International Journal of Mathematics and Statistics Invention (IJMSI)
E-ISSN: 2321 – 4767 P-ISSN: 2321 - 4759
www.ijmsi.org Volume 11 Issue 1 || Jan. - Feb., 2023 || PP 55-62

Decision Making By Choice Matrices Algorithm with Fuzzy Soft Matrix

Dr. Rajesh Kumar Pal
Associate Professor, Dept. of Mathematics, D.A.V.(P.G.) College, Dehradun

Dr. Rasmita Sharma
Associate Professor, Dept. of Mathematics, D.A.V.(P.G.) College, Dehradun

Abstract: *In fuzzy soft set theory, many matrices of various sorts are defined in this study. Here, we have discussed all of these concepts and applied new algorithm of choice matrices on these matrices with the help of relevant examples. Additionally, an effective method for solving real-world decision-making problems based on fuzzy soft sets that may involve multiple decision-makers has been created.*
Keywords: *Fuzzy Soft Set, Fuzzy Soft Matrix, Choice Matrix.*

I. Introduction :

We require approaches that offer some type of flexible information processing capacity in order to handle real-life ambiguous circumstances. To resolve such issues, earlier [3] have defined different types of soft matrices recently [1] and [2] presented remarkable work on Fuzzy soft matrices based on soft set theory [9] and [10].

In the year 1999, Molodtsov [6] first introduced soft set as a completely generic mathematical instrument for modeling uncertainty. Researchers choose the kind of parameters they need to simplify the decision-making process since there are virtually no limitations in characterizing the objects, which makes it more effective in the absence of incomplete information. Further studies on soft set theory, fuzzy soft set theory, and related topics have been conducted by Maji et al. [9, 10, 11]. Maji et al. [9] also employ rough set theory's notion of attributes reduction to minimize However, using this method, one can also obtain an artificial optimal choice object. As a result, Chen et al. [4] demonstrated that the method of attributes reduction in rough set theory cannot be directly transferred to parameters reduction in soft set theory, but he did not disclose the intricate procedure of parameters reduction in soft set theory. The complete procedure for parameter reduction with the use of SQL (Structured Query Language), which Chambelin and Boyce [5] established, is provided by Zou et al. in [12].

In addition, Zhi Kong et al. [14] have provided a new concept of fuzzy soft set normal parameter reduction and proposed an algorithm for it. Additionally, Zou and Xiao's[13] data analysis methods for soft sets with partial data were provided..

For reflecting actual states of partial data in soft sets, the methods proposed in [13] are better. However, rough sets or fuzzy soft sets are typically used in the applications of soft set theory to help solve problems. A new soft set-based decision-making approach (uni-int decision-making method) [8] was developed by Cagman et al. and picks a set of ideal elements from the options. Additionally, they provided a concept for soft matrices, which are just soft set representations. This depiction has a number of benefits. In a computer, matrices and the soft sets they represent can be easily stored and operated upon. Additionally, Cagman et al. [7] have suggested an approach for handling situations involving soft sets and many operations. But the Cagman technique is exceedingly time-consuming and has a high computational complexity for soft set based decision making situations with more than two decision makers. Therefore, in [1], we first described various types of soft matrices, choice matrices, and provided some operations on them. We then used a novel method that uses these choice matrices and the newly proposed soft matrices operations to address soft set based decision making problems. This novel approach has the advantage of being able to solve any soft set-based decision-making problem with a large number of decision makers extremely quickly and with a minimally complex computing process.

We have the idea of a fuzzy soft matrix was put forth in this presentation. Then, after providing suitable examples, we defined various types of fuzzy soft matrices. Here, we have also suggested the idea of a decision matrix connected to a fuzzy soft set. further presented some operations on choice matrices and fuzzy soft matrices. Finally, we have provided a new technique for solving fuzzy soft set-based decision-making issues using these choice matrices and recently described operations of fuzzy soft matrices. The uniqueness of this novel strategy is that it can readily answer any fuzzy soft-based decision-set forming problem involving a large number of decision-makers, and the computational process is relatively straightforward.

II. Preliminaries

Fuzzy Soft Set Matrix:

Let (F_A, E) be a fuzzy soft set over U. Then a subset of UxE is uniquely defined by $R_A = \{(u.e) : e \epsilon A, u \epsilon F_A(e)\}$ which is called a relation form of (F_A, E). Now the characteristic function of R_A is written by χ_{RA} : UXE → [0,1] s.t, if the $\chi_{RA}(u.e) = \mu(u.e)$ [where $\mu(u.e)$ is the membership value of the object u associated with the parameter e.]

Now if the set of universe $U = \{u_1, u_2,........………....u_m)$ and the set of parameters $E= \{e_1,e_2,..........e_n\}$, then R_A can be presented by a table as in the following form

	e_1	e_2	……….	e_n
u_1	$\chi_{RA}(u_1,e_1)$	$\chi_{RA}(u_1,e_2)$	……….	$\chi_{RA}(u_1,e_n)$
U_2	$\chi_{RA}(u_2,e_1)$	$\chi_{RA}(u_2,e_2)$	……….	$\chi_{RA}(u_2,e_n)$
…..	………..	…………	……….	………..
U_m	$\chi_{RA}(u_m,e_1)$	$\chi_{RA}(u_m,e_2)$	……….	$\chi_{RA}(u_m,e_n)$

which is called a fuzzy soft matrix of order mxn corresponding to the fuzzy soft set (F_A,E) over U. A fuzzy soft set $(F_A.E)$ is uniquely characterized by the matrix $[a_{ij}]$mxn. Therefore we shall identify any fuzzy soft set with its fuzzy soft matrix and use these two concepts as interchangeable.

Example :

Suppose the initial universe set U contains five Houses h_1, h_2, h_3, h_4, h_5 and parameter set
E = { costly, elegant, cheap, comfortable, Size)= $\{e_1,e_2,.e_3,e_4,e_5)$.
A = $\{e_2,.e_3,e_4,e_5\}$ C E
Let F:A→P(U) such that
$F(e_1) = \{h_1/0.8, h_2./0.3, h_3./0.6, h_4/0.5, h_5/0.2\}$.
$F(e_2) = \{h_1/0.8, h_2./0.2, h_3./0.5, h_4/0.4, h_5/0.1\}$.
$F(e_3) = \{h_1/0.3, h_2./0.7, h_3./0.5, h_4/0.4, h_5/0.9\}$
$F(e_4)= \{h_1/0.8, h_2./0.6, h_3./0.4, h_4/0.2, h_5/0.7\}$.
$F(e_5)= \{h_1/0.5, h_2./0.2, h_3./0.8, h_4/0.3, h_5/0.3\}$.

Then we write a fuzzy soft set describing the quality of the houses is given by,
$(F, E) = \{(e_1,\{h_1/0.8, h_2./0.3, h_3./0.6, h_4/0.5, h_5/0.2\})$,
$(e_2, \{h_1/0.8, h_2./0.2, h_3./0.5, h_4/0.4, h_5/0.1\})$,
$(e_3, \{h_1/0.3, h_2./0.7, h_3./0.5, h_4/0.4, h_5/0.9\})$,
$(e_4, \{h_1/0.8, h_2./0.6, h_3./0.4, h_4/0.2, h_5/0.7\})$,
$(e_5,\{h_1/0.5, h_2./0.2, h_3./0.8, h_4/0.3, h_5/0.3\})\}$.

and then the relation form of (F,A) is written by.
$R_A = (\{\{h_1/0.8, h_2./0.3, h_3./0.6, h_4/0.5, h_5/0.2\},e_1)$,
$(\{h_1/0.8, h_2./0.2, h_3./0.5, h_4/0.4, h_5/0.1\},e_2)$,.
$\{h_1/0.3, h_2./0.7, h_3./0.5, h_4/0.4, h_5/0.9\},e_3)$,
$\{h_1/0.8, h_2./0.6, h_3./0.4, h_4/0.2, h_5/0.7\},e_4)$,
$\{h_1/0.5, h_2./0.2, h_3./0.8, h_4/0.3, h_5/0.3\},e_5)$.

Hence the fuzzy soft matrix $(a_{ij},)$ is written by

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

Row-Fuzzy Soft Matrix: A fuzzy soft matrix of order 1xn i.e., with a single row is called a row-fuzzy soft matrix. Physically, a row-fuzzy soft matrix formally corresponds to a fuzzy soft set whose universal set contains only one object.

Column-Fuzzy Soft Matrix : A fuzzy soft matrix of order mx1 i.e., with a single column is called a column-fuzzy soft matrix. Physically, a column-fuzzy soft matrix formally corresponds to a fuzzy soft set whose parameter set contains only one parameter.

Square Fuzzy Soft Matrix : Fuzzy soft matrix of order mxn is said to be a square fuzzy soft matrix if m = n ie., the number of rows and the number of columns are equal. That means a square-fuzzy soft matrix is formally equal to a fuzzy soft set having the same number of objects and parameters.

Null Fuzzy Soft Matrix: A fuzzy soft matrix of order mxn is said to be a null fuzzy soft matrix or zero fuzzy soft matrix if all of it's a elements are zero. A null fuzzy soft matrix is denoted by Φ. Now the fuzzy soft set associated with a null fuzzy soft matrix must be a null fuzzy soft set.

Complete or Absolute Fuzzy Soft Matrix : A fuzzy soft matrix of order mxn is said to be a complete or absolute fuzzy soft matrix if all of its elements are one. A complete or absolute fuzzy soft matrix is denoted by, C_A. Now the fuzzy soft set associated with an absolute fuzzy soft matrix must be an absolute fuzzy soft set.

Slant Fuzzy Soft Matrix : A square fuzzy soft matrix of order mxn is said to be a slant-fuzzy soft matrix if all of its non-diagonal rudiments are zero.

Transpose of a Fuzzy Soft Matrix : The transpose of a square fuzzy soft matrix(aij) of order mxn is another square fuzzy soft matrix of order nxm attained from(a_{ij}) by changing its rows and columns. It's denoted by($a_{ij})^T$. thus the fuzzy soft set associated with($a_{ij})^T$ becomes a new fuzzy soft set over the same elements and over the same set of parameters.

Choice Matrix: It is a square matrix whose rows and columns both indicate parameters. If ξ is a choice matrix, then its element ξ(i, j) is defined as follows:

ξ(i, j) = 1 when i-th and j-th parameters are both choice parameters of the decision makers
= 0 otherwise, i.e. when atleast one of the i-th or j-th parameters is not under choice.

There are different types of choice matrices according to the number of decision makers. Like the choice matrices associated with a soft set based decision making problem; here also the choice matrices only contain the digits 0 and 1, the only difference is about the nature of the associated parameters. We may realize this by the following example.

Example:
Suppose that U be a set of four companies,
say,
U = {c_1.c_2, c_3,c_4} Let E be a set of parameters, given by, E={costly, working environment, good salary, posh area, cheap} = {e_1, e_2, e_3, e_4,e_5} (say)
Now let the fuzzy soft set (F, E) describing the quality of the companies, is given by, basis of his choice parameters working environment, good salary, cheap which form a subset P of the parameter set E.
(F.E)={ costly companies = {c_1/0.9, c_2/0.2, c_3/0.4. c_4./0.8),
companies with working environment = {c_1/0.8, c_2/0.3, c_3/0.5. c_4./0.4
companies with good salary = {c_1/0.9, c_2/0.2, c_3/0.4. c_4./0.8),
companies in posh area = {c_1/0.7, c_2/0.9, c_3/0.4. c_4./0.8),
cheap companies = {c_1/0.1, c_2/0.7, c_3/0.5. c_4./0.2)}

Suppose Mr. Bajaj wants to procure a company on the basis on the choice parameters working environment, good salary and cheap which form a subset B of the parameter set E.
Therefore B= {e_2,e_3,e_5}
Now the choice matrix of Mr.Bajaj is,

$$(\xi_{ij})_B = e_B \begin{pmatrix} & & e_B & & \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 1 \end{pmatrix}$$

Now let the choice parameter set of Mr khetan is K={ e_1, e_2, e_3, e_4}

Now suppose Mr.Bajaj and Mr.Khetan together wants to procure a company according to their choice parameters.

Then the combined choice matrix of Mr. Bajaj and Mr Khetan is

$$(\xi_{ij})_{(B\,,\,K)} = e_B \begin{pmatrix} & & e_K & & \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 1 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 0 \end{pmatrix}$$

[Here the entries e_{ij} = 1 indicates that e_i is a choice parameter of Mr.Bajaj and e_j is a choice parameter of Mr.Khetan. Now e_{ij} = 0 indicates either e_i fails to be a choice parameter of Mr.Bajaj or e_j fails to be a choice parameter of Mr.Khetan.] Again the above combined choice matrix of Mr.bajaj and Mr.Khetan may be also presented in its transpose form as,

$$(\xi_{ij})_{(K\,,\,B)} = e_K \begin{pmatrix} & & e_B & & \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 1 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

Now let us see the form of the combined choice matrix associated with three decision makers. Suppose that Mr. Zing is willing to buy a company together with Mr Bajaj and Mr.Khetan on the basis of his choice parameters working environment, good salary, posh area, which form a subset Z of the parameter set E. Therefore Z={e_2, e_3,e_4}

Then the combined choice matrix of Mr.Bajaj , Mr.Khetan and Mr.Zing will be of three different types which are as follows,

(i) When set of common choice parameters of Mr.Bajaj and Mr.Khetan considered.

$$(\xi_{ij})_{(Z,\ B\wedge K)} = e_Z \begin{pmatrix} & & e_{B\wedge K} & & \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}$$

[Since the set of common choice parameters of Mr.Bajaj and Mr.Khetan is, B^K={e_2,e_3}]

[Here the entries eij = 1 indicates that e_i, is a choice parameter of Mr.Zing and e_i, is a common choice parameter of Mr. Bajaj and, Mr.Khetan.

. Now e_{ij} = 0 indicates either e_i, fails to be a choice parameter of Mr.ing or e_j, fails to be a common choice parameter of Mr.Bajaj and Mr. Khetan.

(ii) When set of common choice parameters of Mr.Khetan Mr. Zing considered , so K^Z={e_2,e_3, e_4}

$$(\xi_{ij})_{(B,\ K\wedge Z)} = e_P \overset{e_{K\wedge Z}}{\begin{pmatrix} 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 & 0 \end{pmatrix}}$$

(iii) When set of common choice parameters of Mr. bajaj Mr. Zing considered , so B^Z={e_2,e_3}

$$(\xi_{ij})_{(K,\ Z\wedge B)} = e_K \overset{e_{Z\wedge B}}{\begin{pmatrix} 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 \end{pmatrix}}$$

Symmetric Fuzzy Soft Matrix:
A square fuzzy soft matrix A of order nxn is said to be a symmetric fuzzy soft matrix, if its transpose be equal to it, i.e., if $A^T = A$. Hence the fuzzy soft matrix (a_{ij}) is symmetric, if $a_{ij}=a_{ji}$.

III. Choice Matrix Algorithm:

This new approach is specially based on choice matrices. These choice matrices represent the choice parameters of the decision makers and also help us to solve the fuzzy soft matrix based decision making problems with least computational complexity. So by the help of these newly choice matrices and proposed the operations on them we are presenting the following algorithm:

Step-1: First construct the combined choice matrix with respect to the choice parameters of the decision makers.

Step-2: Compute the product fuzzy soft matrices by multiplying each given fuzzy soft matrix with the combined choice matrix as per the rule of multiplication of fuzzy soft matrices.

Step-3: Compute the sum of these product fuzzy soft matrices to have the resultant fuzzy soft matrix (R_j).

Step-4: Then compute the weight of each object (O_i) by adding the entries of its concerned row (i-th row) of R_j, and denote it as W(O_i).

Step-5: The object having the highest weight becomes the optimal choice object. If more than one object have the highest weight then any one of them may be chosen as the optimal choice object.

To illustrate the basic idea of the algorithm, now we apply it to a fuzzy soft set based decision making problem.

III. Choice Matrix Algorithm : This new approach is especially grounded on choice matrices. These choice matrices represent the choice parameters of the decision makers and also help us to break the fuzzy soft matrix grounded decision problems with least computational complexity. So by the help of these recently choice matrices and proposed the operations on them we're presenting the following algorithm

Step-1: First construct the concerted choice matrix with respect to the choice parameters of the decision makers.
Step- 2: compute the product fuzzy soft matrices by multiplying each given fuzzy soft matrix with the concerted choice matrix as per the rule of multiplication of fuzzy soft matrices.
Step- 3: compute the sum of these product fuzzy soft matrices to have the attendant fuzzy soft matrix(R_j).
Step- 4: also compute the weight of each object(Oi) by adding the entries of its concerned row (i- th row) of Rj, and denote it as W(O_i).

Step- 5: The object having the highest weight becomes the optimal choice object. If further more than one object have the highest weight also any one of them may be chosen as the optimal choice object. To illustrate the introductory idea of the algorithm, now we apply it to a fuzzy soft set grounded decision making problem.

IV. Case Study: Decision making of the Problem:

Two friends Ravi and Shyamsundram together want to buy a Agriculture Farm among three farms. Ravi is interested to purchase the farm for his personal use and Shyamsundram is interested for business purpose. The set of parameters of these three farms F_1,F_2, F_3 are area, Productivity, Location and commercial benefit. Ravi is interested in Productivity and location of the Farm while preferences of Shyamsundaram are Productivity and commercial benefits of the farm.
Let the set of universe U consist of three Farms F_1,F_2, F_3. and the set of parameters
E= { area, Productivity, Location and commercial benefit }={e_1,e_2,e_3,e_4}

So the sets of choice parameters of Ravi and Shyamsundram respectively, are
A = { Productivity, Location}= {e_2,e_3} C E and
B = { Productivity, Commercial benefit = {e_2,e_4} CE

Now let according to the choice parameters of Ravi and Shyamsundram, we have the fuzzy soft sets (F,A) and (G, B), both describing the importance of the Farms according to Ravi and Shyamsundram respectively.

Let the fuzzy soft matrices of the fuzzy soft sets (F, A) and (G, B) are respectively,

$$A_{ij} = \begin{pmatrix} 0 & 0.9 & 0.5 & 0 \\ 0 & 0.6 & 0.8 & 0 \\ 0 & 0.5 & 0.4 & 0 \end{pmatrix}$$

$$B_{jk} = \begin{pmatrix} 0 & 0.8 & 0 & 0.6 \\ 0 & 0.5 & 0 & 0.7 \\ 0 & 0.6 & 0 & 0.8 \end{pmatrix}$$

Now the problem is to select the Farm among the three farms which satisfies the choice parameters of Ravi and Shyamsundram as much as possible.

The Choice matrix of Ravi is

$$\mathbf{e_A} \begin{pmatrix} & e_A & & \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \end{pmatrix}$$

And choice matrix of Shyamsundram is

$$\mathbf{e_B} \begin{pmatrix} & e_B & & \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \end{pmatrix}$$

1) The combined choice matrix of Ram and Shyamsudram is,

$$\mathbf{e_B}\begin{bmatrix} & & e_A & \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix}$$

or it may be presented in its transpose form

$$\mathbf{e_A}\begin{bmatrix} & & e_B & \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

2) Corresponding product fuzzy soft matrices are

$$U_A = \begin{bmatrix} 0 & 0.9 & 0.5 & 0 \\ 0 & 0.6 & 0.8 & 0 \\ 0 & 0.5 & 0.4 & 0 \end{bmatrix} \otimes$$

$$\mathbf{e_A}\begin{bmatrix} & & e_B & \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 0 & 0 \end{bmatrix}$$

$$= \text{The Normalized form of} \begin{bmatrix} 0 & 1.4 & 0 & 1.4 \\ 0 & 1.4 & 0 & 1.4 \\ 0 & 0.9 & 0 & 0.9 \end{bmatrix}$$

Dividing each element of array by 7.d , we get

$$= \begin{bmatrix} 0 & 0.19 & 0 & 0.19 \\ 0 & 0.19 & 0 & 0.19 \\ 0 & 0.12 & 0 & 0.12 \end{bmatrix}$$

$$U_B = \begin{bmatrix} 0 & 0.8 & 0 & 0.6 \\ 0 & 0.5 & 0 & 0.7 \\ 0 & 0.6 & 0 & 0.8 \end{bmatrix} \otimes$$

$$\mathbf{e_B}\begin{bmatrix} & & e_A & \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} = \text{The Notmalized form of} \begin{bmatrix} 0 & 1.4 & 1.4 & 0 \\ 0 & 1.2 & 1.2 & 0 \\ 0 & 1.4 & 1.4 & 0 \end{bmatrix}$$

Dividing each element of the array by 8.0, we get

$$= \begin{bmatrix} 0 & 0.18 & 0.18 & 0 \\ 0 & 0.15 & 0.15 & 0 \\ 0 & 0.18 & 0.18 & 0 \end{bmatrix}$$

3) The sum of these product fuzzy soft matrices is,

$$= \begin{bmatrix} 0 & 0.19 & 0 & 0.19 \\ 0 & 0.19 & 0 & 0.19 \\ 0 & 0.12 & 0 & 0.12 \end{bmatrix} \oplus$$

$$\begin{bmatrix} 0 & 0.18 & 0.18 & 0 \\ 0 & 0.15 & 0.15 & 0 \\ 0 & 0.18 & 0.18 & 0 \end{bmatrix}$$

$$= \begin{bmatrix} 0 & 0.19 & 0.18 & 0.19 \\ 0 & 0.19 & 0.15 & 0.19 \\ 0 & 0.18 & 0.18 & 0.12 \end{bmatrix} = R_j$$

4) Now the weights of the ponds are,
$W(F_1) = 0+0.19+0.18+0.19 = 0.56$
$W(F_2) = 0+0.19+0.15+0.19 = 0.53$
$W(F_3) = 0+0.18+0.18+0.12 = 0.48$

5) The agriculture Farm associated with the first row of the resultant fuzzy soft matrix (R_j) has the highest weight $\{W(F_1) = 1.09\}$, therefore F_1 will be the optimal choice Farm. Hence Ravi and Shyamsundram will buy the Farm F_1, according to their choice parameters.

V. Conclusion:

In this paper first we have defined different types of fuzzy soft matrices. Moreover we have proposed the concept of choice matrix which represents the choice parameters of the decision makers associated with a fuzzy soft set based decision making problem. Finally we have presented a new algorithm using these choice matrices to solve fuzzy soft set based decision making problems. The speciality of this new method is that it may solve any fuzzy soft set based decision. making problem involving huge number of decision makers easily along with a very simple computational procedure.

References

[1]. T.M. Basu, N.K. Mahapatra, S.K. Mondal, Different types of matrices in fuzzy soft set theory and their application in decision making problem, IRACST,Vol. 2 No.3(2012), 389-398.
[2]. B.K. Saikia, H. boruah, P.K. das, An application of generalized fuzzy soft matrices in decision making problem, IOSR-JM, 10(2014), 33-41
[3]. T. Mitra Basu, N.K Mahapatra, S.K Mondal, Matrices in Soft Set Theory And Their Applications in Decision Making Problems, S. Asia. J. Math. Vol. 2 No. 2 (2012), 126-143.
[4]. D. Chen, E.C.C.Tang, D. S. Yeung, X. wang, The parameterization Reduction of Soft Set and it's Application, Comput Math Appl., 49(2005), 757-763.
[5]. D. D. Chamberlin, Boyce R. SEQUEL 2: A Unified Approach to Data Definition, Manipulation And Control, IBM Journal of Research and Development, 20(1974).
[6]. D.Molodtsov, Soft Set Theory-First Results, Comput Math Appl., 37(1999), 19-31.
[7]. Naim Cagman, Serdar Enginoglu, Soft Matrix Theory and it's Decision Making, Comput Math Appl., 59(2010), 3308-3314.
[8]. Naim Cagman, Serdar Enginoglu, Soft Set Theory and Uni-int Decision Making, Eur J Oper Res. 207(2010), 848-855.
[9]. P. K. Maji, R. Biswas and A. R. Roy, An application of soft sets in a decision making problem, Comput Math Appl. 44(2002), 1077-1083
[10]. P. K. Maji, R. Biswas and A. R. Roy, Soft Set Theory, Comput Math Appl. 45 (2003), 555-562.
[11]. P. K. Maji, R. Biswas and A. R. Roy, Fuzzy Soft Sets, J Fuzzy Math. Vol. 9, No. 3 (2001), 589-602.
[12]. Y. Zou, Y. Chen, Research on Soft Set Theory and Parameters Reduction Based on Relational Algebra, Second International Symposium on Information Technology Application, DOI 10.1109/1ITA.2008.264.
[13]. Y. Zou, Z. Xiao, Data Analysis Approaches of Soft Sets under Incomplete Information, Knowledge-Based Systems, 21(2008), 941-945.
[14]. Zhi Kong, Liqun Gao, Lifu Wang, Steven Li, The normal parameter reduction of soft sets and its algorithm, Comput Math Appl. 56(2008), 3029-3037.