Inverse Hyper soft set theory

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ABSTRACT

In this paper we will mainly discuss about soft set theory, which was introduced by Molodtsov[1]. The main description on this paper is about inverse hypersoft set. Moreover, here see about some types of it ,such as, inverse hypersoft subset, null inverse hypersoft set, AND operation, OR operation, intersection and union of inverse hypersoft set.This paper also describe the properties of inverse hypersoft set.

Key Words: soft set, Hyper soft set, Inverse soft set, Inverse hyper soft set.

1. INTRODUCTION

We have uncertainties over many problems, which cannot be solved by many of the theories, so that the mathematician Molodtsov[1] brought a new theory called soft set theory. This soft set theory also have some special application,such as decision making,information science ect[3]…. .If there is introduction, then there is also extention, therefore Smarandache extended the soft set theory to their types[14],[15]. The main purpose of this paper is to make everyone know about the extension of hypersoft set theory and also about their properties.

2. PRELIMINARIES

Definition2.1 [2]

A pair (F,E) is called a softest over U and only if F is a mapping of E into the set of all subjects of the set U, i.e. F:E→P(U) is the power set of U.

Definition2.2[7]

Let p(E) Be the set of all subsets of parameterset E.A pair (F,U) is called an inverse soft set over E, where F is a mapping given by F: U→ $P(E)$.

Definition2.3[2]

The complement of a soft set(F,A) is defined as$(F,A)^c$ =(F^c,A), where$F^c(e)=(F(e))^c$=X F(e), for all e∈A.

Definition2.4[2]

The difference of two sets(F,A) and (G,A) is defined by (F,A)- (G,A) = (F - G,A),where (F - G)(e)=F(e) - G(e),for all e∈A.

Definition2.5[2]

Let(F,A) be a soft setover X and x.x is said to be in the soft set (F,E) denoted by x∈ (F,A) IF X∈F(e) for all e∈A.

Definition2.6[14]

(1) Let U be a universe of discourse, P(U) the power set U and $E_1, E_2, E_3, \ldots E_n$ the pairwise disjoint sets of parameters. Let A_i be the nonempty subject of E_i for each i-1,2,3..n.A hyper soft set can be identified by the pair (F, $A_1 X A_2 X A_3 X \ldots X A_n$),where:

$$F : A_1 X A_2 X A_3 X \ldots X A_n \rightarrow P(U)$$

3. INVERSE HYPERSOFT SET

Definition 3.1

Let U be the reference set and P(E) be the power set of attribute set E where E= $E_1 X E_2 X E_3, \ldots x E_n$.A pair (H,U) is called an inverse hypersoft set over E. hwere H is a mapping given by H:U→P(E).

Example3.1:

Let U={l_1, l_2, l_3, l_4} be the set of man.

Let attribute set $E_{1=}$((van,car, auto)) be the set of four wheelers.

E_2=((cycle,bike)) be the set of two wheelers.

We define the hypersoft set by

H=((van,bike))={ l_1,l_4}

H=((van,cycle))={ l_1,l_3}

H=((car,bike))={ l_2,l_4}

H=((auto,cycle))={ l_3,l_4}

Now we define the inverse hypersoft set by

H(l_1)={(van, bike),(van, cycle)}

= (van, {bike, cycle})

H(l_2)=(van,cycle)

H(l_3)={(van,cycle),(auto,cycle)}

=({van,auto},cycle).

H(l_4)={(car,bike),(auto,cycle)}

=({car,auto},{bike,cycle}).

Definition3.2

Let (H,U) and (I,V) be two inverse hypersoft set over the common Attribute set E={E_1 X E2 . . . ..XE_n }.We say that (H,U) is an inverse hypersoft subset of (I,V)

if U⊆V,then exist v∈V such that H(u)⊂I(v) where H(u)=($x_1,x_2, . . .,x_n$)and I(v)=($y_1,y_2, ... ,y_n$) for all u∈U.

Example 3.2:

Let H={ l_2,l_3} and I={l_1,l_2,l_3,l_4}

Trivially H⊂I

Now (H,U) ana (I,V) is two inverse hypersoft sets over the same attribute set E={ E_1 X E2},Where $E_{1=}${van,cycle}

E2={cycle,bike} defined as follows:

H(l_2)=(van,cycle)

H(l_3)=({van,car}.bike)

I(l_1)=(auto,cycle)

I(l_2)=({van,car},{cycle})

$I(l_3)$=({van,car},(cycle,bike),

$I(l_4)$=(auto,bike)

Therefore we have (H,U) ⊂(I,V)

Definition 3.3

Two inverse hypersoft sets (H,U), (I, V) over a same attribute set E={E_1 X E_2 . . . ..X E_n } are said to be inverse hypersoft set equal if (H,U)is an inverse hypersoft set of (I, V) and (I, V) is an inverse hypersoft set of (H,U).

It is denoted by (H,U) = (I, V)

Definition 3.4

An inverse hypersoft set (H,U) over a attribute set E={E_1 X E_2 . . . ..X E_n } are said to be null inverse hypersoft set if H(u)=($\phi, \phi, \dots, \phi$)for all u ∈ U . Also it is denoted by ϕ^E.

Example 3.3:

Consider example 3.1, $H(l_1)$= $H(l_2)$= $H(l_3)$= $H(l_4)$=(ϕ, ϕ).

So (H,U) is null inverse hypersoft set.

Definition 3.5

An inverse hypersoft set (H,U) over a attribute set E={E_1 X E_2 . . . ..X E_n } are said to be absolute inverse hypersoft set if H(u)=E for all u ∈ U . Also it is denoted by A^E.

Example 3.4:

Consider example 3.1, $H(l_1)$= $H(l_2)$= $H(l_3)$= $H(l_4)$=({van,car,auto},{cycle, bike}).So (H,U) is null inverse hypersoft set.

Definition 3.6

Let (H,U) and (I, V) be two inverse hypersoft set over the same attribute set E= {E_1 X E2 . . . ..X E_n }.Then (H,U) AND (I, V) is defined as (H,U) ∧ (I, V)=(O, U x V) where O(u, v)= H(u)∩ I(v) for all (u,v) ∈ U xV.

Definition 3.7

Let (H,U) and (I, V) be two inverse hypersoft set over the same attribute set E= {E_1 X E2 . . . ..X E_n }.Then (H,U) OR (I, V) is defined as (H,U) ∨ (I, V)=(O, U x V) where O(u, v)= H(u)∪ I(v) for all (u,v) ∈ U xV.

Definition 3.8

The complement of an inverse hypersoft set (H,U) denoted by$(H, U)^c$

is defined as $(H,U)^c$= (H^c,U) where H^c:U→ P(E_1 X E2 . . . ..X E_n) is given by H^c(u)= ∼ H(u) (here ∼ means not in set).

Definition 3.9

Intersection of two inverse hypersoft sets (H, U) and (I,V) over the same attribute set E= {E_1 X E2 . . . ..X E_n } is the inverse hypersoft set (δ,W), where W= U ∩V and δ(w)= (X_1 ∩ Y_1, X_2∩ Y_2, ... , X_n∩ Y_n) for each w ∈ W such that H(w)=(X_1 , X_2, ... ,X_n) for each w ∈U and I(w)=(Y_1, Y_2, ... ,Y_n) for each w ∈V.

We denote it (H, U) $\breve{\cap}$ (I,V) = (δ,W).

Definition 3.10

Let (H, U) and (I,V) be two inverse hypersoft set over the same attribute set E= {E_1 X E2 . . . ..X E_n } such that U∩V≠ $\phi. Then\ union\ of$ (H, U) and (I, V)denoted by (H, U) $\breve{\cup}$ (I,V) is defined as (H, U) $\breve{\cup}$ (I,V) = (δ,W) where

$$\delta(w)=\begin{cases}(X_1,X_2,\ldots,X_n) & w\in U-V\\ (Y_1,Y_2,\ldots,Y_n) & w\in V-U\\ (X_1\cup Y_1,X_2\cup Y_2,\ \ldots,X_n\cup Y_n) & w\in U\cap V\end{cases}$$

H(w)= (X_1 , X_2 , ... ,X_n) for each w ∈U and I(w)=(Y_1, Y_2, ... ,Y_n) for each w ∈V.

Proposition 3.1:

Let (H, U) be a inverse hypersoft set over the attribute set E= {E_1 X E_2 . . . ..X E_n }, ϕ^Ebe null inverse hypersoft setand A^E be absolute inverse hypersoft set. Then (i) (H, U)∪ ϕ^E= (H, U)

(ii) (H, U)∩ ϕ^E= ϕ^E

(iii) (H, U)∪ A^E= A^E

(iv) (H, U)∩ A^E= (H, U)

Proof :

Using the definitions 3.4,3.5,3.9,3.10, we can proved the above statement.

Proposition 3.2:

Let (H, U) and (I,V) be two inverse hypersoft set over the same attribute set E= {E_1 X E2 . . . ..X E_n } such that U∩V≠ ϕ . Then

$(i)((H,U)\cup(I,V))^C=(H,U)^c\cap(I,V)^c$

(ii)$((H,U)\cap(I,V))^C=(H,U)^c\cup(I,V)^c$

Proof:

Using the definitions3.8, 3.9, 3.10, we can proved this.

4. Conclusion:

Here we are defining inverse hyper soft set as attribute set and a reference set. We define also the inverse hyper soft subset, inverse hyper soft set equal, null inverse hypersoft set,absolute inverse hypersoft set, AND operation ,OR operation for inverse hyper soft subset, complement of inverse hyper soft subset, Union of inverse hyper soft subset and Intersection of inverse hyper soft subset. Further we explore some properties of inverse hyper soft subset.

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