_1, v_2, v_3, v_4\}$ and f_A (e_2)=$\{v_1, v_2, v_3\}$, then we can proceed the soft set, $(f_A, E) = \{(e_1, \{v_1, v_2, v_3, v_4\}), (e_2, \{v_1, v_2, v_3\})\}$ one V which determined the "Colour of the balls" which Mr. X is going to buy.*

Definition 2.6 (Fuzzy set)**.** *Let V be the starting universe, E be the set of all parameters and X≤E. A pair (F, X) is a fuzzy set over V where, F: X→P(V) is, where P(V) is known as the collection of all subsets of V.*

Example 2.7. *Consider, the Example 2.3, here we unable to apply with only two real numbers 0 and 1, we able characterized it by a membership function instead of crisp number 0 and 1, which associated with every element of a real number on the interval [0, 1], then $(f_A, E) = \{f_A, (e_1) = \{(v_1, 0.3), (v_2, 0.2), (v_3, 0.5), (v_4, 0.7)\}, (f_A, (e_2) = \{(v_1, 0.2), (v_2, 0.7), (v_3, 0.1)\}$ is known as the fuzzy soft set defines the "Colour of the balls" which Mr. X is going to buy.*

Definition 2.8 (Fuzzy soft Matrices)**.** *Let (f_A, E) be fuzzy soft set over V, then a subset $V \times E$ is uniquely determined by $R_A = \{(v, e) : e \in \mathrm{A}, v \in f_A(e)\}$ is a relation form of (f_A, E). The characteristic function of R_A be proceed by $\lambda_{RA} : V \times E \to [0, 1]$, where $\lambda_{RA} : [v, e] \in [0, 1]$ is the membership value of $v \in V$ for all $e \in V$ if $\lambda_{ij} = \lambda_{RA}[v_i, e_j]$, we define a matrix.*

$$[\lambda_{ij}]_{m\times n} = \begin{pmatrix} \lambda_{11} & \lambda_{12} & \lambda_{1n} \\ \lambda_{21} & \lambda_{22} & \lambda_{2n} \\ \Lambda_{m1} & \lambda_{m2} & \lambda_{mn} \end{pmatrix}$$

Example 2.9. *Assume that $V = \{v_1, v_2, v_3, v_4\}$ is a universal set and E= $\{e_1, e_2, e_3, e_4\}$ is a set of all parameters, if A≤E = $e_1, e_2, e_3,\}$ and f_A $(e_1) = \{(v_1, 0.2), (v_2, 0.5), (v_3, 0.7), (v_4, 0.6)\}$, f_A $(e_2) = \{(v_1, 0.3), (v_2, 0.6), (v_3, 0.4), (v_4,$*

0.2)}, f_A (e_3) = {(v_1, 0.4), (v_2, 0.7), (v_3, 0.1), (v_4, 0.9)}, then the fuzzy soft set (f_A, E) is a parameterized family { f_A (e_1), f_A (e_2), f_A (e_3)} of all fuzzy sets over V. Hence the fuzzy soft matrix [λ_{ij}] to be proceed by

$$[\lambda_{ij}] = \begin{pmatrix} 0.2 & 0.3 & 0.4 & 0 \\ 0.5 & 0.6 & 0.7 & 0 \\ 0.7 & 0.4 & 0.1 & 0 \\ 0.6 & 0.2 & 0.9 & 0 \end{pmatrix}$$

Definition 2.10 (Zero fuzzy Matrix)**.** *Let $[Z_{ij}] \in FSM_{m\times n}$, then $[Z_{ij}]$ is known as the Zero fuzzy soft matrix defined by [0], if $Z_{ij} = 0$ for each i and j.*

Definition 2.11 (Universal fuzzy Matrix)**.** *Let $[Z_{ij}] \in FSM_{m\times n}$, then $[Z_{ij}]$ is known as the fuzzy universal Matrix defined by [1], if $Z_{ij} = 1$ for each i and j.*

Definition 2.12 (Fuzzy sub Matrices)**.** *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{m\times n}$ then $[a_{ij}]$ is a fuzzy sub matrix of [b_{ij}] and [c_{ij}] be defined by, $[a_{ij}] \leq [b_{ij}] \leq [c_{ij}]$ if $a_{ij} \leq b_{ij} \leq c_{ij}$. For each i and j.*

Definition 2.13 (Union of fuzzy Matrices)**.** *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{m\times n}$ then union of [a_{ij}], [b_{ij}] and [c_{ij}] be defined by $[a_{ij}]\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}]$ is defined as $[a_{ij}]\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}] = \max\{a_{ij}, b_{ij}, c_{ij}\}$ for each i and j.*

Definition 2.14 (Intersection of fuzzy Matrices)**.** *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{m\times n}$, then intersection of $[a_{ij}]$, $[b_{ij}]$ and $[c_{ij}]$ defined by $[a_{ij}]\tilde{\cap}[b_{ij}]\tilde{\cup}[c_{ij}] = \min\{a_{ij}, b_{ij}, c_{ij}\}$ for each i and j.*

Definition 2.15 (Complement fuzzy Matrix)**.** *Let $[z_{ij}] \in FSM_{m\times n}$, then the complement of fuzzy Matrix [z_{ij}] is defined by [z_{ij}]^0, where [z_{ij}]^0 = 1-Z_{ij} for each i and j.*

Definition 2.16 (Fuzzy equal Matrices)**.** *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{m\times n}$, then [$a_{ij}$], [$b_{ij}$] and [$c_{ij}$] are to be fuzzy equal Matrices, defined by [a_{ij}] = [b_{ij}] = [c_{ij}], if a_{ij} = b_{ij} = c_{ij} for each i and j.*

Example 2.17. *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{3\times 3}$, then* $[a_{ij}] = \begin{pmatrix} 0.2 & 0.4 & 0.7 \\ 0.3 & 0.1 & 0.5 \\ 0.6 & 0.8 & 0.4 \end{pmatrix}$, $[b_{ij}] = \begin{pmatrix} 0.5 & 0.7 & 0.1 \\ 0.3 & 0.2 & 0.4 \\ 0.9 & 0.6 & 0.8 \end{pmatrix}$ *and* $[c_{ij}] = \begin{pmatrix} 0.1 & 0.3 & 0.5 \\ 0.4 & 0.6 & 0.8 \\ 0.7 & 0.2 & 0.9 \end{pmatrix}$ *then* $[a_{ij}]\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}] = \begin{pmatrix} 0.5 & 0.7 & 0.7 \\ 0.4 & 0.6 & 0.8 \\ 0.9 & 0.8 & 0.9 \end{pmatrix}$, $[a_{ij}]\tilde{\cap}[b_{ij}]\tilde{\cap}[c_{ij}] = \begin{pmatrix} 0.1 & 0.3 & 0.1 \\ 0.3 & 0.1 & 0.4 \\ 0.6 & 0.2 & 0.4 \end{pmatrix}$. *Let* $[c_{ij}]^0 = 1 - [c_{ij}] = \begin{pmatrix} 0.9 & 0.7 & 0.5 \\ 0.6 & 0.4 & 0.2 \\ 0.3 & 0.8 & 0.1 \end{pmatrix}$.

Proposition 2.18. *Let $[z_{ij}] \in FSM_{m\times n}$, then*

(1). $[[z_{ij}]^0] = [z_{ij}]$

(2). $[z_{ij}] \leq [z_{ij}]$

(3). $[z_{ij}]\tilde{\cup}[z_{ij}] = [z_{ij}]$

(4). $[z_{ij}]\tilde{\cap}[z_{ij}] = [z_{ij}]$

(5). $[z_{ij}]\tilde{\cup}[0] = [z_{ij}]$

(6). $[z_{ij}]\tilde{\cap}[0] = [0]$

Proposition 2.19. *Let $[a_{ij}]$, $[b_{ij}]$, $[c_{ij}] \in FSM_{m\times n}$, then de Morgan's type results are true.*

1. $(([a_{ij}]\tilde{\cup}[b_{ij}])\tilde{\cup}[c_{ij}])^0 = (([a_{ij}]^0\tilde{\cap}[b_{ij}]^0)\tilde{\cap}[c_{ij}]^0)$

2. $(([a_{ij}]\tilde{\cap}[b_{ij}])\tilde{\cap}[c_{ij}])^0 = (([a_{ij}]^0\tilde{\cup}[b_{ij}]^0)\tilde{\cup}[c_{ij}]^0)$.

Proof. For each i and j,

(1). $(([a_{ij}]\tilde{\cup}[b_{ij}])\tilde{\cup}[c_{ij}])^0 = [\max\{a_{ij}, b_{ij}, c_{ij}\}]^0 = [1-\max\{a_{ij}, b_{ij}, c_{ij}\}] = [\min\{1-a_{ij}, 1-b_{ij}, 1-c_{ij}\}] = [a_{ij}]^0\tilde{\cap}[b_{ij}]^0\tilde{\cap}[c_{ij}]^0$.

(2). $(([a_{ij}]\tilde{\cap}[b_{ij}]\tilde{\cap}[c_{ij}])^0 = [\min\{a_{ij}, b_{ij}, c_{ij}\}]^0 = [1-\min\{a_{ij}, b_{ij}, c_{ij}\}] = [\max\{1-a_{ij}, 1-b_{ij}, 1-c_{ij}\}] = [a_{ij}]^0\tilde{\cup}[b_{ij}]^0\tilde{\cup}[c_{ij}]^0$ □

Definition 2.20 (t-norm)**.** *Let $T : [0,1] \times [0,1]$ be a function satisfying the following axioms.*

1. $T(x, 1) = x$, $\forall\ x \in [0, 1]$ *(identity)*

2. $T(x, y) = T(y, x)$, $\forall\ x, y \in [0, 1]$ *(commutatively)*

3. *If* $y_1 \le y_2$, *then* $T(x, y_1) \le T(x, y_2)$ $\forall\ x, y_1,\ y_2 \in [0, 1]$*(Monotonicity)*

4. $T(x, T(y, z)) = T(T(x, y), z)$, $\forall\ x, y, z \in [0, 1]$ *(Associatively)*

Then T is called t-norm, A t-norm is a Continuous if T is continuous function in [0,1].

3. Union of the Fuzzy Matrices on t-norm

Definition 3.1 (Union of fuzzy Matrices on t-norm)**.** *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{m\times n}$, then union of fuzzy Matrices on t-norm is determined by,* $[a_{ij}]\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}] = [a_{ij} + b_{ij} + c_{ij} - a_{ij}b_{ij}c_{ij}]$ *for each i and j.*

Definition 3.2 (Intersection of fuzzy Matrices on t-norm)**.** *Let $[a_{ij}], [b_{ij}], [c_{ij}] \in FSM_{m\times n}$, then intersection of fuzzy Matrices $[a_{ij}]$, $[b_{ij}]$ and $[c_{ij}]$ on t-norm is determined by,* $[a_{ij}]\tilde{\cap}[b_{ij}]\tilde{\cap}[c_{ij}] = [a_{ij}.b_{ij}.c_{ij}]$ *for each i and j.*

Proposition 3.3. *Let $[a_{ij}]$ $[b_{ij}]$ and $[c_{ij}] \in FSM_{m\times n}$, then De Morgan's type results are true*

1. $([a_{ij}]\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}])^0 = [a_{ij}]^0\tilde{\cap}[b_{ij}]^0\tilde{\cap}[c_{ij}]^0$

2. $([a_{ij}]\tilde{\cap}[b_{ij}]\tilde{\cap}[c_{ij}])^0 = [a_{ij}]^0\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}]^0$.

Proof. (1). For each i and j,

$$
\begin{aligned}
([a_{ij}]\tilde{\cup}[b_{ij}]\tilde{\cup}[c_{ij}])^0 &= [a_{ij} + b_{ij} + c_{ij} - a_{ij}.b_{ij}.c_{ij}]^0 \\
&= [1 - (a_{ij} + b_{ij} + c_{ij} - -a_{ij}.b_{ij}.c_{ij})] \\
&= [(1 - a_{ij} - b_{ij} - c_{ij} + a_{ij}.b_{ij}.c_{ij})] \\
&= [(1 - a_{ij})(1 - b_{ij})(1 - c_{ij})] \\
&= [1 - a_{ij}]\tilde{\cap}[1 - b_{ij}]\tilde{\cap}[1 - c_{ij}] \\
&= [a_{ij}]^0\tilde{\cap}[b_{ij}]^0\tilde{\cap}[c_{ij}]^0
\end{aligned}
$$

The proof of (2) is similar to (1). □

Definition 3.4 (Scalar Multiplication of fuzzy Matrix)**.** *Let $[z_{ij}] \in FSM_{m\times n}$, then Multiplication of fuzzy Matrix by a Scalar k denoted by $k[z_{ij}]$ is defined as,* $k[z_{ij}] = [kz_{ij}]$, $0 \le k \le 1$.

Proposition 3.5. *Let* $[z_{ij}] \in FSM_{m\times n}$*, and q and r are two scalars such that* $0 \leq q,\ r \leq 1$*, then*

1. $q(r[z_{ij}]) = (qr)[z_{ij}]$
2. $q \leq r = q[z_{ij}] \leq r[z_{ij}]$

Definition 3.6 (Three Important operators of t-norm)**.**

1. *Minimum operator:* $T_M(\lambda_1,\ \lambda_2,\ \ldots,\ \lambda_n) = min\ (\lambda_1,\ \lambda_2,\ \ldots,\ \lambda_n)$
2. *Product Operator:* $T_P\ (\lambda_1,\ \lambda_2,\ \ldots,\ \lambda_n) = \prod_{i=1}^{n} \lambda_i$
3. *Operator Lukasiewicz t-norm (Bounded t-norm):* $T_L((\lambda_1,\ \lambda_2,\ \ldots,\ \lambda_n) = max\ (\sum_{i=1}^{n} \lambda_i\text{-}n\ +1,0)$

Example 3.7. $[a_{ij}],\ [b_{ij}],\ [c_{ij}] \in FSM_{3\times 3}$*, where* $[a_{ij}] = \begin{pmatrix} 0.3 & 0.5 & 0.2 \\ 0.1 & 0.7 & 0.6 \\ 0.4 & 0.8 & 0.5 \end{pmatrix}$, $[b_{ij}] = \begin{pmatrix} 0.2 & 0.1 & 0.4 \\ 0.6 & 0.8 & 0.9 \\ 0.3 & 0.6 & 0.7 \end{pmatrix}$, $[c_{ij}] = \begin{pmatrix} 0.1 & 0.6 & 0.8 \\ 0.7 & 0.5 & 0.3 \\ 0.2 & 0.4 & 0.7 \end{pmatrix}$ *then*

$$T_M([a_{ij}],[b_{ij}],[c_{ij}] = \begin{pmatrix} 0.1 & 0.1 & 0.2 \\ 0.1 & 0.5 & 0.3 \\ 0.2 & 0.4 & 0.5 \end{pmatrix}$$

$$T_p([a_{ij}],[b_{ij}],[c_{ij}] = \begin{pmatrix} 0.6 & 0.30 & 0.64 \\ 0.42 & 0.180 & 0.162 \\ 0.24 & 0.192 & 0.245 \end{pmatrix}$$

$$T_L([a_{ij}],[b_{ij}],[c_{ij}] = \begin{pmatrix} 0 & 0 & 0 \\ 0 & 0 & 0 \\ 0 & 0 & 0 \end{pmatrix}$$

Definition 3.8. *Arithmetic mean (A.M) of fuzzy Matrix Let* $\widetilde{A_{AM}} = \frac{\sum_{j=1}^{n} \lambda_{ij}{}^{\tilde{A}}}{n}$.

4. Fuzzy Soft Matrices in Decision Making Based on T-norm Operators

In this part, we insert forward fuzzy square matrices in Decision making by using different operators of t-norm.

Input-fuzzy square Matrix of m objects, each of which has 'n'-parameters.

Output-An optimum result.

Algorithm

Step – 1 : Choose the set of parameters

Step – 2 : Construct the fuzzy square Matrix.

Step – 3 : Compute T_M

Step – 4 : Compute the membership value of fuzzy square Matrix of the Arithmetic mean as $A_{AM}(T_M)$

Step – 5 : Find the highest membership value.

Example 4.1. *Suppose a radio station produces five types of channels* c_1, c_2, c_3, c_4, c_5 *such that* V=\{ c_1, c_2, c_3, c_4, c_5\} *and* F=\{ f_1 *(very low frequency),* f_2 *(low frequency),* f_3 *(medium frequency),* f_4 *(high frequency)* \} *be the set of parameters. Here, We just explained the four types of frequencies as followed by,*

Very low frequency: *The VLF radio waves has a very long wave length between 10km and 100km, and it propagates on the ground surface, past small mountain.*

Low frequency: *The LF radio waves has a wave length between 1km and 10km, and itprogates very far.*

Medium frequency: *The MF radio waves has a wave length between 100km and 1000km, and it progatesby reflecting on the E-layer of the ionosphere formed at the altitude of about 100km.*

High frequency: *The HF radio waves has a very long wave length between 10km and 1OOkm, and it can travel to the opposite side of the planet by reflecting on the F-layer of the ionosphere formed at the altitude of about 200km-400km the ground surface. Suppose Mr.Z is ready to hear a radio, On the basis of parameters, four experts Mr.W, Mr.X, Mr.Y, Mr.Z give their valuable comments on the radio channel and the following fuzzy soft matrices are constructed as follows*

$$A = \begin{pmatrix} 0.7 & 0.8 & 0.9 & 0.8 \\ 0.81 & 0.3 & 0.5 & 0.6 \\ 0.6 & 0.9 & 0.65 & 0.8 \\ 0.7 & 1 & 0.6 & 0.7 \\ 0.8 & 0.4 & 0.7 & 0.5 \end{pmatrix}, \ B = \begin{pmatrix} 0.55 & 0.3 & 0.9 & 0.4 \\ 0.8 & 0.6 & 0.4 & 0.8 \\ 0.5 & 0.8 & 0.8 & 0.9 \\ 0.65 & 0.5 & 0.7 & 0.5 \\ 0.4 & 0.6 & 0.4 & 0.7 \end{pmatrix}$$

$$C = \begin{pmatrix} 0.9 & 0.6 & 0.7 & 0.9 \\ 0.4 & 0.8 & 0.5 & 0.8 \\ 0.8 & 0.83 & 0.6 & 0.9 \\ 0.7 & 0.9 & 0.9 & 0.65 \\ 0.4 & 0.5 & 0.7 & 0.8 \end{pmatrix}, \ D = \begin{pmatrix} 0.5 & 0.65 & 0.7 & 0.4 \\ 0.56 & 0.9 & 0.4 & 0.4 \\ 0.5 & 0.6 & 0.6 & 0.8 \\ 0.8 & 0.8 & 0.7 & 0.6 \\ 0.83 & 1 & 0.9 & 0.7 \end{pmatrix}$$

From the above result, it is obvious that c_3 *channel will be preferred If* T_P *and* T_L *are used instead of* T_M *,then we have*

$$TM = \begin{pmatrix} 0.5 & 0.3 & 0.7 & 0.4 \\ 0.4 & 0.3 & 0.4 & 0.4 \\ 0.5 & 0.6 & 0.6 & 0.8 \\ 0.65 & 0.5 & 0.6 & 0.5 \\ 0.4 & 0.4 & 0.4 & 0.5 \end{pmatrix}; \ AAM\,(TM) = \begin{pmatrix} 0.475 \\ 0.375 \\ 0.625 \\ 0.562 \\ 0.425 \end{pmatrix}$$

$$TP = \begin{pmatrix} 0.1732 & 0.0936 & 0.3969 & 0.1728 \\ 0.1451 & 0.1296 & 0.04 & 0.1536 \\ 0.12 & 0.3585 & 0.1872 & 0.5184 \\ 0.2548 & 0.36 & 0.2646 & 0.1365 \\ 0.1062 & 0.14 & 0.1764 & 0.196 \end{pmatrix}; \ AAM\,(TP) = \begin{pmatrix} 0.2091 \\ 0.117 \\ 0.296 \\ 0.2539 \\ 0.1546 \end{pmatrix}$$

$$TL = \begin{pmatrix} 0 & 0 & 0.2 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 0.13 & 0 & 0.4 \\ 0 & 0.2 & 0.9 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}; \ AAM\,(TL) = \begin{pmatrix} 0.05 \\ 0 \\ 0.1325 \\ 0.275 \\ 0 \end{pmatrix}$$

From the above result 2 and 3, it shows that c_3 *channel* c_4 *will be selected respectively by Mr.Z.*

5. Conclusion

We have define the fuzzy soft set theory and also the fuzzy matrix with examples. We extend the concept with regard to the matrices of union, intersection, complement, addition, multiplication and trace of fuzzy soft matrices . We have discussed some properties related to this concepts. The resolution of fuzzy matrix constitutes a new quality of decision. In this article, to solve the problem we approach the t-norm operators with the help of Multi -criteria Decision Making problems.

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