Properties of Soft Intuitionistic Fuzzy Sets

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Abstract

of soft set is one of the recent topics developed for dealing The concept with the uncertainties present in most of our real life situations. The parameterization tools of soft set theory enhance the flexibility of its applications to different problems. In this work, we give definition of arbitrary fuzzy soft set, we are giving the properties with proof and examples. We further give the proof of Degree of Subset hood of fuzzy soft sets in a fuzzy soft class and verify these with examples. We also present the definitions of the subset hood of soft intuitionstic fuzzy sets along with illustrative examples.

Keywords: Soft fuzzy set; soft intuitionstic fuzzy set; intuitionstic fuzzy set; Subset hood of soft intuitionstic fuzzy set

I. INTRODUCTION

Most of our traditional tools for formal modeling, reasoning and computing are crisp, deterministic and precise in character. However, there are many complicated problems in economics, engineering. Environment, social science, medical science etc. that involve uncertainties. The Theory of Probability, Theory of Fuzzy Sets, Theory of Intutionistic Fuzzy sets, Theory of Vague Sets, Theory of Interval Mathematics and Theory of Rough Sets are considered as mathematical tools for dealing with uncertainties. In this paper we introduced new concepts of soft intuitionstic fuzzy set. There has been incredible interest in the subject due to its diverse applications, ranging from engineering and computer science to social behavior studies. Fuzzy set was introduced by Lotfi A. Zadeh [11]. Intuitionstic fuzzy sets was provided by Atanassov [2]. A soft set was later defined by Molodstov [8]. Maji et al [6], came up with the reduction of the weight soft set. Aktas et al [1] introduced the concept of soft group theory. Maji et al [7] contributed towards the fuzzification of the notion of soft set. Aktas and cagman [1] and Aktas et al. [18] introduced the basic version of soft group theory, while Maji et al. [17] described the application of soft set theory to a decision making problem using rough sets. Recently Kong et al. [12,13] applied the soft set theoretic approach in decision making problems. Fuzzy soft set was first mentioned by Maji et al. [5]. Soft fuzzy set was defined by Yao et al. [10] followed by intuitionstic fuzzy set defined by Xu Yong-jie et al. [9]. Alkhazaleh et al. [16] introduced the concept of fuzzy parameterized interval-valued fuzzy soft set and gave its application in decision making. Alkhazaleh et al.[14] also al. [15] proposed the concept of possibility fuzzy soft set. In this paper we define a soft inituitionstic fuzzy set and the degree of subset hood along with several examples.

II. PRELIMINARIES

Definition I-A.

Let X be an initial set and U be a set of parameters. Let P(X) denotes the power set of X, and let $A \subset U$. A pair (F, A) is called a soft set over X, where F is a mapping given by $F: A \rightarrow P(X)$.

Definition II-B.

Let X be an initial set and U be a set of parameters. Let $\tilde{F}(X)$ denotes the fuzzy power set of X, and let $A \subset X$. A pair (F, A) is called

a fuzzy soft set over X, where F is a mapping given by
F: A $\rightarrow$ $\tilde{F}$(X).

Definition II-C.

Let X be an initial set and U be a set of parameters. Let P(X) denotes the power set of X. Let A $\subset$ X. A pair (F, A) is called a fuzzy soft set over X, where F is a mapping given by
F: A $\rightarrow$ $\tilde{F}$(X) and

F(x) = {y $\in$ X: $\tilde{I}_{\propto}$(x, y) $\geq$ α, x $\in$ A, y $\in$ X, α $\in$ [0, 1]}$\subset$ X×Y,
is defined as cut-set
$\tilde{I}$ $\in$ F(X×Y)

Definition II-D.

Consider X and U as a universe set and a set of parameters respectively. IFS(X) denotes the inituitionstic fuzzy power set of X. Let A $\subset$ U. A pair (F, A) is called a fuzzy soft set over X, where F is a mapping given by
F: A $\rightarrow$ IFS(X).

We recall these definitions in order to use them to introduce the concept of soft inituitionstic fuzzy set and define the degree of subset hood of soft inituitionstic fuzzy set.

III. SOFT INITUITIONSTIC FUZZY SET

III-A. Relation on Soft Inituitionstic Fuzzy Set

Let $\tilde{I}_{\propto}$ = ($\widetilde{I_{\mu\alpha}}$, $\widetilde{I_{\gamma\alpha}}$) be an inituitionstic fuzzy subset of X×Y, and $\tilde{I}_{\propto}$ is defined as inituitionstic fuzzy relationship from X to Y. We write X $\xrightarrow{\tilde{I}}$ Y, and $\tilde{I}$(x, y) denotes the degree of correspondence between x and y based on the relationship $\tilde{I}$. Let F(X×Y) denotes the family of an inituitionstic fuzzy relationship on X to Y. The set

$\tilde{I}_{\propto}$ = {(x, y)$\in$X×Y: $\widetilde{I_{\mu\alpha}}$(x, y) $\geq$ α and $\widetilde{I_{\gamma\alpha}}(x, y)$ $\leq$ α} $\subset$ X×Y is defined as α-cut set if $\tilde{I}$ $\in$ F(X×Y) for
α $\in$ [0, 1].

III-B .Soft Inituitionstic Fuzzy Set

Let X be an initial set and U be a set of parameters. Let $\tilde{F}$(X) denotes the power set of U. Let A $\subset$ U. A pair (F, A) is called a fuzzy soft set over X, where F is a mapping given by
F: A $\rightarrow$ $\tilde{F}$(X) and

F(x) = {y $\in$X: (x, y) $\in$ $\tilde{I}_{\propto}$, x $\in$ A, y $\in$ X, α $\in$ [0, 1]}.

Example.

Suppose that U=$\{h_1, h_2, h_3, h_4, h_5, h_6\}$ is the set of houses and E = {expensive (e_1), beautiful (e_2), wooden (e_3), green surrounding (e_4)}.

$\tilde{I}_{\propto}$=(0.6, 0.4)/(h_1, e_1)+(0.7, 0.3)/(h_1, e_2)+
(0, 1)/(h_1, e_3)+(0.3, 0.7)/(h_1, e_4)+
(0.9, 0.1)/(h_2, e_1)+(0, 1)/(h_2, e_2)+
(0.7, 0.3)/(h_2, e_3)+(0.1, 0.9)/(h_2, e_4)+
(0.5, 0.5)/(h_3, e_1)+(0.7, 0.3)/(h_3, e_2)+
(0.9, 0.1)/(h_3, e_3)+(0.4, 0.6)/(h_3, e_4)+
(0.3, 0.5)/(h_4, e_1)+(0.9, 0.1)/(h_4, e_2)+
(0.6, 0.4)/(h_4, e_3)+(0.2, 0.8)/(h_4, e_4)+
(0.7, 0.3)/(h_5, e_1)+(0.6, 0.4)/(h_5, e_2)+
(0.5, 0.5)/(h_5, e_3)+(0.5, 0.5)/(h_5, e_4)+
(0.8, 0.2)/(h_6, e_1)+(0.5, 0.5)/(h_6, e_2)+
(0.8, 0.2)/(h_6, e_3)+(0.3, 0.5)/(h_6, e_4).

Then, a soft intuitionistic fuzzy set,

F(e_1)={(h_1, 0.6, 0.4),(h_2, 0.9, 0.1),
(h_3, 0.5, 0.5),(h_4, 0.3, 0.5),(h_5, 0.7, 0.3),
(h_6, 0.8, 0.2)}
F(e_2)={(h_1, 0.7, 0.3),(h_2, 0,1),
(h_3, 0.7, 0.3),(h_4, 0.9, 0.1),(h_5, 0.6, 0.4),
(h_6, 0.5, 0.5)},

$F(e_3)=\{(h_1, 0,1),(h_2, 0.7, 0.3),$
$(h_3, 0.9, 0.1),(h_4, 0.6, 0.4),(h_5, 0.5, 0.5),$
$(h_6, 0.8, 0.2)\},$
$F(e_4)=\{(h_1, 0.3, 0.7),(h_2, 0.1, 0.9),$
$(h_3, 0.4, 0.6),(h_4, 0.2, 0.8),(h_5, 0.5, 0.5),$
$(h_6, 0.3, 0.5)\}$

III-C. Subset Of Soft Intuitionistic Fuzzy Sets

Definition

For two intutionistic fuzzy sets $(F, A)_{\tilde{I}}$ and $(G, B)_{\tilde{I}}$ over common universe X, we say that $(F, A)_{\tilde{I}}$ is a soft intutionistic fuzzy subset of $(G, B)_{\tilde{I}}$ if:

(i) $A \subset B$ and

(ii) $\forall \xi \in A$, $F(\xi)$ is an intutionistic fuzzy subset of $G(\xi)$,
($A \subset B$ iff $\forall\ x \in U, \mu_A(x) \le \mu_B(x)$ and $\gamma_A(x) \le \gamma_B(x)$).
denoted by $(F, A) \subset (G, B)$.

III-D. Equality Of Soft Intuitionistic Fuzzy Sets

Definition

Two soft intuitionstic fuzzy sets $(F, A)_{\tilde{I}}$ and $(G, B)_{\tilde{I}}$ over common universe X are said to be soft intuitionstic fuzzy sets equal if $(F, A)_{\tilde{I}}$ is a soft intuitionstic subset of $(G, B)_{\tilde{I}}$ and $(G, B)_{\tilde{I}}$ is a soft intuitionstic subset of $(F, A)_{\tilde{I}}$.

Example

Let $(F, A)_{\tilde{I}}$ and $(G, B)_{\tilde{I}}$ of two soft intuitionstic fuzzy sets in the same common universe
$X=\{h_1, h_2, h_3, h_4, h_5, h_6\}$. A = {expensive ($e_1$), beautiful ($e_2$), wooden ($e_3$), green surrounding ($e_4$)}, B ={expensive ($e_1$), beautiful ($e_2$), wooden ($e_3$), green surrounding ($e_4$)}. Suppose
$F(e_1)=\{(h_1, 0.6, 0.4),(h_2, 0.9, 0.1),$
$(h_3, 0.5, 0.5),(h_4, 0.3, 0.5),(h_5, 0.7, 0.3),$
$(h_6, 0.8, 0.2)\}$
$F(e_2)=\{(h_1, 0.7, 0.3),(h_2, 0,1),$
$(h_3, 0.7, 0.3),(h_4, 0.9, 0.1),(h_5, 0.6, 0.4),$
$(h_6, 0.5, 0.5)\},$
$F(e_3)=\{(h_1, 0,1),(h_2, 0.7, 0.3),$
$(h_3, 0.9, 0.1),(h_4, 0.6, 0.4),(h_5, 0.5, 0.5),$
$(h_6, 0.8, 0.2)\},$
$F(e_4)=\{(h_1, 0.3, 0.7),(h_2, 0.1, 0.9),$
$(h_3, 0.4, 0.6),(h_4, 0.2, 0.8),(h_5, 0.5, 0.5),$
$(h_6, 0.3, 0.5)\}$

and

$G(e_1)=\{(h_1, 0.6, 0.4),(h_2, 0.9, 0.1),$
$(h_3, 0.5, 0.5),(h_4, 0.3, 0.5),(h_5, 0.7, 0.3),$
$(h_6, 0.8, 0.2)\},$

$G(e_2)=\{(h_1, 0.7, 0.3),(h_2, 0,1),$
$(h_3, 0.7, 0.3),(h_4, 0.9, 0.1),(h_5, 0.6, 0.4),$
$(h_6, 0.5, 0.5)\},$

$G(e_3)=\{(h_1, 0,1),(h_2, 0.7, 0.3),$
$(h_3, 0.9, 0.1),(h_4, 0.6, 0.4),(h_5, 0.5, 0.5),$
$(h_6, 0.8, 0.2)\},$
$G(e_4)=\{(h_1, 0.3, 0.7),(h_2, 0.1, 0.9),$
$(h_3, 0.4, 0.6),(h_4, 0.2, 0.8),(h_5, 0.5, 0.5),$
$(h_6, 0.3, 0.5)\}$

Then $F(e_1) = G(e_1)$, $F(e_2) = G(e_2)$, $F(e_3) = G(e_3)$, $F(e_4) = G(e_4)$, we have (F, A)=(G, B).

III-E.Complement of Soft Intuitionistic Fuzzy Set

Definition.

The complement of soft intuitionistic fuzzy set $(F, A)_{\tilde{I}}$ is denoted by $(F, A)_{\tilde{I}}^{C}$
and defined by $(F, A)_{\tilde{I}}^{C} = (F^C, \neg A)$ where $F^C : \neg A \to \tilde{F}(X)$ is a mapping given by $F^C(A)$ = intuitionistic fuzzy complement of $F(\neg e)$, $\forall e \in \neg A$.

Example

Let $(F, A)_{\tilde{I}}$ of a soft intuitionistic fuzzy sets in the common universe X $=\{h_1, h_2, h_3, h_4, h_5, h_6\}$. A = {expensive ($e_1$), beautiful ($e_2$), wooden ($e_3$), green surrounding ($e_4$)}. Then $\neg A$ = {not expensive ($\neg e_1$), not beautiful ($\neg e_2$), not wooden ($\neg e_3$), not green surrounding ($\neg e_4$)}. Suppose that
$F(e_1)=\{(h_1, 0.6, 0.4),(h_2, 0.9, 0.1),$
$(h_3, 0.5, 0.5),(h_4, 0.3, 0.7),(h_5, 0.7, 0.3),$
$(h_6, 0.8, 0.2)\}$

F(e_2)={(h_1, 0.7, 0.3),(h_2, 0,1),
(h_3, 0.7, 0.3),(h_4, 0.9, 0.1),(h_5, 0.6, 0.4),
(h_6, 0.5, 0.5)},
F(e_3)={(h_1, 0,1),(h_2, 0.7, 0.3),
(h_3, 0.9, 0.1),(h_4, 0.6, 0.4),(h_5, 0.5, 0.5)
,(h_6, 0.8, 0.2)},
F(e_4)={(h_1, 0.3, 0.7),(h_2, 0.1, 0.9),
(h_3, 0.4, 0.6),(h_4, 0.2, 0.8),(h_5, 0.5, 0.5),
(h_6, 0.3, 0.7)}
and
F($\neg e_1$)={(h_1, 0.4, 0.6),(h_2,0.1, 0.9),
(h_3, 0.5, 0.5),(h_4,0.7, 0.3),(h_5, 0.3, 0.7),
(h_6,0.2, 0.8)}
F($\neg e_2$)={(h_1, 0.3, 0.7),(h_2, 1,0),
(h_3, 0.3, 0.7),(h_4, 0.1, 0.9),(h_5, 0.4, 0.6),
(h_6, 0.5, 0.5)},
F($\neg e_3$)={(h_1,1, 0),(h_2, 0.3, 0.7),
(h_3, 0.1, 0.9),(h_4, 0.4, 0.6),(h_5, 0.5, 0.5),
(h_6, 0.2, 0.8)},
F($\neg e_4$)={(h_1,0.7, 0.3),(h_2,0.9, 0.1),
(h_3, 0.6, 0.4),(h_4,0.8, 0.2),(h_5, 0.5, 0.5),
(h_6,0.7, 0.3)}

III-F.Null Soft Intuitionistic Fuzzy Set

Definition .

Let $(F,A)_{\tilde{I}}$ a a soft intuitionistic fuzzy set over X is said to be a null a soft intuitionistic fuzzy set denoted by Φ, if ∀ ξ ∈ A, F(ξ) = null a soft intuitionistic fuzzy set of X(null-set).

Example

Let $(F,A)_{\tilde{I}}$ of a soft intuitionistic fuzzy set in the common universe X= {h_1, h_2, h_3, h_4, h_5, h_6}. A = {expensive (e_1), beautiful (e_2), wooden (e_3), green surrounding (e_4)}. Then the soft intutionistic fuzzy set $(F,A)_{\tilde{I}}$ is the collection of approximation as below

$(F,A)_{\tilde{I}}$={expensive=ϕ, beautiful=ϕ, wooden=ϕ, green surrounding=ϕ}. Here $(F,A)_{\tilde{I}}$ is the null soft intuitionistic fuzzy set.

III-G.Union of Soft Intuitionistic Fuzzy Set

Definition.

The union of two soft intuitionistic fuzzy sets $(F,A)_{\tilde{I}}$and $(G,B)_{\tilde{I}}$ over a common universe X is the soft intuitionistic fuzzy set $(H,C)_{\tilde{I}}$ where C = A∪B and ∀ e ∈ C

$$H(e) = \begin{cases} F(e) & \text{if } e \in A - B \\ G(e) & \text{if } e \in B - A \\ F(e) \cup G(e) & \text{if } e \in A \cap B. \end{cases}$$

We write $(F,A)_{\tilde{I}} \tilde{\cup} (G,B)_{\tilde{I}} = (H,C)_{\tilde{I}}$.

Example

Assume that X = {h_1, h_2, h_3} is the set of houses under consideration and

U = {e_1 ,e_2, e_3, e_4} is the set of parameter is an intuitionistic fuzzy word or a sentence involving intuitionistic fuzzy words A,B ⊂ U such that A = {expensive (e_1), beautiful (e_2),green surrounding (e_4)}, and B = {expensive (e_1),wooden (e_3), green surrounding (e_4)}. The soft intuitionistic fuzzy set $(F,A)_{\tilde{I}}$ and $(G,B)_{\tilde{I}}$ describe the "attractiveness of the house" thought by person X and person Y respectively.

Suppose that intuitionistic fuzzy relationship

$$\tilde{I} = \left\{ \frac{(0.3,0.4)}{(h_1,e_1)} + \frac{(0.5,0.3)}{(h_1,e_2)} + \frac{(0.3,0.4)}{(h_1,e_4)} + \frac{(0.8,0)}{(h_2,e_1)} + \frac{(0.1,0.5)}{(h_2,e_2)} + \frac{(0.3,0.6)}{(h_2,e_4)} + \frac{(0,0.4)}{(h_3,e_1)} + \frac{(0.5,0.5)}{(h_3,e_2)} + \frac{(0.3,0.4)}{(h_3,e_4)} \right\}.$$

Thus, we can view the soft intuitionistic fuzzy set $(F,A)_{\tilde{I}}$as a collection of intuitionistic fuzzy approximations (which are under the fuzzy relationship $\tilde{R}$) as below: $(F,A)_{\tilde{I}}$=

{expensive={$\frac{(0.3,0.4)}{h_1}$, $\frac{(0.8,0)}{h_2}$, $\frac{(0,0.4)}{h_3}$},
beautiful={$\frac{(0.5,0.3)}{h_1}$, $\frac{(0.1,0.5)}{h_2}$, $\frac{(0.5,0.5)}{h_3}$},
greensurrounding= {$\frac{(0.3,0.4)}{h_1}$, $\frac{(0.3,0.6)}{h_2}$, $\frac{(0.3,0.4)}{h_3}$}}.

And suppose that intuitionistic fuzzy relationship

$$\tilde{\mathrm{I}} = \left\{\frac{(0.1,0.5)}{(h_1,e_1)} + \frac{(0.4,0.5)}{(h_1,e_3)} + \frac{(0.1,0.6)}{(h_1,e_4)} + \frac{(0.4,0.3)}{(h_2,e_1)} + \frac{(0.1,0.7)}{(h_2,e_3)} + \frac{(0.5,0.3)}{(h_2,e_4)} + \frac{(0.4,0.3)}{(h_3,e_1)} + \frac{(0.2,0.5)}{(h_3,e_3)} + \frac{(0.3,0.4)}{(h_3,e_4)}\right\}.$$

Thus, we can view the soft intuitionistic fuzzy set $(\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}}$as a collection of intuitionistic fuzzy approximations (which are under the fuzzy relationship $\tilde{\mathrm{R}}$) as below: $(\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}}$=

{expensive={$\frac{(0.1,0.5)}{h_1}, \frac{(0.4,0.3)}{h_2}, \frac{(0.4,0.3)}{h_3}$},

wooden={$\frac{(0.4,0.5)}{h_1}, \frac{(0.1,0.7)}{h_2}, \frac{(0.2,0.5)}{h_3}$},

greensurrounding= {$\frac{(0.1,0.6)}{h_1}, \frac{(0.5,0.3)}{h_2}, \frac{(0.3,0.4)}{h_3}$}}.

To find the $(\mathrm{F},\mathrm{A})_{\tilde{\mathrm{I}}}\tilde{\cup}(\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}}=(\mathrm{H},\mathrm{C})_{\tilde{\mathrm{I}}}$.

We have

C = {expensive (e_1), beautiful (e_2),wooden (e_3), green surrounding (e_4)}, then

H (e_1) = F (e_1) ∪ G (e_1)

$$=\left\{\frac{\max(0.3,0.1),\min(0.4,0.5)}{h_1}, \frac{\max(0.8,0.4),\min(0,0.3)}{h_2}, \frac{\max(0.0.4),\min(0.4,0.3)}{h_3}\right\}$$

$$=\left\{\frac{(0.3,0.4)}{h_1},\frac{(0.8,0)}{h_2},\frac{(0.4,0.3)}{h_3}\right\},$$

H (e_2) = F (e_2)

$$= \left\{\frac{(0.5,0.3)}{h_1}, \frac{(0.1,0.5)}{h_2}, \frac{(0.5,0.5)}{h_3}\right\},$$

H (e_3) = G (e_3)

$$= \left\{\frac{(0.4,0.5)}{h_1}, \frac{(0.1,0.7)}{h_2}, \frac{(0.2,0.5)}{h_3}\right\},$$

H (e_4) = F (e_4) ∪ G (e_4)

$$= \left\{\frac{\max(0.2,0.1),\min(0.8,0.6)}{h_1}, \frac{\max(0.4,0.5),\min(0.5,0.3)}{h_2}, \frac{\max(0.6.0.3),\min(0.2,0.4)}{h_3}\right\}$$

$$= \left\{\frac{(0.2,0.6)}{h_1}, \frac{(0.5,0.3)}{h_2}, \frac{(0.6,0.2)}{h_3}\right\},$$

Thus, we can view the soft intuitionistic fuzzy set $(\mathrm{H},\mathrm{C})_{\tilde{\mathrm{I}}}$ as a collection of intuitionistic fuzzy

$(\mathrm{H},\mathrm{C})_{\tilde{\mathrm{I}}}$={expensive={$\frac{(0.3,0.4)}{h_1}, \frac{(0.8,0)}{h_2}, \frac{(0.4,0.3)}{h_3}$},

beautiful={$\frac{(0.5,0.3)}{h_1}, \frac{(0.1,0.5)}{h_2}, \frac{(0.5,0.5)}{h_3}$},

wooden={$\frac{(0.4,0.5)}{h_1}, \frac{(0.1,0.7)}{h_2}, \frac{(0.2,0.5)}{h_3}$},

greensurrounding=

{$\frac{(0.2,0.6)}{h_1}, \frac{(0.5,0.3)}{h_2}, \frac{(0.6,0.2)}{h_3}$}}.

III-H.Intersection of Soft Intuitionistic Fuzzy Set

Definition.

The intersection of two soft intuitionistic fuzzy sets $(\mathrm{F},\mathrm{A})_{\tilde{\mathrm{I}}}$and $(\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}}$ over a common universe X is the soft intuitionistic fuzzy set $(\mathrm{H},\mathrm{C})_{\tilde{\mathrm{I}}}$ where C = A∪B and ∀ e ∈ C

$$\mathrm{H}(e) = \begin{cases} \mathrm{F(e)} & \text{if } e \in A - B \\ \mathrm{G(e)} & \text{if } e \in B - A \\ \mathrm{F(e)} \cap \mathrm{G(e)} & \text{if } e \in A \cap B. \end{cases}$$

We write $(\mathrm{F},\mathrm{A})_{\tilde{\mathrm{I}}}\tilde{\cap}(\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}}=(\mathrm{H},\mathrm{C})_{\tilde{\mathrm{I}}}$.

III-I. Degree of Subset hood of Soft Intuitionistic Fuzzy Set

Definition.

Let X be a Universal, U be a set of parameters and let $(\mathrm{F},\mathrm{A})_{\tilde{\mathrm{I}}}$and $(\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}}$ are two soft intuitionistic fuzzy sets of X. Then the degree of subset hood denoted by $\mathbf{S}\,(\mathrm{A},\mathrm{B})_{\tilde{\mathrm{I}}}$ is defined as,

$$\mathbf{S}\,(\mathrm{A},\mathrm{B})_{\tilde{\mathrm{I}}\,\mu}=\frac{1}{|(\mathrm{F},\mathrm{A})|_{\tilde{\mathrm{I}}_\mu}}\left\{ \begin{array}{c} |(\mathrm{F},\mathrm{A})|_{\tilde{\mathrm{I}}_\mu} - \\ \sum \max\{0, (\mathrm{F},\mathrm{A})_{\tilde{\mathrm{I}}_\mu} - (\mathrm{G},\mathrm{B})_{\tilde{\mathrm{I}}_\mu}\} \end{array} \right\}$$

where

$|(F,A)|_{\tilde{I}_\mu} = \sum \mu_A(x)$

$|(F,A)|_{\tilde{I}_\gamma} = \sum \gamma_A(x)$

$|G,B|_{\tilde{I}_\mu} = \sum \mu_B(x)$

$|G,B|_{\tilde{I}_\gamma} = \sum \gamma_B(x)$

and

$$\mathbf{S}(B,A)_{\tilde{I}\,\mu} = \frac{1}{|(G,B)|_{\tilde{I}_\mu}}\left\{\begin{array}{c}|(G,B)|_{\tilde{I}_\mu} \\ -\sum \max\{0,(G,B)_{\tilde{I}_\mu} - (F,A)_{\tilde{I}_\mu}\end{array}\right\}$$

Example:

Let $(F,A)_{\tilde{I}}$ and $(G,B)_{\tilde{I}}$ of two soft intuitionistic fuzzy sets in the same common universe X= $\{h_1, h_2, h_3, h_4, h_5, h_6\}$ is the set of houses under consideration and U = $\{e_1, e_2, e_3, e_4\}$ is the set of parameter is an intuitionistic fuzzy word or a sentence involving intuitionistic fuzzy words A,B ⊂ U such that A = {expensive (e_1), beautiful (e_2),green surrounding (e_4)}, and B = {expensive (e_1),wooden (e_3), green surrounding (e_4)}. The soft intuitionistic fuzzy set $(F,A)_{\tilde{I}}$ and $(G,B)_{\tilde{I}}$ describe the "attractiveness of the house" thought by person X and person Y respectively.

$$(F,A)_{\tilde{I}} = \{\frac{(0.5,0.3)}{h_1}, \frac{(0.1,0.5)}{h_2}, \frac{(0.5,0.5)}{h_3}, \frac{(0.3,0.6)}{h_4}, \frac{(0.3,0.4)}{h_5}, \frac{(0.1,0.4)}{h_6}\}$$

$$(G,B)_{\tilde{I}} = \{\frac{(0.4,0.5)}{h_1}, \frac{(0.6,0.3)}{h_2}, \frac{(0.2,0.7)}{h_3}, \frac{(0.4,0.5)}{h_4}, \frac{(0.6,0.2)}{h_5}, \frac{(0.8,0.1)}{h_6}\}$$

$$(F,A)_{\tilde{I}_\mu} = \{\frac{h_1}{0.5}, \frac{h_2}{0.1}, \frac{h_3}{0.5}, \frac{h_4}{0.3}, \frac{h_5}{0.3}, \frac{h_6}{0.1}\}$$

$$(F,A)_{\tilde{I}_\gamma} = \{\frac{h_1}{0.3}, \frac{h_2}{0.5}, \frac{h_3}{0.5}, \frac{h_4}{0.6}, \frac{h_5}{0.4}, \frac{h_6}{0.4}\}$$

$$(G,B)_{\tilde{I}_\mu} = \{\frac{h_1}{0.4}, \frac{h_2}{0.6}, \frac{h_3}{0.2}, \frac{h_4}{0.4}, \frac{h_5}{0.6}, \frac{h_6}{0.8}\}$$

$$(G,B)_{\tilde{I}_\gamma} = \{\frac{h_1}{0.5}, \frac{h_2}{0.3}, \frac{h_3}{0.7}, \frac{h_4}{0.5}, \frac{h_5}{0.2}, \frac{h_6}{0.1}\}$$

$|(F,A)|_{\tilde{I}_\mu} = \sum \mu_A(x) = 1.8$

$|(F,A)|_{\tilde{I}_\gamma} = \sum \gamma_A(x) = 3.0$

$|G,B|_{\tilde{I}_\mu} = \sum \mu_B(x) = 2.2$

$|G,B|_{\tilde{I}_\gamma} = \sum \gamma_B(x) = 2.3$

$$\mathbf{S}(A,B)_{\tilde{I}\,\mu} = \frac{1}{|(F,A)|_{\tilde{I}_\mu}}\{|(F,A)|_{\tilde{I}_\mu} - \sum \max\{0,(F,A)_{\tilde{I}_\mu} - (G,B)_{\tilde{I}_\mu}\}$$

$$=\{\frac{1}{1.8}\{1.8 - \sum \max\{0,(0.1,-0.5,0.3,-0.1,-0.3,-0.7)\}\}$$

$$=\frac{1}{1.8}\{1.4\} = 0.7778$$

$\mathbf{S}(A,B)_{\tilde{I}\,\mu} \cong 0.8$ and

$$\mathbf{S}(A,B)_{\tilde{I}\,\gamma} = \frac{1}{|(F,A)|_{\tilde{I}_\gamma}}\{|(F,A)|_{\tilde{I}_\gamma} - \sum \max\{0,(F,A)_{\tilde{I}_\gamma} - (G,B)_{\tilde{I}_\gamma}\}$$

$$=\frac{1}{3.0}\{3.0 - \sum \max\{0,(-0.2,0.2,-0.2,0.1,0.2,0.6)\}$$

$\mathbf{S}(A,B)_{\tilde{I}\,\gamma} \cong 0.6$

IV. Conclusion:

In this paper the basic concept of a vague soft set is recalled. We have introduced the concept of soft intutionistic fuzzy set as an extension to the intutionistic fuzzy set. The basic properties on soft intutionistic fuzzy set are also presented. The complement, null, equality, union, intersection, subset and subset hood as far as future direction are concerned. It is hoped that our findings will help enhancing this study on fuzzy soft sets for the researchers.

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