Journal of Computer and Mathematical Sciences, *Vol.10(3),547-556 March 2019* *ISSN 0976-5727 (Print)*
(An International Research Journal), *www.compmath-journal.org* *ISSN 2319-8133 (Online)*

A Generalized Real Life Problem Solved By Uni–Int Decision Making Method

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(Received on: March 14, 2019)

ABSTRACT

We repeat operation of Molodtsov's soft sets and built all operations simple for better results. We have explained *Uni–Int* decision function as well as multiplication of two soft sets. This latest concept supports to make *Uni–Int* method. This method chooses a group of optimum elements from the alternatives. We apply this method on a problem where two friends want to take rent room. This method successfully reduces many alternatives of rant room into small set.

Keywords: Fuzzy soft sets, Fuzzy soft operations, Fuzzy soft products, *Uni–Int* decision function, *Uni–Int* decision making method.

1. INTRODUCTION

Everybody wants to get higher education at present. Many of them have to leave their own city and go to metro cities for higher education where they live on rent room. To select rent room is very difficult according to own parameters. But in this paper *Uni-Int* decision making method makes it easy according to own desire.

We observe a special type of problems which contain doubtful data. There are many useful theories which can solve this doubtful data such as fuzzy set theory, intuitionistic fuzzy sets etc. Above given theories can only solve particular problems as shown in[18]. To get rid of these problems. Molodtsov[11] given a theory of soft set as a mathematical concept for solving any doubtful data, it can solve any type of problem.

In[12], Molodtsov given many fields where the application of soft set is useful such as smoothness of functions, game theory, operations research and so on. In today's scenario, the graph of work on and application of this theory is increasing very fast. Roy *et al*.[14] described rough mathematics for solving a decision problem. Chen *et al*.[3] and Kong *et al*.[7] described the latest explanation of how to decrease requirement. Xiao *et al*.[16] told soft sets and information structure are associated with each other. They presented that it is the part of unique information structure.

Maji *et al*.[8,9] presented comprehensive logical research on this theory. At present researchers took keen interest due to this study. Soft groups were presented by Aktas and Cagman[1]. They explained that soft sets are correlated with the related concepts of fuzzy sets. Soft BCK/BCI-algebras and soft sub algebras presented by Jun[5]. Jun and Park[6] told that this theory support algebraic architecture of BCK/BCI-algebras. Park *et al*.[13] completely interpret soft WS-algebras and obtain elementary properties. Feng *et al*.[4] interpret soft semi rings with the help of this theory and measured their characteristics. Sun *et al*.[15] explained an essential form of soft module theory, this theory enhance the notion of module by adding many algebraic structure of soft sets.

We obtain soft sets from universal set. The parameters are fuzzy approach in daily life according to fuzzy set theory. Many researchers were inspired by its application and started work on this theory. Majumdar and Samanta[10] interpret many correlation parts of these types of sets. Roy and Maji[14] described many output on the application of soft sets in decision problem. Yang *et al*.[17] explained devaluation of soft sets and examines a decision problem by these sets.

Till now, there are many application of soft set theory which gives reliable output by using these sets. The procedure of soft sets is defined here again. These procedures are very practical and make better results. We further define decision making method, this method choose some best elements from the collection of elements. In the end we solve an example, this example tell that the method can work in different area.

We introduce our work in this form. We again define the definition of soft set in coming part. Part 3 of this paper show that we did product of soft sets and express their related work. In part 4, *Uni–Int* decision function helps for making *Uni–Int* decision making method, this method solves many problems. In the last part of this paper we give our conclusion.

2. MATHEMATICAL PRELIMINARIES

Soft set theory

Here, we give latest definitions and many outcome of this theory. Universal set, parameter set are represented by T, H respectively and power set of T is represented as P(T) and (any set)$P_1 \subseteq H$.

Definition 1. The ordered pair of soft set F_{P_1} over T is describing below.
$F_{P_1} = \{(h, f_{P_1}(h)) : h \in H,\ f_{P_1}(h) \in P(T)\}$,
Here $f_{P_1} : H \longrightarrow P(T)$, $f_{P_1}(h) = \phi$ if $h \notin P_1$.
Now, the fuzzy approximation function of F_{P_1} is denoted by f_{P_1}. The soft set can be obtained by solving $f_{P_1}(h)$ and these are *h*-element of set. It is very important to remember that $f_{P_1}(h)$ may or may not give any arbitrary values.

Thus, We will denote C(T) as a collection of soft set for T.
To understand the above concept, we take an example given below.

Example 1. F_{P_1} 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 h_i (i = 1,2,3,4,5) shows as "Low Rent", "Near Institute", "Good Locality", "Accommodation Type", "Security" respectively. Here, we select "Near Institute", "Accommodation Type", "Security" as a soft set.
Suppose, P_1 = {h_2, h_4, h_5} ⊆ H and $f_{P_1}(h_2)$ = {t_5, t_6}, $f_{P_1}(h_4)$ ={t_1, t_2, t_3} and $f_{P_1}(h_5)$ = T. Hence, the soft set F_{P_1} as a set of ordered pairs define below.
F_{P_1}= {(h_2, {t_5, t_6}),(h_4,{t_1, t_2, t_3}),(h_5,T)}

Definition 2. Suppose F_{P_1} ∈ C (T). If $f_{P_1}(h)$ =Φ ∀ h ∈ P_1, it means F_{P_1}do not contain anything so it is null soft set, represented by F_Φ.
$f_{P_1}(h)$ =Φ this indicates that T does not contain any rent room according to requirement (parameter) ∀ h ∈ H. So we will not show such elements, it is pointless.

Definition 3. Suppose F_{P_1} ∈ C (T). If $f_{P_1}(h)$ =T ∀ h ∈ P_1, then F_{P_1} indicates as a P_1-universal soft set and symbolized by $F_{\widetilde{P_1}}$.

Example 2. Suppose T= {t_1, t_2, t_3, t_4, t_5} is universal set and H= {h_1, h_2, h_3, h_4} is a collection of parameters.
P_1= {h_1, h_4}, $f_{P_1}(h_1)$ = {t_1, t_2, t_3}, $f_{P_1}(h_4)$ = Φ, soft set F_{P_1} can be shown in this form F_{P_1}= $\{(h_1, \{t_1, t_2, t_3\})\}$
P_2= {h_2, h_3}, $f_{P_2}(h_2)$=T, $f_{P_2}(h_3)$ =T, Now it is P_2-universal soft set. So $F_{P_2} = F_{\widetilde{P_2}}$.

Definition 4. Suppose F_{P_1}, F_{P_2} ∈ C (T), the necessary condition for a soft subset F_{P_1} of F_{P_2} is $f_{P_1}(h) \subseteq f_{P_2}(h)$. So $F_{P_1} \,\tilde{\subseteq}\, F_{P_2}$

Proposition 1. Suppose F_{P_1}, F_{P_2} ∈ C (T), Now
a. $F_\Phi \,\tilde{\subseteq}\, F_{P_1}$.
b. $F_{P_1} \,\tilde{\subseteq}\, F_{P_1}$.
c. $F_{P_1} \,\tilde{\subseteq}\, F_{P_2}$ and $F_{P_2} \,\tilde{\subseteq}\, F_{P_3} \Longrightarrow F_{P_1} \,\tilde{\subseteq}\, F_{P_3}$.

Proof. Approximate functions of the soft sets help solving these identities ∀ h∈ H.
a. $f_\Phi(h) \subseteq f_{P_1}(h)$ Because $\Phi \subseteq f_{P_1}(h)$.
b. $f_{P_1}(h) \subseteq f_{P_1}(h)$ Because $f_{P_1}(h) = f_{P_1}(h)$
c. $f_{P_1}(h) \subseteq f_{P_2}(h)$ and $f_{P_2}(h) \subseteq f_{P_3}(h) \Longrightarrow f_{P_1}(h) \subseteq f_{P_3}(h)$.

Definition 5. Suppose F_{P_1}, F_{P_2} ∈ C (T). Two soft sets F_{P_1} and F_{P_2} are equal and represented as $F_{P_1} = F_{P_2} \Leftrightarrow f_{P_1}(h) = f_{P_2}(h)$ ∀ h∈ H.

Proposition 2. Suppose F_{P_1}, F_{P_2}, F_{P_3} ∈ C (T). So

a. $F_{P_1} = F_{P_2}$ and $F_{P_2} = F_{P_3} \Leftrightarrow F_{P_1} = F_{P_3}$

b. $F_{P_1} \tilde{\subseteq} F_{P_2}$ and $F_{P_2} \tilde{\subseteq} F_{P_1} \Leftrightarrow F_{P_1} = F_{P_2}$

Proof. Approximate functions help to solve above question. ∀ h∈ H.

a. $f_{P_1}(h) = f_{P_2}(h)$ and $f_{P_2}(h) = f_{P_3}(h) \Leftrightarrow f_{P_1}(h) = f_{P_3}(h)$

b. $f_{P_1}(h) \subseteq f_{P_2}(h)$ and $f_{P_2}(h) \subseteq f_{P_1}(h) \Leftrightarrow f_{P_1}(h) = f_{P_2}(h)$

Definition 6. Suppose F_{P_1} ∈ C (T). The approximate function explains the complement $F^{\tilde{C}}{}_{P_1}$ of soft set F_{P_1} .

$f_{P^{\tilde{C}}{}_1}(h) = f^{C}{}_{P_1}(h)$ ∀ h∈ H

Here, $f_{P_1}(h)$ is approximation function and $f^{C}{}_{P_1}(h)$ its complement. Specially $f^{C}{}_{P_1}(h)$ =T\ $f_{P_1}(h)$ ∀ h∈ H

Do not forget, remember that we take two symbols C and $\tilde{C}$ they indicate classical sets and complement of soft sets respectively.

Proposition 3. Suppose F_{P_1} ∈ T, then

a. $(F_{P_1}^{\tilde{C}})^{\tilde{C}} = F_{P_1}$.

b. $F_{\Phi}^{\tilde{C}} = F_{\tilde{H}}$.

Proof. We can solve above identity with the help of approximate functions. ∀ h∈ H,

a. $\left(f_{P_1}^{C}(h)\right)^{C} = f_{P_1}(h)$

b. $f_{\Phi}^{C}(h)$ =T\ $f_{\Phi}(h)$ = T\ Φ= T=$f_{\tilde{H}}(h)$.

Definition 7. Suppose F_{P_1}, F_{P_2} ∈ C (T). The approximate function describes the union $F_{P_1} \tilde{\cup} F_{P_2}$ of two soft set F_{P_1}, F_{P_2}.

$f_{P_1 \tilde{\cup} P_2}(h) = f_{P_1}(h) \cup f_{P_2}(h)$ ∀ h∈ H.

Proposition 4. Suppose F_{P_1}, F_{P_2}, F_{P_3} ∈ C (T), So

a. $F_{P_1} \tilde{\cup} F_{P_1} = F_{P_1}$, $F_{P_1} \tilde{\cup} F_{\Phi} = F_{P_1}$.

b. $F_{P_1} \tilde{\cup} F_{\tilde{H}} = F_{\tilde{H}}$.

c. $F_{P_1} \tilde{\cup} F_{P_1}^{C} = F_{\tilde{H}}$.

d. $F_{P_1} \tilde{\cup} F_{P_2} = F_{P_2} \tilde{\cup} F_{P_1}$.

e. $(F_{P_1} \tilde{\cup} F_{P_2}) \tilde{\cup} F_{P_3} = F_{P_1} \tilde{\cup} (F_{P_2} \tilde{\cup} F_{P_3})$.

Definition 8. Suppose F_{P_1}, F_{P_2} ∈ C (T). The approximate function describes the intersection $F_{P_1} \tilde{\cap} F_{P_2}$ of two soft set F_{P_1}, F_{P_2}.

$f_{P_1 \tilde{\cap} P_2}(h) = f_{P_1}(h) \cap f_{P_2}(h)$ ∀ h∈ H.

Proposition 5. Suppose $F_{P_1}, F_{P_2}, F_{P_3} \in$ C (T), So

a. $F_{P_1} \tilde{\cap} F_{P_1} = F_{P_1}$.
b. $F_{P_1} \tilde{\cap} F_{\Phi} = F_{\Phi}$.
c. $F_{P_1} \tilde{\cap} F_{\tilde{H}} = F_{P_1}$.
d. $F_{P_1} \tilde{\cap} F_{P_1}^{C} = F_{\Phi}$.
e. $F_{P_1} \tilde{\cap} F_{P_2} = F_{P_2} \tilde{\cap} F_{P_1}$.
f. $(F_{P_1} \tilde{\cap} F_{P_2}) \tilde{\cap} F_{P_3} = F_{P_1} \tilde{\cap} (F_{P_2} \tilde{\cap} F_{P_3})$.

Proposition 6. Suppose $F_{P_1}, F_{P_2} \in$ C (T). The soft sets follow the De Morgan's law.

a. $(F_{P_1} \tilde{\cup} F_{P_2})\tilde{C} = F_{P_1}^{\tilde{C}} \tilde{\cap} F_{P_2}^{\tilde{C}}$.
b. $(F_{P_1} \tilde{\cap} F_{P_2})\tilde{C} = F_{P_1}^{\tilde{C}} \tilde{\cup} F_{P_2}^{\tilde{C}}$.

Proof. The approximate function describes the De Morgan's law.

a. $f_{(P_1 \tilde{\cup} P_2)}\tilde{C}(h) = f^{C}{}_{(P_1 \tilde{\cup} P_2)}(h) = (f_{P_1}(h) \cup f_{P_2}(h))^{C} = (f_{P_1}(h))^{C} \cap (f_{P_2}(h))^{C} = f_{(P_1)\tilde{C} \tilde{\cap} (P_2)\tilde{C}}(h)$.

The option b can also do in the same way.

Proposition 7. Suppose $F_{P_1}, F_{P_2}, F_{P_3} \in$ C (T), So

a. $F_{P_1} \tilde{\cup} (F_{P_2} \tilde{\cap} F_{P_3}) = (F_{P_1} \tilde{\cup} F_{P_2}) \tilde{\cap} (F_{P_1} \tilde{\cup} F_{P_3})$.
b. $F_{P_1} \tilde{\cap} (F_{P_2} \tilde{\cup} F_{P_3}) = (F_{P_1} \tilde{\cap} F_{P_2}) \tilde{\cup} (F_{P_1} \tilde{\cap} F_{P_3})$.

The approximate function describes the above identity. ∀ h∈ H.

a. $f_{P_1 \tilde{\cup} (P_2 \tilde{\cap} P_3)}(h) = f_{P_1}(h) \cup f_{P_2 \tilde{\cap} P_3}(h)$.
$= f_{P_1}(h) \cup (f_{P_2}(h) \cap f_{P_3}(h))$.
$= (f_{P_1}(h) \cup f_{P_2}(h)) \cap (f_{P_1}(h) \cup (f_{P_3}(h))$.
$= f_{(P_1 \tilde{\cup} P_2)}(h) \cap f_{(P_1 \tilde{\cup} P_3)}(h)$.
$= f_{(P_1 \tilde{\cup} P_2) \tilde{\cap} (P_1 \tilde{\cup} P_3)}(h)$.

The option b can also do in the same way.

Definition 9. Suppose $F_{P_1}, F_{P_2} \in$ C (T)**.** Then, the approximate function describes the difference $F_{P_1} \tilde{\cap} F_{P_2}$ of two soft sets F_{P_1}, F_{P_2}.

$f_{P_1 \tilde{\setminus} P_2}(h) = f_{P_1}(h) \setminus f_{P_2}(h)$ ∀ h∈ H.

Do not forget, remember that we take these symbols $\tilde{\cap}$, $\tilde{\cup}$, and $\tilde{\setminus}$ to indicate approximate functions. But these are not classical set operations. $f_{P_1 \tilde{\setminus} P_2}(h)$, $f_{P_1 \tilde{\cap} P_2}(h)$ and $f_{P_1 \tilde{\cup} P_2}(h)$ shows approximate function of $F_{P_1} \tilde{\setminus} F_{P_2}$ $F_{P_1} \tilde{\cap} F_{P_2}$, $F_{P_1} \tilde{\cup} F_{P_2}$, respectively.

Proposition 8. Suppose $F_{P_1}, F_{P_2}, F_{P_3} \in$ C (T), then.

a. $F_{P_1} \tilde{\setminus} F_{P_2} = F_{P_1} \tilde{\cap} F_{P_2}^{\tilde{C}}$.
b. $F_{P_1} \tilde{\setminus} F_{P_2} = F_{\Phi} \Leftrightarrow F_{P_1} \tilde{\subseteq} F_{P_2}$.
c. $P_1 \cap P_2 = \Phi \Longrightarrow F_{P_1} \tilde{\setminus} F_{P_2} = F_{P_1}$ and $F_{P_2} \tilde{\setminus} F_{P_1} = F_{P_2}$.

Proof. The approximate function describes the above identity. ∀ h ∈ H.

a. $f_{P_1 \tilde{\setminus} P_2}(h) = f_{P_1}(h) \setminus f_{P_2}(h) = f_{P_1}(h) \cap f_{P_2}(h)^C$.
b. $f_{P_1}(h) \setminus f_{P_2}(h) = f_{\Phi}(h) = \Phi \Leftrightarrow f_{P_1}(h) \subseteq f_{P_2}(h)$.
c. $P_1 \cap P_2 = \Phi \Longrightarrow f_{P_1}(h) \setminus f_{P_2}(h) = f_{P_1}(h)$ and $f_{P_2}(h) \setminus f_{P_1}(h) = f_{P_2}(h)$.

3. PRODUCTS OF SOFT SETS

Above, the approximate function describes binary operations of soft sets. Here, this function also describes the products of two soft sets. The soft set theory has four types of products And-product, Or-product, And–Not-product, and Or–Not-product respectively.

Definition 10. Suppose $F_{P_1}, F_{P_2} \in$ C (T), then the approximate function describes the And-product ($F_{P_1} \wedge F_{P_2}$) of two soft sets.

$f_{P_1 \wedge P_2}(h)$: H×H ⟶ P (T), $f_{P_1 \wedge P_2}(h_1, h_2) = f_{P_1}(h_1) \cap f_{P_2}(h_2)$.

Definition 11. Suppose $F_{P_1}, F_{P_2} \in$ C (T), then the approximate function describes the Or-product ($F_{P_1} \vee F_{P_2}$) of two soft sets.

$f_{P_1 \vee P_2}(h)$: H×H ⟶ P (T), $f_{P_1 \vee P_2}(h_1, h_2) = f_{P_1}(h_1) \cup f_{P_2}(h_2)$.

Definition 12. Suppose $F_{P_1}, F_{P_2} \in$ C (T), then the approximate function describes the And–Not-product ($F_{P_1} \overline{\wedge} F_{P_2}$) of two soft sets.

$f_{P_1 \overline{\wedge} P_2}(h)$: H×H ⟶ P (T), $f_{P_1 \overline{\wedge} P_2}(h_1, h_2) = f_{P_1}(h_1) \cap f_{P_2}^C(h_2)$.

Here, $F_{P_1} \overline{\wedge} F_{P_2} = F_{P_1} \wedge F^{\tilde{C}}{}_{P_2}$.

Definition 13. Suppose $F_{P_1}, F_{P_2} \in$ C (T), then the approximate function describes the Or–Not-product ($F_{P_1} \underline{\vee} F_{P_2}$) of two soft sets.

$f_{P_1 \underline{\vee} P_2}(h)$: H×H ⟶ P (T), $f_{P_1 \underline{\vee} P_2}(h_1, h_2) = f_{P_1}(h_1) \cup f_{P_2}^C(h_2)$.

Here, $F_{P_1} \underline{\vee} F_{P_2} = F_{P_1} \vee F^{\tilde{C}}{}_{P_2}$.

Example 3. Suppose T= $\{t_1, t_2, t_3, t_4\}$ and H= $\{h_1, h_2, h_3\}$ are universal set, set of all parameters respectively. We can make soft set by taking two subset $P_1 = \{h_1, h_2\}$, $P_2 = \{h_2, h_3\}$ of H.

$F_{P_1} = \{(h_1, T), (h_2, \{t_2, t_3, t_4\})\}$,

$F_{P_2} = \{(h_2, \{t_3, t_4\}), (h_3, \{t_1, t_2, t_3\})\}$,

We calculate $F_{P_1} \wedge F_{P_2}$ **:**

$\{((h_1, h_2), \{t_3, t_4\}), ((h_1, h_3), \{t_1, t_2, t_3\}), ((h_2, h_2), \{t_3, t_4\}), ((h_2, h_3), \{t_2, t_3\})\}$.

In the same way we can find $F_{P_1} \vee F_{P_2}$, $F_{P_1} \overline{\wedge} F_{P_2}$, $F_{P_1} \underline{\vee} F_{P_2}$.

Remember that $\wedge$,$\vee$, $\overline{\wedge}$ and $\underline{\vee}$ do not follow the commutative law.

Proposition 9. Suppose $F_{P_1}, F_{P_2}, F_{P_3} \in$ C (T), then.

a. $F_{P_1} \vee (F_{P_2} \vee F_{P_3}) = (F_{P_1} \vee F_{P_2}) \vee F_{P_3}$.
b. $F_{P_1} \wedge (F_{P_2} \wedge F_{P_3}) = (F_{P_1} \wedge F_{P_2}) \wedge F_{P_3}$.

Remember that $\overline{\wedge}$ and $\underline{\vee}$ do not follow the associative law.

Proposition 10. Suppose F_{P_1}, F_{P_2} ∈ C (T), then.

a. $(F_{P_1} \vee F_{P_2})^{\tilde{C}} = F_{P_1}^{\tilde{C}} \wedge F_{P_2}^{\tilde{C}}$.

b. $(F_{P_1} \underline{\vee} F_{P_2})^{\tilde{C}} = F_{P_1}^{\tilde{C}} \overline{\wedge} F_{P_2}^{\tilde{C}}$.

c. $(F_{P_1} \overline{\wedge} F_{P_2})^{\tilde{C}} = F_{P_1}^{\tilde{C}} \underline{\vee} F_{P_2}^{\tilde{C}}$.

d. $(F_{P_1} \wedge F_{P_2})^{\tilde{C}} = F_{P_1}^{\tilde{C}} \vee F_{P_2}^{\tilde{C}}$.

The approximate functions can solve above identity. ∀ h ∈ H.

a. $f_{(P_1 \vee P_2)^{\tilde{C}}}(h_1, h_2) = f^{C}_{P_1 \vee P_2}(h_1, h_2)$

$= (f_{P_1}(h_1) \cup f_{P_2}(h_2))^{C}$.

$= f^{C}_{P_1}(h_1) \cap f^{C}_{P_2}(h_2)$.

$= f_{P_1^{\tilde{C}} \wedge P_2^{\tilde{C}}}(h_1, h_2)$.

b. $f_{(P_1 \underline{\vee} P_2)^{\tilde{C}}}(h_1, h_2) = f^{C}_{P_1 \underline{\vee} P_2}(h_1, h_2)$.

$= (f_{P_1}(h_1) \cup f^{C}_{P_2}(h_2))^{C}$.

$= f^{C}_{P_1}(h_1) \cap f_{P_2}(h_2)$.

$= f^{C}_{P_1}(h_1) \cap (f^{C}_{P_2}(h_2))^{C}$.

$= f_{P_1^{\tilde{C}} \overline{\wedge} P_2^{\tilde{C}}}(h_1, h_2)$.

The option c and d can also do in the same way.

4. *Uni–Int* DECISION MAKING METHOD

Here, a *Uni–Int* method is built by ∧-product, ∧-product is built by the combination of *Uni–Int* operators and *Uni–Int* decision 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 as a set of all ∧-product of soft set for T.

Definition 14. Suppose F_{P_1}, F_{P_2} ∈ C (T). Then *Uni-Int* operators symbolically written as Uni_xInt_y and Uni_yInt_x and explained as follows.

$Uni_xInt_y : \wedge(T) \longrightarrow P(T)$, $Uni_xInt_y (F_{P_1} \wedge F_{P_2}) = \cup_{x \in P_1}(\cap_{y \in P_2}(f_{P_1 \wedge P_2}(h_1, h_2)))$.

$Uni_yInt_x : \wedge(T) \longrightarrow P(T)$, $Uni_yInt_x (F_{P_1} \wedge F_{P_2}) = \cup_{y \in P_2}(\cap_{x \in P_1}(f_{P_1 \wedge P_2}(h_1, h_2)))$.

Now, the method Uni_xInt_y is altered method of Uni_yInt_x and symbolically written as alt-Uni_xInt_y.

So alt-Uni_xInt_y = Uni_yInt_x and alt-alt-Uni_xInt_y = Uni_xInt_y.

UniInt set and *alt-UniInt* set of $F_{P_1} \wedge F_{P_2}$ symbolically denoted by $Uni_xInt_y(F_{P_1} \wedge F_{P_2})$, $Uni_yInt_x (F_{P_1} \wedge F_{P_2})$ respectively.

We can see $Uni_xInt_y(F_{P_1} \wedge F_{P_2}) \neq Uni_yInt_x (F_{P_1} \wedge F_{P_2})$.

Proposition 11. Suppose F_{P_1}, F_{P_2} ∈ C (T). Then

$Uni_xInt_y(F_{P_1} \wedge F_{P_2}) = Uni_yInt_x(F_{P_2} \wedge F_{P_1})$.

Proof. Proof of this proposition is based on definition 14.

Definition 15. Suppose $F_{P_1} \wedge F_{P_2} \in$ C (T). We can explain *Uni–Int* function for the ∧-products.

Uni–Int : ∧(T) ⟶ P (T),

Uni–Int($F_{P_1} \wedge F_{P_2}$) = Uni_xInt_y($F_{P_1} \wedge F_{P_2}$) ∪ Uni_yInt_x($F_{P_1} \wedge F_{P_2}$).

It is clear that ∧ −product does not follow the commutative law. But the proposition given below is correct.

Proposition 12. Suppose $F_{P_1} \wedge F_{P_2} \in$ C (T). So

Uni–Int($F_{P_1} \wedge F_{P_2}$) = *Uni−Int*($F_{P_2} \wedge F_{P_1}$) .

Proof. This identity is about to same as Proposition 11.

Suppose collection of items and collection of requirements are given. The following steps of *Uni–Int* method help to choose a group of small alternatives. On behalf of problem.

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

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

Rule 3: Calculate the And-product of soft sets.

Rule 4: Calculate the *Uni–Int* decision set for And-product.

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 4. 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 Shyam 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= $\{h_1, h_2, h_3 \ldots . h_6\}$. Here i=1,2,3…..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 Shyam) 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_{P_1} = $\{(h_3, \{t_3, t_6, t_{12}, t_{20}, t_{27}, t_{30}, t_{31}, t_{35}, t_{38}, t_{40}, t_{42}, t_{43}, t_{44}\})$,

$(h_4, \{t_2, t_4, t_{12}, t_{17}, t_{18}, t_{20}, t_{21}, t_{23}, t_{27}, t_{31}, t_{35}, t_{41}, t_{43}, t_{45}\})$,

$(h_5, \{t_1, t_2, t_{12}, t_{14}, t_{17}, t_{22}, t_{24}, t_{27}, t_{29}, t_{32}, t_{35}, t_{37}, t_{41}, t_{42}\})$,

$(h_6, \{t_2, t_4, t_{11}, t_{12}, t_{16}, t_{19}, t_{23}, t_{27}, t_{28}, t_{33}, t_{35}, t_{40}, t_{44}, t_{45}\})\}$

F_{P_1} = $\{(h_2, \{t_2, t_3, t_4, t_7, t_{14}, t_{20}, t_{22}, t_{25}, t_{27}, t_{33}, t_{32}, t_{36}, t_{40}, t_{43}, t_{45}\})$,

$(h_4, \{t_2, t_5, t_7, t_{11}, t_{12}, t_{13}, t_{14}, t_{21}, t_{29}, t_{31}, t_{32}, t_{35}, t_{36}, t_{44}, t_{45}\})$,

$(h_6, \{t_3, t_4, t_9, t_{10}, t_{11}, t_{14}, t_{15}, t_{18}, t_{21}, t_{23}, t_{27}, t_{36}, t_{44}, t_{45}\})\}$

Rule 3: We calculate And-product ($F_{P_1} \wedge F_{P_2}$) of above soft sets.
{((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}}),
}

Rule 4: So, in the end we calculate *Uni*$_x$–*Int*$_y$($F_{P_1} \wedge F_{P_2}$) and *Uni*$_y$–*Int*$_x$($F_{P_1} \wedge F_{P_2}$) in this form
Uni$_x$–*Int*$_y$($F_{P_1} \wedge F_{P_2}$) = $\cup_{x \in P_1}(\cap_{y \in P_2}(f_{P_1 \wedge P_2}$(x, y))) =∪ {

∩{{t_3, t_{20}, t_{27}, t_{40}, t_{43}}, {t_{12}, t_{31}, t_{35}, t_{44}}, {t_3, t_{27}, t_{44}}},
∩ {{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}}},
∩ {{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}}},
∩ {{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}}}
}

=∪ {Φ, {t_{45}}, {t_{14}}, {t_{45}}} = {t_{14}, t_{45}}

And
Uni$_y$–*Int*$_x$($F_{P_1} \wedge F_{P_2}$) = $\cup_{y \in P_2}(\cap_{x \in P_1}(f_{P_1 \wedge P_2}$(x, y))) =∪ {
∩ {{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}}},
∩ {{t_{12}, t_{31}, t_{35}, 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}}},
∩ {{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}}}
}
=∪ {{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–Int($F_{P_1} \wedge F_{P_2}$) = *Uni*$_x$–*Int*$_y$($F_{P_1} \wedge F_{P_2}$) ∪ *Uni*$_y$–*Int*$_x$($F_{P_1} \wedge F_{P_2}$).
= {t_{14}, t_{45}}∪{t_{12}, t_{27}, t_{35}}={ t_{12}, t_{14}, t_{27}, t_{35}, t_{45}}.

5. CONCLUSION

The leading target of this work is again define the procedure of soft sets and built a *Uni–Int* method. In this technique we first do And-product and then apply union-intersection function on it. As we see many alternative of rent room in given problem. By this method we reduce the alternative according to our parameters. Many researchers showed this work in the form of matrix before. It is very difficult and complicated to show this type of work in matrix form but this method remove these types of problems and give better results. We belief that the following work would be constructive to develop the planned method to further studies.

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