JOURNAL of New Theory

A NOTE ON "APPLICATION OF FUZZY SOFT SETS TO INVESTMENT DECISION MAKING PROBLEM"

Nihal Yılmaz Özgür[1]   <nihal@balikesir.edu.tr>
Nihal Taş[1,*]   <nihaltas@balikesir.edu.tr>

[1]*Department of Mathematics, Balıkesir University, 10145 Balıkesir, TURKEY*

Abstract − In this paper we give a new method on investment decision making problem by means of the notions of "period", "soft set" and "matrix form".

1   Introduction

Kalaichelvi and Malini studied application of fuzzy soft sets to investment decision making problem based on the data collected from female employees working in both government and private sector undertakings located in Coimbatore, Tamil Nadu, India [2]. Clearly it is very important the notion of "period" (daily, weekly, monthly or annually) for investment decision making problems. The aim of this paper is to introduce a new method to include the notion of period using the soft set and matrix form theories.

2   Main Results

We recall the following definition which is needed throughout the paper.

[**]*Edited by* İshak Altun *and* Naim Çağman *(Editor-in-Chief).*
  [*]*Corresponding Author.*

Definition 2.1. [3] Let U be an initial universe, $P(U)$ be the power set of U and E be the set of all parameters. A soft set (F, E) on the universe U is defined

$$(F, E) = \{(e, F(e)) : e \in E, F(e) \in P(U)\},$$

where $F : E \to P(U)$.

In [1] it was introduced soft matrix theory and used this theory to construct a soft max-min decision making method. In this paper we use different matrix forms obtained soft sets and new characteristic functions. Using the parameters given in [2], we introduce a new method by means of the notions of "period", "soft set" and "matrix form".

The following informations were given by Kalaichelvi and Malini in [2]. But the notion of period is not used in this application.

Factors Influencing Investment Decision:

$\mathbf{P}_1$ - Safety of funds
$\mathbf{P}_2$ - Liquidity of funds
$\mathbf{P}_3$ - High returns
$\mathbf{P}_4$ - Maximum profit in minimum period
$\mathbf{P}_5$ - Stable return
$\mathbf{P}_6$ - Easy accessibility
$\mathbf{P}_7$ - Tax concession
$\mathbf{P}_8$ - Minimum risk of possession

Investment Avenues:

$\mathbf{I}_1$ - Bank Deposit
$\mathbf{I}_2$ - Insurance
$\mathbf{I}_3$ - Postal Savings
$\mathbf{I}_4$ - Shares and Stocks
$\mathbf{I}_5$ - Mutual Fund
$\mathbf{I}_6$ - Gold
$\mathbf{I}_7$ - Real Estate

Let $U = \{I_1, I_2, I_3, I_4, I_5, I_6, I_7\}$ be the initial universal set and $E = \{P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8\}$ be the set of all parameters. We consider the universal set and the set of parameters, respectively as follows:

$$\begin{aligned} U &= \{I_i : 1 \le i \le n\}, \\ E &= \{P_j : 1 \le j \le m\}. \end{aligned}$$

Let the soft set (F, E) be defined as follows:

$$(F, E) = \{(P_j, A_j) : 1 \le j \le m, A_j \in P(U)\}.$$

Now we define new characteristic function of the soft set (F, E) as follows:

$$f(P_j)_i = \begin{cases} 1 & \text{if } I_i \in A_j \\ 0 & \text{if } I_i \notin A_j \end{cases}.$$

The matrix form of the soft set (F, E) is obtained as follows:

$$M = \begin{bmatrix} f(P_1)_1 & f(P_1)_2 & \cdots & f(P_1)_n \\ \vdots & \vdots & \ddots & \vdots \\ f(P_m)_1 & f(P_m)_2 & \cdots & f(P_m)_n \end{bmatrix}.$$

We create a matrix which shows selectional investment avenues using a parameter set E and defined the function h as follows:

$$h(P_{j_1}, P_{j_2}, ..., P_{j_n}) = \begin{cases} 1 & \text{if } f_1(P_{j_1})_i = ... = f_n(P_{j_n})_i = 1 \\ 0 & \text{if others} \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j_1, ..., j_n \in \{1, 2, 3, 4, 5, 6, 7, 8\}$.

Now we introduce our method as an application of profit situations via soft sets on different periods.

Since it was not given any information about the period of data for private and government sector in [2], we consider investment avenues I_i, $1 \le i \le n$ with $\mu_{F_j(P_j)}(I_i) \ge 0.5$ as the *first period*. Then we obtain the following soft set:

$$(F, E) = \{(P_1, A_1 = \{I_1, I_2, I_3, I_6\}), (P_2, A_2 = U), (P_3, A_3 = U),$$
$$(P_4, A_4 = \{I_4, I_5, I_6, I_7\}), (P_5, A_5 = \{I_1, I_2, I_3\}), (P_6, A_6 = U),$$
$$(P_7, A_7 = \{I_1, I_2, I_3\}), (P_8, A_8 = \{I_1, I_2, I_3, I_4, I_5\})\}.$$

Let us write a matrix form of (F, E) using the characteristic function $f(P_j)_i$ of the set (F, E) as follows:

$$f(P_j)_i = \begin{cases} 1 & \text{if } I_i \in A_j \\ 0 & \text{if } I_i \notin A_j \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j \in \{1, 2, 3, 4, 5, 6, 7, 8\}$.

Then we obtain the following matrix:

$$M = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8$).

We consider three cases which are given in [2]. For these cases, we give the matrix forms using soft sets in the first period.

Case 1:

Let $E_1 = \{P_1, P_3\}$ be a parameter set. Then we have the following soft set (F_1, E_1) in the first period:

$$(F_1, E_1) = \{(P_1, A_1 = \{I_1, I_2, I_3, I_6\}), (P_3, A_3 = U)\}.$$

Then the matrix form of the soft set (F_1, E_1) is obtained using the characteristic function $f_1(P_j)_i$ as follows:

$$M_1 = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_1, P_3). The matrix form M_1 shows us that I_1, I_2, I_3 and I_6 are the best investment avenues for investor.

Case 2:

Let $E_2 = \{P_2, P_4, P_8\}$ be a parameter set. Then we have the following soft set (F_2, E_2) in the first period:

$$(F_2, E_2) = \{(P_2, A_2 = U), (P_4, A_4 = \{I_4, I_5, I_6, I_7\}), (P_8, A_8 = \{I_1, I_2, I_3, I_4, I_5\})\}.$$

Then the matrix form of the soft set (F_2, E_2) is obtained using the characteristic function $f_2(P_j)_i$ as follows:

$$M_2 = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_2, P_4, P_8). The matrix form M_2 shows us that I_4 and I_5 are the best investment avenues for investor.

We give a matrix form for M_1 and M_2 using a parameter set $E_{1,2} = \{P_1, P_2, P_3, P_4, P_8\}$ and the function h defined as follows:

$$h(P_{j_1}, P_{j_2}) = \begin{cases} 1 & \text{if } f_1(P_{j_1})_i = f_2(P_{j_2})_i = 1 \\ 0 & \text{if others} \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j_1, j_2 \in \{1, 2, 3, 4, 8\}$. Then

$$M_{1,2} = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 0 & 0 & 0 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 \end{bmatrix},$$

where columns show avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameter pairs (resp. $(P_1, P_2), (P_1, P_4), (P_1, P_8), (P_3, P_2), (P_3, P_4), (P_3, P_8)$). For example, the parameter pair (P_1, P_2) shows factors influencing investment decision which are both safety of funds and liquidity of funds.

Case 3:

Let $E_3 = \{P_2, P_5, P_6, P_7\}$ be a parameter set. Then we have the following soft set (F_3, E_3) in the first period:

$$(F_3, E_3) = \{(P_2, A_2 = U), (P_5, A_5 = \{I_1, I_2, I_3\}), (P_6, A_6 = U), (P_7, A_7 = \{I_1, I_2, I_3\})\}.$$

Then the matrix form of the soft set (F_3, E_3) is obtained using the characteristic function $f_3(P_j)_i$ as follows:

$$M_3 = \begin{bmatrix} 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 1 & 1 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_2, P_5, P_6, P_7). The matrix form M_3 shows us that I_1, I_2 and I_3 are the best investment avenues for investor.

We give a matrix form for M_1, M_2 and M_3 using a parameter set $E_{1,2,3} = \{P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8\}$ and the function h defined as follows:

$$h(P_{j_1}, P_{j_2}, P_{j_3}) = \begin{cases} 1 & \text{if } f_1(P_{j_1})_i = f_2(P_{j_2})_i = f_3(P_{j_3})_i = 1 \\ 0 & \text{if others} \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j_1, j_2, j_3 \in \{1, 2, 3, 4, 5, 6, 7, 8\}$. Then the matrix form $M_{1,2,3}$ is obtained similarly $M_{1,2}$.

We consider investment avenues I_i, $1 \le i \le n$ with $\mu_{F_j(P_j)}(I_i) \ge 0.75$ as the *second period*. Then we obtain the following soft set:

$$(F', E) = \{(P_1, A_1 = \{I_1, I_2, I_3, I_6\}), (P_2, A_2 = \{I_1, I_4, I_5, I_6\}), (P_3, A_3 = \{I_6, I_7\}),$$
$$(P_4, A_4 = \{I_4\}), (P_5, A_5 = \{I_1, I_2, I_3\}), (P_6, A_6 = \{I_1, I_2, I_3, I_6\}),$$
$$(P_7, A_7 = \{I_2, I_3\}), (P_8, A_8 = \{I_1, I_2, I_3, I_4, I_5\})\}.$$

Let us write a matrix form of (F', E) using the characteristic function $f'(P_j)_i$ of the set (F', E) as follows:

$$f'(P_j)_i = \begin{cases} 1 & \text{if } I_i \in A_j \\ 0 & \text{if } I_i \notin A_j \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j \in \{1, 2, 3, 4, 5, 6, 7, 8\}$.

Then we obtain the following matrix:

$$M' = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 1 & 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8$).

Using the above similar arguments, for the second period we only consider **Case1** and **Case2** which is given in [2]. For these cases, we give matrix form using soft set in the second period. **Case3** can be shown by similar arguments.

Case 1:

Let $E_1 = \{P_1, P_3\}$ be a parameter set. Then we have the following soft set (F'_1, E_1) in the second period:

$$(F'_1, E_1) = \{(P_1, A_1 = \{I_1, I_2, I_3, I_6\}), (P_3, A_3 = \{I_6, I_7\})\}.$$

Then the matrix form of the soft set (F'_1, E_1) is obtained using the characteristic function $f'_1(P_j)_i$ as follows:

$$M'_1 = \begin{bmatrix} 1 & 1 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 1 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_1, P_3). The matrix form M'_1 shows us that I_6 is the best investment avenue for investor. Hence we see that our result coincides with the result of **Case1** given in [2].

Case 2:

Let $E_2 = \{P_2, P_4, P_8\}$ be a parameter set. Then we have the following soft set (F'_2, E_2) in the second period:

$$(F'_2, E_2) = \{(P_2, A_2 = \{I_1, I_4, I_5, I_6\}), (P_4, A_4 = \{I_4\}), (P_8, A_8 = \{I_1, I_2, I_3, I_4, I_5\})\}.$$

Then the matrix form of the soft set (F'_2, E_2) is obtained using the characteristic function $f'_2(P_j)_i$ as follows:

$$M'_2 = \begin{bmatrix} 1 & 0 & 0 & 1 & 1 & 1 & 0 \\ 0 & 0 & 0 & 1 & 0 & 0 & 0 \\ 1 & 1 & 1 & 1 & 1 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_2, P_4, P_8). The matrix form M'_2 shows us that I_4 is the best investment avenue for investor. Again our result coincides with the result of **Case2** given in [2].

We give a matrix form for M'_1 and M'_2 using a parameter set $E_{1,2} = \{P_1, P_2, P_3, P_4, P_8\}$ and the function h defined as follows:

$$h(P_{j_1}, P_{j_2}) = \begin{cases} 1 & \text{if } f'_1(P_{j_1})_i = f'_2(P_{j_2})_i = 1 \\ 0 & \text{if others} \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j_1, j_2 \in \{1, 2, 3, 4, 8\}$. Then

$$M'_{1,2} = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix},$$

where columns show avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameter pairs (resp. $(P_1, P_2), (P_1, P_4), (P_1, P_8), (P_3, P_2), (P_3, P_4), (P_3, P_8)$).

Finally we consider investment avenues I_i, $1 \le i \le n$ with $\mu_{F_j(P_j)}(I_i) = 1$ as the *third period*. Then we obtain the following soft set:

$$(F'', E) = \{(P_1, A_1 = \{I_1, I_3\}), (P_2, A_2 = \{I_1, I_6\}), (P_3, A_3 = \emptyset),$$
$$(P_4, A_4 = \emptyset), (P_5, A_5 = \{I_1, I_2, I_3\}), (P_6, A_6 = \{I_1, I_3, I_6\}),$$
$$(P_7, A_7 = \emptyset), (P_8, A_8 = \{I_1, I_2, I_3\})\}.$$

Let us write a matrix form of (F'', E) using the characteristic function $f''(P_j)_i$ of the set (F'', E) as follows:

$$f''(P_j)_i = \begin{cases} 1 & \text{if } I_i \in A_j \\ 0 & \text{if } I_i \notin A_j \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j \in \{1, 2, 3, 4, 5, 6, 7, 8\}$.

Then we obtain the following matrix:

$$M'' = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. $P_1, P_2, P_3, P_4, P_5, P_6, P_7, P_8$).

We only consider **Case1** and **Case2** which is given in [2]. For these cases, we give matrix form using soft set in the third period.

Case 1:

Let $E_1 = \{P_1, P_3\}$ be a parameter set. Then we have the following soft set (F_1'', E_1) in the third period:

$$(F_1'', E_1) = \{(P_1, A_1 = \{I_1, I_3\}), (P_3, A_3 = \emptyset)\}.$$

Then the matrix form of the soft set (F_1'', E_1) is obtained using the characteristic function $f_1''(P_j)_i$ as follows:

$$M_1'' = \begin{bmatrix} 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_1, P_3). The matrix form M_1'' shows us that I_1 and I_3 are the best investment avenues for investor.

Case 2:

Let $E_2 = \{P_2, P_4, P_8\}$ be a parameter set. Then we have the following soft set (F_2'', E_2) in the third period:

$$(F_2'', E_2) = \{(P_2, A_2 = \{I_1, I_6\}), (P_4, A_4 = \emptyset), (P_8, A_8 = \{I_1, I_2, I_3\})\}.$$

Then the matrix form of the soft set (F_2'', E_2) is obtained using the characteristic function $f_2''(P_j)_i$ as follows:

$$M_2'' = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 0 \end{bmatrix},$$

where columns show investment avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameters (resp. P_2, P_4, P_8). The matrix form M_2'' shows us that I_1 is the best investment avenue for investor.

We give a matrix form for M_1'' and M_2'' using a parameter set $E_{1,2} = \{P_1, P_2, P_3, P_4, P_8\}$ and the function h defined as follows:

$$h(P_{j_1}, P_{j_2}) = \begin{cases} 1 & \text{if } f_1''(P_{j_1})_i = f_2''(P_{j_2})_i = 1 \\ 0 & \text{if others} \end{cases},$$

where $i \in \{1, 2, 3, 4, 5, 6, 7\}$ and $j_1, j_2 \in \{1, 2, 3, 4, 8\}$. Then

$$M_{1,2}'' = \begin{bmatrix} 1 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 1 & 0 & 1 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \\ 0 & 0 & 0 & 0 & 0 & 0 & 0 \end{bmatrix},$$

where columns show avenues (resp. $I_1, I_2, I_3, I_4, I_5, I_6, I_7$) and rows show parameter pairs (resp. $(P_1, P_2), (P_1, P_4), (P_1, P_8), (P_3, P_2), (P_3, P_4), (P_3, P_8)$).

Now we show these investment results for **Case1** and **Case2** on the table.

FIRST PERIOD															
	I_1	I_2	I_3	I_4	I_5	I_6	I_7		I_1	I_2	I_3	I_4	I_5	I_6	I_7
P_1	1	1	1	0	0	1	0	(P_1,P_2)	1	1	1	0	0	1	0
P_3	1	1	1	1	1	1	1	(P_1,P_4)	0	0	0	0	0	1	0
P_2	1	1	1	1	1	1	1	(P_1,P_8)	1	1	1	0	0	0	0
P_4	0	0	0	1	1	1	1	(P_3,P_2)	1	1	1	1	1	1	1
P_6	1	1	1	1	1	0	0	(P_3,P_4)	0	0	0	1	1	1	1
								(P_3,P_8)	1	1	1	1	1	0	0

SECOND PERIOD															
	I_1	I_2	I_3	I_4	I_5	I_6	I_7		I_1	I_2	I_3	I_4	I_5	I_6	I_7
P_1	1	1	1	0	0	1	0	(P_1,P_2)	1	0	0	0	0	1	0
P_3	0	0	0	0	0	1	1	(P_1,P_4)	0	0	0	0	0	0	0
P_2	1	0	0	1	1	1	0	(P_1,P_8)	1	1	1	0	0	0	0
P_4	0	0	0	1	0	0	0	(P_3,P_2)	0	0	0	0	0	1	0
P_6	1	1	1	1	1	0	0	(P_3,P_4)	0	0	0	0	0	0	0
								(P_3,P_8)	0	0	0	0	0	0	0

THIRD PERIOD															
	I_1	I_2	I_3	I_4	I_5	I_6	I_7		I_1	I_2	I_3	I_4	I_5	I_6	I_7
P_1	1	0	1	0	0	0	0	(P_1,P_2)	1	0	0	0	0	0	0
P_3	0	0	0	0	0	0	0	(P_1,P_4)	0	0	0	0	0	0	0
P_2	1	0	0	0	0	1	0	(P_1,P_8)	1	0	1	0	0	0	0
P_4	0	0	0	0	0	0	0	(P_3,P_2)	0	0	0	0	0	0	0
P_6	1	1	1	0	0	0	0	(P_3,P_4)	0	0	0	0	0	0	0
								(P_3,P_8)	0	0	0	0	0	0	0

From above table, we see that investment avenues change according to period. Consequently if we have period data then fuzzy soft set is not necessary for investment decision making problem. In this paper we construct the notion of period using membership value since we did not have real period data for government and private sector.

3   Conclusion

In this paper we introduce a new method for investment decision making problems. Our method needs the periods of the data (so it is very attractive) and uses only soft set theory (instead of fuzzy soft set theory). Investor decides more accurate investment avenue according to the factors influencing his investment decision.

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