Decision Making in Mass Media Using Fuzzy Soft Sets

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Abstract
Mass Media is the third largest emerging industry of Pakistan. It involves so many decision making in regard to selection of shows, anchors, lighting and technical equipment. The problem becomes ambiguous as most of the channel owners are investors and seldom know about the complications and technicalities of this industry. Solutions given by fuzzy structures in different areas has provoked us to find their applications in the nexus of Mass Media. In this paper, the choice matrix and cardinals of the fuzzy soft set are considered for the approach of decision making. A case study is discussed for the ordering of TV shows to be aired daywise in a sequence using choice matrix and reduct fuzzy soft set. An application with the algorithm is provided for the selection of anchor person for any TV program on the basis of cardinal sets and FS-aggregation operator.

Keywords: Fuzzy soft set; FS-aggregate algorithm; Selection.

1. Introduction

The tool of Fuzzy sets for dealing uncertainties were founded by Zadeh in 1965 [1]. A fuzzy set is a bijection from choice function to the interval [0,1]. Rough set was developed by Pawlak in 1982, which was then applied in the nexus of medical science, computer systems and in modeling other fields [2]. At present the Soft set theory is on its voyage of progress creating advancements in all the fields of science and social sciences coming on its way [3]. The applications of soft set theory in decision making can be found in [4], whereas a new definition of parameterizations reduction can be seen in [5] to reduction and compare the under consideration concept of attributes reduction in rough set structure. The algebra of soft set was introduced by Rosenfeld [6]. Biswas et al. discussed the algebraic nature of rough sets and proposed the topic of rough groups [7]. Saeed et al. came up with the new notion of soft element and soft members under the soft set environment [8].

The concept of fuzzy soft set (fs-set) was given by Maji et al. by the amalgamation of
ideas of fuzzy sets in [9]. A number of researchers have harnessed fs-sets to propose the solutions of problems having decision making which can be seen in [10, 11]. Moreover, Bhardwaj et al. used reduct soft set for real life decision making problems [12]. Lin presented novel theory of soft set for computing a unified view of fuzzy sets via neighborhood; and applied it in the selection decision-making problem [13, 14]. Zulqarnain et al. presented the generalized TOPSIS technique for the multi-criteria decision-making in neutrosophic structure and intuitionistic fuzzy soft structure to diagnose a medical disease in [15, 16]. Saeed et al. has presented the major applications of fuzzy logic controller in smart parking system and impact of pH on detergent in automatic washing machine in [17, 18]. Rahman et al. introduced the m-convex and m-concave sets in the structure of soft set with their properties [19]. Saeed et al. presented the wide application of neutrosophic soft set in the player selection for the soccer team and extended the TOPSIS technique in the intuitionistic fuzzy structure based on linguistic terms for decision making in [20, 21].

In this paper, we have devised the techniques discussed by Pal in [22] and Gogai et al. in [23] to solve decision making problems encountered by media houses in a rather different way. The paper is having the following formation. Section 1 of this note comprises of introduction, section 2 presents some fuzzy soft set theoretic definitions, section 3 presents algorithms which will help us in solving the problems discussed in this paper, section 4 presents the problems discussed in this paper and at last in section 5, conclusions and future directions in this concern will be presented.

2. Preliminaries

In this section, we give some basic notions related to proposed article.

2.1 Fuzzy Set
Fuzzy set \( A \) in universe \( Y \) is as follows

\[
A = \{(y, \mu_A(y)) : y \in Y\}.
\]

Where the function \( \mu_A : Y \to [0,1] \) defines the degree value of membership of the element \( y \in Y \) [1].

Let \( A \) and \( B \) be two Fuzzy Set and \( \mu_A, \mu_B \) are their membership functions. The complement \( A' \) is defined by its membership bijection as

\[
\mu_{A'}(y) = 1 - \mu_A(y); \text{ for } y \in Y.
\]

The union operation \( A \cup B \) of union can be expressed as

\[
\mu_{A\cup B}(y) = \max\{\mu_A(y),\mu_B(y)\}.
\]

The intersection operation \( A \cap B \) of union can be expressed as

\[
\mu_{A\cap B}(y) = \min\{\mu_A(y),\mu_B(y)\}.
\]
2.2 Soft Set
Molodtsov rectified this difficulty by using an appropriate parameterization. Let \( \Lambda \) be any nexus and \( \Omega \) be a set of parameters. The pair \((F, \Omega)\) is called a Soft Set (over \( \Lambda \)) if and only if \( F \) is a mapping of \( \Omega \) into the set of all subsets of \( \Lambda \). Hence the Soft Set is a parameterized family of subsets of the set \( \Lambda \).

In this paper, \( \Lambda \) is any nexus, \( \Omega \) is a set of parameters, \( P(\Lambda) \) is the power set of \( \Lambda \), and \( B \subseteq \Omega \).

A soft set \((F, B)\) over \( \Lambda \) is a set defined by a bijection \( F_B \) representing a mapping \( F_B: B \to P(\Lambda) \); for all \( \omega \in B \). The soft set \((F, B)\) can be depicted by the collection of ordered order pairs [3].

\[
(F, B) = \{(\omega, F_B(\omega)) : \omega \in B, F_B(\omega) \in P(\Lambda)\}.
\]

2.2.1 Example
Suppose \( \Lambda = \{\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5\} \) be a universal set and \( \Omega = \{\omega_1, \omega_2, \omega_3, \omega_4\} \) be a set of parameters. If \( B = \{\omega_1, \omega_2, \omega_4\} \subseteq \Omega \), \( F_B(\omega_1) = \{\lambda_2, \lambda_4\}, F_B(\omega_2) = \Lambda \) and \( F_B(\omega_4) = \{\lambda_1, \lambda_3, \lambda_5\} \) then the soft set \( F_B \) is written by

\[
F_B = \{(\omega_1, \{\lambda_2, \lambda_4\}), (\omega_2, \Lambda), (\omega_4, \{\lambda_1, \lambda_3, \lambda_5\})\}.
\]

2.3 Fuzzy Soft Set
A fuzzy soft set \((F, B)\) over \( \Lambda \) is a set given by a bijection \( F_B \) representing a mapping \( F_B: B \to \mathcal{P}(\Lambda) \). Here, \( F_B \) is called fuzzy approximate function of the fuzzy soft set \((F, B)\). Thus, a fuzzy soft set \((F, B)\) over \( \Lambda \) can be represented by the set of ordered pairs [9];

\[
(F, B) = \{(\omega, F_B(\omega)) : \omega \in \Omega; F_B(\omega) \in \mathcal{P}(\Lambda)\}.
\]

Note that the set of all fuzzy subsets over \( \Lambda \) will be denoted by \( \mathcal{P}(\Lambda) \).

Let \((F, B) \in FS(\Lambda)\). If \( F_B(\omega) = \phi; \) for all \( \omega \in B \), then \((F, B)\) is known as an empty fuzzy soft set, depicted by \( F_\phi \).

Let \((F, B) \in FS(\Lambda)\). If \( F_B(\omega) = \Lambda; \) for all \( \omega \in B \), then \((F, B)\) is known as an universal fuzzy soft set, depicted by \( F_\Lambda \).

2.3.1 Example
Let \( \Lambda = \{\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5\} \) be a universal set and \( \Omega = \{\omega_1, \omega_2, \omega_3, \omega_4\} \) be a set of parameters. If \( B = \{\omega_1, \omega_2, \omega_4\} \subseteq \Omega \), \( F_B(\omega_1) = \{0.9/\lambda_2, 0.5/\lambda_4\}, F_B(\omega_2) = \Lambda \), and \( F_B(\omega_4) = \{0.2/\lambda_1, 0.4/\lambda_3, 0.8/\lambda_5\} \) then the soft set \( F_B \) is written by

\[
(F, B) = \{(\omega_1, \{0.9/\lambda_2, 0.5/\lambda_4\}), (\omega_2, \Lambda), (\omega_4, \{0.2/\lambda_1, 0.4/\lambda_3, 0.8/\lambda_5\})\}.
\]

2.4 Reduct Soft Set
Let \( C \subseteq \Omega \) and \((F, C) \subseteq (F, \Omega)\) Suppose \( R \) is a reduct of \( C \). Then soft set \((F, R)\) is called reduct softest \((F, C)\).

The choice value of an object \( C_i \Lambda \) is \( p_i \) where \( p_i = \sum c_{ij} \), where \( c_{ij} \) are the entries in the
2.5 Weighted Soft Set
The weighted soft set called “W-soft set” is the weights given to attributes of each choice of the objects under consideration i.e for \( c_i \in \lambda \) this value is \( W_{pi} \) where \( W_{pi} = \sum d_{ij} \) such that \( d_{ij} = w_j \times y_{ij} \) [5].

3. Fuzzy Soft Aggregation Operator

An fuzzy soft (fs) aggregation operator is a tool for generating an aggregate out of fs-set and its cardinal set of a fuzzy set. The approximate functions of an fs-set are fuzzy in nature. An fs-aggregation operator is an operation with which a number of approximate functions of an fs-set are joined together forming a single aggregate of fs-set such that the resulting set is fuzzy in nature. After we find an aggregate fuzzy set, it becomes necessary to identify best single option out of resulting ones. Therefore, we can do decision making via algorithm given below.

Step 1: Compute \((F, B)\) over \(\Lambda\).
Step 2. Calculate cardinal set (c-set) \(c(F, B)\) of \((F, B)\).
Step 3: Evaluate aggregate fuzzy set \((F, B)^*\) of \((F, B)\).
Step 4: Identify the best option from the resulting set by finding max \((F, B)^*(\lambda)\).

Step 1:
Let \((F, B) \in FS(\Lambda)\). Assume that \(\Lambda = \{\lambda_1, \lambda_2, ..., \lambda_m\}\), \(\Omega = \{\omega_1, \omega_2, ..., \omega_n\}\) and \(B \subseteq \Omega\), then the \((F, B)\) can be presented in the Table 1.

| \((F, B)\) | \(\omega_1\) | \(\omega_2\) | \(\vdots\) | \(\omega_n\) |
|------------|-------------|-------------|-------------|-------------|
| \(\lambda_1\) | \(\mu_{F, B}(\omega_1)(\lambda_1)\) | \(\mu_{F, B}(\omega_2)(\lambda_1)\) | \(\vdots\) | \(\mu_{F, B}(\omega_n)(\lambda_1)\) |
| \(\lambda_2\) | \(\mu_{F, B}(\omega_1)(\lambda_2)\) | \(\mu_{F, B}(\omega_2)(\lambda_2)\) | \(\vdots\) | \(\mu_{F, B}(\omega_n)(\lambda_2)\) |
| \(\vdots\) | \(\vdots\) | \(\vdots\) | \(\vdots\) | \(\vdots\) |
| \(\lambda_m\) | \(\mu_{F, B}(\omega_1)(\lambda_m)\) | \(\mu_{F, B}(\omega_2)(\lambda_m)\) | \(\vdots\) | \(\mu_{F, B}(\omega_n)(\lambda_m)\) |

Where \(\mu_{F, B}(\omega)\) is the membership function of \((F, B)\). If \(b_{ij} = \mu_{F, B}(\omega_j)(\lambda_i)\) for \(i = 1, 2, ..., m\) and \(j = 1, 2, ..., n\); then \((F, B)\) is distinctly expressed by the matrix

\[
[a_{ij}] = \begin{bmatrix}
    b_{11} & b_{12} & \ldots & b_{1n} \\
    b_{21} & b_{22} & \ldots & b_{2n} \\
    \vdots & \vdots & \ddots & \vdots \\
    b_{m1} & b_{m2} & \ldots & b_{mn}
\end{bmatrix}
\]
This matrix is called an $m \times n$ fs-matrix of $(F, B)$ over $\Lambda$.

**Step 2:**
Let $(F, B) \in FS(\Lambda)$ then the cardinal set (c-set) of $(F, B)$ denoted by $c(F, B)$ and defined by $c(F, B) = \{\mu_{c(F_B)}(\omega) / \omega : \omega \in B\}$ is a fuzzy set over $\Omega$. The membership function $\mu_{c(F_B)}$ of $c(F, B)$ is defined by $\mu_{c(F_B)}: \Omega \to [0,1]$,

$$\mu_{c(F_B)}(\omega) = \frac{|F_B(\omega)|}{|\Lambda|}.$$ 

where $|\Lambda|$ and $|F_B(\omega)|$ are the cardinalities of nexus $\Lambda$ and fuzzy set $F_B(y)$ respectively.

The collection of all c-sets of the fs-sets over $U$ will be depicted by $c_{FS}(\Lambda) \subseteq F(\Lambda)$. Now let $(F, B) \in FS(\Lambda)$ and $c(F, B) \in cFS(\Lambda)$.

Assume that $\Omega = \{\omega_1, \omega_2, \ldots, \omega_n\}$ and $B \subseteq \Omega$, then $c(F, B)$ can be presented by the Table 2.

| $c(F, B)$ | $\omega_1$ | $\omega_2$ | $\vdots$ | $\omega_n$ |
|-----------|-----------|-----------|----------|-----------|
| $\mu_{c(F_B)}$ | $\mu_{c(F_B)}(\omega_1)$ | $\mu_{c(F_B)}(\omega_2)$ | $\vdots$ | $\mu_{c(F_B)}(\omega_n)$ |

If $a_{1j} = \mu_{c(F_B)}(\omega_j)$ for $j = 1, 2, \ldots, n$, then the c-set $c(F, B)$ is distinctly express by a matrix,

$$[a_{1j}] = [a_{11}, a_{12}, \ldots, a_{1n}]$$

Which is called the cardinal matrix (c-matrix) of the c-set $c(F, B)$ over $\Lambda$.

**Step 3:**
Let $(F, B) \in FS(\Lambda)$ and $c(F, B) \in cFS(\Lambda)$, then fs-aggregation operator, denoted by FS-agg, is defined by $FS - agg: cFS(\Lambda) \times FS(\Lambda) \to F(\Lambda)$ as

$$FS - agg(c(F, B), (F, B)) = F \ast B.$$ 

where $F \ast B = \{\mu_{F \ast B}(\lambda) / \lambda : \lambda \in \Lambda\}$ is a fuzzy set over $U$. $F \ast B$ is called the aggregate fuzzy set of the fs-set $(F, B)$. The membership function $\mu_{F \ast B}$ of $F \ast B$ is denoted as follows:

$$\mu_{F \ast B}: \Lambda \to [0,1],$$

$$\mu_{F \ast B}(\lambda) = \frac{1}{|\Lambda|} \sum_{\omega \in \Omega} \mu_{c(F_B)}(\lambda)(\omega) \ast \mu_{F_B}(\lambda)(\omega).$$

where $|\Lambda|$ is the cardinality of $\Lambda$, now let $(F, B) \in FS(\Lambda)$ and $c(F, B) \in cFS(\Lambda)$. $(F \ast B)$ can be presented by the Table 3.
Table 3: Representation of $F \ast B$

| $F \ast B$ | $\mu_{F \ast B}$ |
|------------|------------------|
| $\lambda_1$ | $\mu_{F \ast B}(\lambda_1)$ |
| $\lambda_2$ | $\mu_{F \ast B}(\lambda_2)$ |
| $\lambda_3$ | $\mu_{F \ast B}(\lambda_3)$ |
| $\vdots$ | $\vdots$ |
| $\lambda_m$ | $\mu_{F \ast B}(\lambda_m)$ |

If $c_{i1} = \mu_{F \ast B}(\lambda_i) \text{ for } i = 1, 2, \ldots, m$ then $F \ast B$ can be represented by the matrix $[c_{i1}]$ as follows:

$$[c_{i1}] = \begin{bmatrix}
  c_{11} \\
  c_{21} \\
  \vdots \\
  c_{m1}
\end{bmatrix}$$

and known as the aggregate matrix of $F \ast B$ over $\Lambda$. Suppose $M \circ (F, B)$, $M \circ c(F, B)$, $M \circ F \ast B$ denotes matrices of $(F, B)$, $c(F, B)$ and $F \ast B$, respectively then

$$|\Lambda| \times M \circ F \ast B = M \circ (F, B) \times M^t \circ c(F, B),$$

and

$$M \circ F \ast B = \frac{1}{|\Lambda|} M \circ (F, B) \times M^t \circ c(F, B).$$

where $M^t \circ c(F, B)$ is the transpose of $M \circ c(F, B)$ and $|\Lambda|$ is the cardinality of $\Omega$.

**Step 4:**
At last we will find the best possible choice by finding maximum value of the aggregate matrix $F \ast B$.

**4. Main Result**

Following are the two sets of problems encountered by the media houses for the show to be telecasted and selection of an anchor person for a particular time slot. The former will be found using fs-agg algorithm.
4.1 Case Study 1
Seven shows are available to be aired at peak hour on Sunday, Monday, Tuesday, Wednesday, Thursday, Friday and Saturday. Now the burning question is depending on commercials rates, channel rating and demand, the management of TV channel is in a fix to decide on which day and which program to be aired? According to the data given by the marketing department of TV channel depending on commercials rates and rating at prime time is higher on Sunday, whereas on the rest of the five days in descending order as follows: Saturday, Friday, Thursday, Monday and Wednesday. On which day which particular show is aired at prime time?

The management of TV channel have the following set of programs

\[ \Lambda = \{ \lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5, \lambda_6, \lambda_7 \}. \]

with the following sets of attributes

\[ \Omega = \{ \omega_1 = \text{Star Cast}, \ \omega_2 = \text{writer}, \ \omega_3 = \text{International Value}, \ \omega_4 = \text{Target Audience}, \ \omega_5 = \text{Adaptation} \}. \]

4.1.1 Parameters
Here we explain all the attributes turn by turn as follows:

**Star Cast**
Star cast means which actors whether they are famous, debutante or average stars are playing roles in it? For Example: The star cast of that show comprises of Tom Cruise, Van Dam and Brook Shield.

**Play Writer**
Whether the play writer is a man of letters, digest writer or a professional play writer? For Example: The play writer is Ian Flaming, Shakespear or Aldose Huxlay?

**International Value**
It refers to the fact that how it is acclaimed in other countries and by the overseas nationals of the country from which that channel belongs to? For Example: Mind Your Language is famous in Pakistan for Ali Nadim and Ranjeet Singh’s Indo-Pak Tussle.

**Target Audience**
It Refers to the group or community about which show is concerned with. For Example: In Mind Your Language the target audience was overseas nationals of all countries residing in the UK having difficulty in English.

**Adaptation**
Adaptation means whether the show concept is partially or completely taken from some novel, short story, a true story, some incidence, theory or some previously telecasted show or a remake. For Example: 007 movies are adaptations from Ian Flaming 007 series, Titanic from
real incidence of Titanic sinking and PTV’s show Jinnah se Quaid (1997)(telecasted as From Jinnah to Quaid from PTV World during 2013) was an adaptation from Mohtarma Fatima Jinnah’s Book Mera Bhai.

4.1.2 Example
Let $B$ be the subset of the set of attributes $\Omega$. So $(F,B)$ that will decide which show to be broadcasted on Sunday, Saturday, Friday, Thursday, Monday, Tuesday and Wednesday is given by:

$$(F,B) = \{ (\lambda_1, \{\omega_1, \omega_5\}), (\lambda_2, \{\omega_2, \omega_3, \omega_4\}), (\lambda_3, \{\omega_2, \omega_3, \omega_4\}), (\lambda_4, \{\omega_1, \omega_4\}), (\lambda_5, \{\omega_1, \omega_2, \omega_4, \omega_5\}), (\lambda_6, \{\omega_2, \omega_4\}), (\lambda_7, \{\omega_3, \omega_4, \omega_5\}) \}.$$

The given soft set is tabulated using the characteristic function as follows:
Consider the soft set $(F,B)$ where $B$ is the choice parameter for channel management.

Suppose

$$h = \begin{cases} 1, & \text{if } h \in F(\omega), \\ 0, & \text{if } h \notin F(\omega). \end{cases}$$

A fuzzy soft set $(F,B)$ can be represented in a tabular form as Table 4.

| $(F,B)$ | $\omega_1$ | $\omega_2$ | $\omega_3$ | $\omega_4$ | $\omega_5$ |
|--------|------------|------------|------------|------------|------------|
| $\lambda_1$ | 1          | 0          | 0          | 0          | 1          |
| $\lambda_2$ | 0          | 1          | 1          | 1          | 0          |
| $\lambda_3$ | 0          | 1          | 1          | 1          | 0          |
| $\lambda_4$ | 1          | 0          | 0          | 1          | 0          |
| $\lambda_5$ | 1          | 1          | 0          | 1          | 1          |
| $\lambda_6$ | 0          | 1          | 0          | 1          | 0          |
| $\lambda_7$ | 0          | 0          | 1          | 1          | 1          |

Where $\omega_i \in B$.

4.1.3 Algorithm for the Broadcast of Shows in Particular Days
To select the sequence in which shows $\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5, \lambda_6$ and $\lambda_7$ to be telecasted owing to their weighted choice values in descending order on the Sunday, Saturday, Friday, Thursday, Monday, Tuesday and Wednesday, the following algorithm may be followed

1. Calculate the soft set $(F,B)$.
2. Evaluate set $B$ of choice parameter for channel management.
3. Identify all reduct-soft set of $(F,C)$.
4. Select one reduct-soft set $(F,R)$.
5. Evaluate the weighted table of the soft set \((F, R)\) according to the weights decided by channel management, i.e. fuzzy soft set.
6. Compute \(W_{qi} \) for \(\lambda_i\) as sum of all weights corresponding to each \(\lambda_i\) as \(W_{qi} = \sum \omega_j\)
7. Select \(\lambda_i\) for which \(W_{qi} = max W_{qi}\).

If \(\lambda_i\) has more than one value, then the values in descending order will be placed for telecast.

Weights
Consider the channel management sets the parameter by the fuzzy mapping from set of parameter to the interval \([0,1]\) as follows:

\[
\text{Star Cast } = \omega_1 = 0.8, \text{ Writter } = \omega_2 = 0.6, \text{ International Value } = \omega_3 = 0.5, \\
\text{ Target Audience } = \omega_4 = 0.3, \text{ Adaptations } = \omega_5 = 0.7
\]

Applying these weights the reduct-softset is evaluated as Table 5

| \(\lambda\) | \(\omega_1\) | \(\omega_2\) | \(\omega_3\) | \(\omega_4\) | \(\omega_5\) | Choice Value \(W_{qi}\) |
|---|---|---|---|---|---|---|
| \(\lambda_1\) | 0.8 | 0 | 0 | 0 | 0.7 | 1.5 |
| \(\lambda_2\) | 0 | 0.6 | 0.5 | 0.3 | 0 | 1.4 |
| \(\lambda_3\) | 0 | 0.6 | 0.5 | 0.3 | 0.7 | 2.1 |
| \(\lambda_4\) | 0.8 | 0 | 0 | 0.3 | 0 | 1.1 |
| \(\lambda_5\) | 0.8 | 0.6 | 0 | 0.3 | 0.7 | 2.4 |
| \(\lambda_6\) | 0 | 0.6 | 0 | 0.3 | 0 | 0.9 |
| \(\lambda_7\) | 0 | 0 | 0.5 | 0.3 | 0 | 0.8 |

4.1.4 Decision
So according to the table show \(\lambda_5\) will be telecasted on Sunday, \(\lambda_3\) on Saturday, \(\lambda_1\) on Friday, \(\lambda_2\) on Thursday, \(\lambda_4\) on Monday, \(\lambda_6\) on Tuesday and \(\lambda_7\) on Wednesday.

4.2 Case Study 2
The news section of the same channel wants to know which Anchor person is will be best suited for the specific time slot for a one program and 4 days a week. The selection is out of 5 anchors \(\lambda_1, \lambda_2, \lambda_3, \lambda_4, \lambda_5\). Now the management asks the opinion from its marketing department, social media cell, along with two agencies i.e advertisement agency, rating agency and from one of its infotainment producers. They have to give their opinion out of the following criteria parameters i.e \(\omega_1\) = Research Work, \(\omega_2\) = Influential Personality, \(\omega_3\) = Command on Language, \(\omega_4\) = Good Personal Relations with all fraternities and \(\omega_5\) = Strong Credibility.

This constitutes a set of parameters
\( \Omega = \{\omega_1, \omega_2, \omega_3, \omega_4, \omega_5\} \).

The opinion given by each of the agencies, departments and officials in the fuzzy soft sets form \((F_1, \Omega), (F_2, \Omega), (F_3, \Omega), (F_4, \Omega)\) and \((F_5, \Omega)\) over \(\Lambda\), where \(F_1, F_2, F_3, F_4\) and \(F_5\) are mappings from \(\Omega\) onto \(P(\Lambda)\) is given as follows:

\[
F_1(\omega_1) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.80 & 0.70 & 0.65 & 0.85 & 0.65 \end{bmatrix}, \quad F_1(\omega_2) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.95 & 0.80 & 0.70 & 0.65 & 0.55 \end{bmatrix}, \quad F_1(\omega_3) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.70 & 0.65 & 0.55 & 0.70 & 0.72 \end{bmatrix}, \quad F_1(\omega_4) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.70 & 0.90 & 0.85 & 0.65 & 0.45 \end{bmatrix}, \quad F_1(\omega_5) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.85 & 0.80 & 0.82 & 0.80 & 0.87 \end{bmatrix},
\]

\[
F_2(\omega_1) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.82 & 0.75 & 0.66 & 0.86 & 0.55 \end{bmatrix}, \quad F_2(\omega_2) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.94 & 0.81 & 0.72 & 0.61 & 0.62 \end{bmatrix}, \quad F_2(\omega_3) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.69 & 0.64 & 0.54 & 0.71 & 0.70 \end{bmatrix}, \quad F_2(\omega_4) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.71 & 0.92 & 0.86 & 0.67 & 0.57 \end{bmatrix}, \quad F_2(\omega_5) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.84 & 0.79 & 0.81 & 0.79 & 0.64 \end{bmatrix},
\]

\[
F_3(\omega_1) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.80 & 0.79 & 0.64 & 0.78 & 0.73 \end{bmatrix}, \quad F_3(\omega_2) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.95 & 0.82 & 0.73 & 0.62 & 0.68 \end{bmatrix}, \quad F_3(\omega_3) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.68 & 0.63 & 0.53 & 0.70 & 0.69 \end{bmatrix}, \quad F_3(\omega_4) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.72 & 0.93 & 0.87 & 0.69 & 0.55 \end{bmatrix}, \quad F_3(\omega_5) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.86 & 0.81 & 0.83 & 0.81 & 0.81 \end{bmatrix},
\]

\[
F_4(\omega_1) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.81 & 0.80 & 0.65 & 0.79 & 0.73 \end{bmatrix}, \quad F_4(\omega_2) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.96 & 0.83 & 0.74 & 0.63 & 0.76 \end{bmatrix}, \quad F_4(\omega_3) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.69 & 0.62 & 0.52 & 0.71 & 0.71 \end{bmatrix}, \quad F_4(\omega_4) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.66 & 0.61 & 0.51 & 0.67 & 0.86 \end{bmatrix}, \quad F_4(\omega_5) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.88 & 0.83 & 0.85 & 0.83 & 0.77 \end{bmatrix},
\]

\[
F_5(\omega_1) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.82 & 0.78 & 0.60 & 0.75 & 0.71 \end{bmatrix}, \quad F_5(\omega_2) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.89 & 0.79 & 0.69 & 0.58 & 0.70 \end{bmatrix}, \quad F_5(\omega_3) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.79 & 0.57 & 0.51 & 0.70 & 0.63 \end{bmatrix}, \quad F_5(\omega_4) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.67 & 0.60 & 0.52 & 0.63 & 0.79 \end{bmatrix}, \quad F_5(\omega_5) = \begin{bmatrix} \lambda_1 & \lambda_2 & \lambda_3 & \lambda_4 & \lambda_5 \\ 0.89 & 0.87 & 0.89 & 0.79 & 0.79 \end{bmatrix},
\]

In the matrix form fuzzy soft sets are represented as:
Since we now have all the fuzzy soft matrices formed by all the agencies and officials giving opinion, we will apply the following algorithm to select the anchor person.

4.2.1 Algorithm for Selection of Anchor Person for a Particular Slot

Step 1. Find the average of all the matrices \((F_1, \Omega), (F_2, \Omega), (F_3, \Omega), (F_4, \Omega)\) and \((F_5, \Omega)\) as \(B\). This will act as FS-agg matrix \((F, B)\) over \(\Lambda\).

Step 2. Find the c-set \(c(F, B)\) of \((F, B)\).

Step 3. Compute \(F * B\) of \((F, B)\).
Step 4. Identify the best suited choice by finding the largest value of the set \( F \ast B \).

**Step 1:**
The average of these matrices is given by:

\[
(F, B) = \begin{bmatrix}
0.8100 & 0.7640 & 0.6400 & 0.8060 & 0.6820 \\
0.9380 & 0.8100 & 0.7300 & 0.6180 & 0.6780 \\
0.7100 & 0.6220 & 0.5300 & 0.7040 & 0.7120 \\
0.6920 & 0.7920 & 0.7220 & 0.6620 & 0.7060 \\
0.8640 & 0.8200 & 0.8400 & 0.8040 & 0.7600
\end{bmatrix}
\]

**Step 2:**
Now we will calculate the c-set for \( c(F, B) \) of the average matrix as follows:

1. \[ \mu_{c(F_B)}(\omega_1) = \frac{0.8100 + 0.7640 + 0.6400 + 0.8060 + 0.6820}{5} = 0.7404. \]
2. \[ \mu_{c(F_B)}(\omega_2) = \frac{0.9380 + 0.8100 + 0.7300 + 0.6180 + 0.6780}{5} = 0.7548. \]
3. \[ \mu_{c(F_B)}(\omega_3) = \frac{0.7100 + 0.6220 + 0.5300 + 0.7040 + 0.7120}{5} = 0.6556. \]
4. \[ \mu_{c(F_B)}(\omega_4) = \frac{0.6920 + 0.7920 + 0.7220 + 0.6620 + 0.7060}{5} = 0.7148. \]
5. \[ \mu_{c(F_B)}(\omega_5) = \frac{0.8640 + 0.8200 + 0.8400 + 0.8040 + 0.7600}{5} = 0.8176. \]

Therefore, the c-matrix is given by:

\[
c(F, B) = \begin{bmatrix}
0.7404 \\
0.7548 \\
0.6556 \\
0.7148 \\
0.8176
\end{bmatrix}
\]

and on set form as \( c(F, B) = \{0.8028/\omega_1, 0.7616/\omega_2, 0.6924/\omega_3, 0.7180/\omega_4, 0.7076/\omega_5, \}. \)

**Step 3:**
Now the aggregate fuzzy set \( M \circ F \ast B \) is computed as:
\[
M \circ F \ast B = \frac{1}{5} \begin{bmatrix}
0.8100 & 0.7640 & 0.6400 & 0.8060 & 0.6820 \\
0.9380 & 0.8100 & 0.7300 & 0.6180 & 0.6780 \\
0.7100 & 0.6220 & 0.5300 & 0.7040 & 0.7120 \\
0.6920 & 0.7920 & 0.7220 & 0.6620 & 0.7060 \\
0.8640 & 0.8200 & 0.8400 & 0.8040 & 0.7600
\end{bmatrix}
\times
\begin{bmatrix}
0.7404 \\
0.7548 \\
0.6556 \\
0.7148 \\
0.8176
\end{bmatrix}
= \begin{bmatrix}
0.5459 \\
0.5561 \\
0.4855 \\
0.5267 \\
0.6010
\end{bmatrix}
\]

In the set form it is given by

\[
F \ast B = \{0.5459/\lambda_1, 0.5561/\lambda_2, 0.4855/\lambda_3, 0.5267/\lambda_4, 0.6010/\lambda_5\}
\]

**Step 4:**

From the aggregate matrix it is found that anchor person \( \lambda_5 \) is the best suited choice for TV channel’s management.

### 5. Conclusion

In this paper, we have solved a decision making problem for the channel management for broadcasting seven different shows on seven different days at prime time. We have solved another problem in which an anchor person is selected for a specific slot by the ranks/grades allotted by five different sources. The problems discussed in this article has opened new meadows where all the complex decision making encountered by channels will be solved. Saving time, money and delays for decision.

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