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A STUDY ON Γ-NEUTROSOPHIC SOFT SET IN DECISION MAKING PROBLEM

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ABSTRACT

Soft set theory was proposed by Molodtsov, it has been regarded as an effective Mathematical tool to deal with uncertainties. In our regular life we frequently faced some realistic problems which needs right decision making, to get the best solution of these problems we need to consider various parameters relating to the best solution. In this paper we study some basic definitions, prepositions and tabular representation of Γ-neutrosophic soft setby introducing a parameter Γ to the neutrosophic soft set, in which the parameter set Γ indicates the brand of the articles or goods.

Keywords: soft set; Γ- Soft set; Γ-neutrosophicsoftset, comparison matrix.

1. INTRODUCTION

The soft theory was first initiated by Molodtsov [1] as one of the important Mathematical tool to solve the problems with uncertainties. The modern set theory formulated by George Contor is formulated the whole Mathematics. Soft set theory does not require the specialization of a parameter; instead it accommodates approximate descriptions of an object as its starting point. Molodtsov successfully applied the soft set theory into several directions, such as smoothness of functions, Riemann integration, theory of probability and Perron integration. Atharkharal and B. Ahmad [2] studied the notation of mapping on classes of fuzzy soft sets and properties of soft images and fuzzy sot inverse images of fuzzy soft sets. K.v. Babitha and J.J. Sunil [3] gave the theoretical aspects of soft sets by extending the notations of equivalence relations, composition of relations, partition of functions of soft sets. Nadal Tahat *et al.* [9] introduced the concept of ordering on soft set relation and vague soft set. P.K. dass and R. Borgohain [5] applied fuzzy soft set in multi-observer, multi-criteria and decision making problems. Irfan Deli et al. [8] studied about relations on neutroscopic soft sets which allows to compose two neutroscopic soft sets and finally a decision making method on neutroscopic soft sets is presented. Pinaki Majumdar and s.k. samanta [4] defined a generalized fuzzy sot sets in decision making problem and medical diagnosis problems. Pabitra Kumar Maji [6] studied some definitions and operations intro- duced on neutrosophic soft set and also some properties of this concept have been established.

Xiaohong Zhang [7] studied the interval soft sets and its applications by calculating the choice values of interval soft sets to solve a decision making problem. This paper is an attempt to study the some basic definitions of Γ-neutrosophic soft set by introducing a parameter Γ to the neutrosophic soft set. Also we present an Application of Γ -Neutrosophic Soft Set in Decision making problem.

2. PRELIMINARIES

2.1 Soft set

Let U be an initial Universal set and K be set of parameters. Suppose that P(U) denotes the power set of U and A be a non- empty sub set of K. A pair (F, A) is called a soft set over U, where, $F : A \rightarrow P(U)$ is mapping.

2.2 Γ- Soft set

Let U be the Universal set and P(U) be the power set of U. Let K and Γ be the sets of parameters attributes. The triode (F, A, Γ) is called a Γ- Soft set over the Universal set, U is (F, A, Γ) = $\{ F(a, \gamma): a \in A, \gamma \in \Gamma\}$ where F is a mapping given by F: A X Γ → P(U) and A is the sub set of K.

2.3 Union of two Γ - soft sets

Let (F, A, Γ) and (G, B, Γ) are two Γ- soft sets over a common Universal set, U then the union of these two Γ- soft sets is denoted by (F, A, Γ) ∪ (G, B, Γ) and is defined by(F, A, Γ) ∪ (G, B, Γ) = (N, (A X Γ) ∪ (B X Γ)), where N (e, γ) = {F (e, γ) if (e, γ) ∈ (A X Γ) - (B X Γ),
= {G (e, γ) if (e, γ) ∈ (B X Γ) - (A X Γ),
= {F (e, γ) ∪ G (e, γ) if (e, γ) ∈ (A X Γ)∩(B X Γ)

2.4 Intersection of two Γ - soft sets

Let (F, A, Γ) and (G, B, Γ) are two Γ- soft sets over a common Universal set, U then the union of these two Γ- soft sets is denoted by (F, A, Γ) ∩ (G, B, Γ) and is defined by

(F, A, Γ) ∩ (G, B, Γ) = (N, (A X Γ) ∩ (B X Γ)),

where N (e, γ) = F (e, γ) or G (e, γ) for every (e, γ) ∈ (A X Γ) ∩ (B X Γ).

3. Γ -NEUTROSOPHIC SOFT SET

3.1Neutrosophic Set: A Neutrosophic Set A on the universe of discourse X defined as A = { < x, $T_A(x)$, $I_A(x)$, $F_A(x)$ >, x ∈ X }, where $T_A(x)$, $I_A(x)$ and $F_A(x)$: X

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$\rightarrow(^{-}0 , 1^{+})$ and $^{-}0 \leq T_A(x)+I_A(x)+F_A(x) \leq 3^{+}$. Here $T_A(x)$, $I_A(x)$ and $F_A(x)$ are respectively the true membership, in deterministic membership and false membership function of an object x ∈ X.

3.2Γ -Neutrosophic Set: A Γ -Neutrosophic Set N (A X Γ) on the universe of discourse U is defined as N= {<(e, γ), $T_{Kx\Gamma}(e, \gamma)$, $I_{Kx\Gamma}(e, \gamma)$, $F_{Kx\Gamma}(e, \gamma)$>, (e, γ)∈UX Γ }, where $T_N(e, \gamma)$, $I_N(e, \gamma)$ and $F_N(e, \gamma)$: UX Γ $\rightarrow(^{-}0, 1^{+})$ and $^{-}0 \leq T_N(e, \gamma)+ I_N(e, \gamma)+ F_N(e, \gamma) \leq 3^{+}$. Here T_N,$I_{Kx\Gamma}$ and $F_{Kx\Gamma}$ are respectively the true membership, indeterminate membership and false membership function of an object (e, γ)∈A X Γ.

3.3 Neutrosophic Soft Set: Let U be an initial universe set and E be a set of parameters which is of neutrosophic in nature. Consider A$\subseteq$E. Let P(U) denotes the set of all neutrosophic sets of U. The collection (F, A) is termed to be the neutrosophic soft set over U, where F is a mapping given by F: A → P (U).

3.4Γ -Neutrosophic Soft Set: Let U be universal set and E be the parameters which is of Neutrosophic nature and also Γ be the another set of parameters which indicates the brand of the articles. Let A$\subseteq$E and P(U) be the set of all Neutrosophic sets of U. The collection (F, A, Γ) is a Γ- Soft set, then it is termed as Γ- Neutrosophic Soft set over U. Where F is a mapping given by F: A X Γ → P(U).

Example 1

Let U be the universal set for consideration and E &Γ be the sets of parameters in which E is of Neutrosophic nature and Γ is the brand of the articles.

Let E = {Beautiful, high cost, low cost, moderate cost, Automatic gear} and Γ= {brand-1, brand-2}. Now to define a Γ- Neutrosophic Soft set means to point out the elements in E.

Let U = { u_1, u_2, u_3, u_4, u_5 }be the five cars for consideration and A = { e_1, e_2, e_3 }, in which e_1 stands for high cost,e_2 stands for low cost and e_3 stands for moderate cost. Let Γ- Neutrosophic Soft set (F, A, Γ) describes the cost ofcarswith two brands under consideration in which (F, A, Γ) is parameterized family, {F(e_i,γ_j), i = 1,2,3 and j = 1 or 2}. The mapping F here is F(high cost, γ_1) means cars with high cost of brand-1, F(high cost, γ_2) means cars with high cost of brand-2 and so on.

F(high cost, γ_1) = {<u_1, 0.6,0.4,0.7>, <u_2, 0.7, 0.9, 0.2>, <u_3, 0.4, 0.3, 0.6>, <u_4, 0.2, 0.8, 0.9 >, <u_5, 0.7, 0.2, 0.8>}.

F(high cost, γ_2) = {<u_1, 0.7,0.3, 0.2>, <u_2, 0.4,0.2, 0.1>, <u_3, 0.4,0.5, 0.6 >}, <u_4, 0.5,0.6, 0.7 >, <u_5, 0.6, 0.1, 0.8> }.

F(low cost, γ_1) = {<u_1, 0.5,0.4,0.6>, <u_2, 0.2, 0.9, 0.2>, <u_3, 0.4, 0.3, 0.2 >, <u_4, 0.2, 0.6, 0.1 >, <u_5, 0.6, 0.8, 0.7>}.

F(low cost, γ_2) ={<u_1, 0.3,0.3, 0.9 >, <u_2, 0.5,0.2, 0.1>, <u_3, 0.8, 0.9, 0.6 >}, <u_4, 0.1, 0.6, 0.7 >, <u_5, 0.9, 0.1, 0.7>}.

F(moderate, γ_1) = { <u_1, 0.6,0.4,0.7>, <u_2, 0.7, 0.9, 0.2 >, <u_3, 0.8, 0.3, 0.9>, <u_4, 0.7, 0.4, 0.9 >, <u_5, 0.7, 0.1, 0.6>}.

F(moderate, γ_2) = {<u_1, 0.2,0.3, 0.6>, <u_2, 0.4, 0.1,0.5>, <u_3, 0.1,0.5, 0.3 >}, <u_4,0.5,0.2, 0.7>, <u_5, 0.3, 0.1, 0.8>}.

For the purpose of storing a Γ -neutrosophic soft set in a computer, we could represent it in the form of a table as shown below. In the following table the entries c_{ij} are the corresponding elements to u_i and the pair of parameters (e_j, γ_m), where c_{ij} = true member ship value of ui with brand-1 or brand-2, indeterminate member ship value of ui with brand-1 or brand-2, false member ship value of ui with brand-1 or brand-2 in F(e_j, γ_m).

Tabular representation of Γ- Neutrosophic soft set (F, K, Γ)

U	high cost-brand-1	high cost-brand-2	low cost-brand-1	low cost-brand-2	moderate cost-brand-1	moderate cost-brand-2
u_1	0.6,0.4,0.7	0.7, 0.3, 0.2	0.5,0.4,0.6	0.3, 0.3, 0.9	0.6,0.4,0.7	0.2, 0.3, 0.6
u_2	0.7,0.9,0.2	0.4, 0.2, 0.1	0.2, 0.9, 0.2	0.5, 0.2, 0.1	0.7, 0.9, 0.2	0.4, 0.1, 0.5
u_3	0.4,0.3,0.6	0.4, 0.5, 0.6	0.4, 0.3, 0.2	0.8, 0.9, 0.6	0.8, 0.3, 0.9	0.1, 0.5, 0.3
u_4	0.2,0.8,0.9	0.5, 0.6, 0.7	0.2, 0.6, 0.1	0.1, 0.6, 0.7	0.7, 0.4, 0.9	0.5, 0.2, 0.7
u_5	0.7,0.2,0.8	0.6, 0.1, 0.8	0.6, 0.8, 0.7	0.9, 0.1, 0.7	0.7, 0.1, 0.6	0.3, 0.1, 0.8

3.5 Γ -Neutrosophic Soft Sub Set: Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U. The set (F, A, Γ) is said to be a Γ -Neutrosophic Soft Sub Set of (G, B, Γ) if A X Γ⊂ B X Γ and $T_{F(e, \gamma)}(u) \leq T_{G(e, \gamma)}(u)$, $I_{F(e, \gamma)}(u) \leq I_{G(e, \gamma)}(u)$ and $F_{F(e, \gamma)}(u) \geq F_{G(e, \gamma)}(u)$, ∀ (e, γ) ∈ A X Γ, γ∈ Γ, e∈ A and u ∈ U.The notation for the sub set is (F, A, Γ)⊂(G, B, Γ).

Example 2 Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U = {u_1, u_2, u_3} be the set of Televisions. Let Γ -Neutrosophic Soft set (F, A, Γ) describes the Television domes and the Γ -Neutrosophic Soft set (G, B, Γ) describes the Televisions of different brands. Consider the tabular representations of Γ -Neutrosophic Soft sets as follows. In this example we consider big box, big Television and small box, small Television has the same dimensions.

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Tabular Representation of Γ- Neutrosophic Soft set (F, A, Γ)

U	Big box of brand-1	Big box of brand-2	small box of brand-1	small box of brand-2
u_1	0.6,0.4,0.7	0.7, 0.3, 0.2	0.5,0.4,0.6	0.3, 0.3, 0.5
u_2	0.7,0.9,0.2	0.4, 0.2, 0.1	0.2, 0.9, 0.2	0.5, 0.2, 0.1
u_3	0.4,0.3,0.6	0.4, 0.5, 0.6	0.4, 0.3, 0.2	0.8, 0.9, 0.6

Tabular Representation of Γ- Neutrosophic Soft set (G, B, Γ)

U	Big T.V of brand-1	Big T.V of brand-2	small T.V of brand-1	small T.V of brand-2	Beautiful T.V of brand-1	Beautiful T.V of brand-2
u_1	0.5,0.2,0.9	0.5, 0.2, 0.5	0.3,0.2,0.8	0.2, 0.2, 0.9	0.6,0.4,0.7	0.2, 0.3, 0.6
u_2	0.4,0.7,0.5	0.2, 0.1, 0.6	0.1, 0.8, 0.6	0.4, 0.1, 0.1	0.7, 0.9, 0.2	0.4, 0.1, 0.7
u_3	0.3,0.1,0.8	0.1, 0.2, 0.9	0.3, 0.2, 0.4	0.6, 0.6, 0.6	0.8, 0.3, 0.9	0.1, 0.5, 0.4

Therefore from then definition, (F, A, Γ)⊂(G, B, Γ).

3.6 Not set of (AXΓ): Let the parameter set (AXΓ) = { (e_1, γ_1), (e_1, γ_2), $(e_2, \gamma_2,\ldots)$ }. The Not set of (AXΓ) is denoted by ~ (AXΓ) and is defined as ~ (AXΓ) = {~ (e_1, γ_1), ~ (e_1, γ_2), ~ $(e_2, \gamma_2,\ldots)$}.where ~ (e_1, γ_1) means that not (e_1, γ_1), i.e., not e_1 of brand -1.

3.7 Complement of Γ- Neutrosophic soft set: The Complement of Γ- Neutrosophic Soft set, (F, A, Γ) is denoted by $(F, A, \Gamma)^c$ and is defined as $(F, A, \Gamma)^c = (F^c, \sim(AX\Gamma))$, where $F^c : \sim(A\ X\ \Gamma) \rightarrow P(U)$ is given by $F^c(\sim(e_1, \gamma_1))$ = Γ- Neutrosophic Soft complement with $T_{F^c(e,\gamma)} = F_{F(e,\gamma)}$, $I_{F^c(e,\gamma)} = I_{F(e,\gamma)}$ and $F_{F^c(e,\gamma)} = T_{F(e,\gamma)}$

3.8 Union of Γ- Neutrosophic soft sets: Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U. The union of these two sets is defined by (F, A, Γ)∪(G, B, Γ) = (G, B, Γ) and is defined by (F, A, Γ)∪(G, B, Γ) = (P, (A∪B)XΓ) and the truth membership, indeterminate membership and false membership are defined as

$T_{P(e,\gamma)}(u) = T_{F(e,\gamma)}(u)$ if $(e, \gamma)\in (AX\Gamma) - (BX\Gamma)$
$= T_{G(e,\gamma)}(u)$ if $(e, \gamma)\in (BX\Gamma) - (AX\Gamma)$
$= \max\{ T_{F(e,\gamma)}(u), T_{G(e,\gamma)}(u) \}$ if $(e, \gamma)\in (AX\Gamma) \cap (BX\Gamma)$
$I_{P(e,\gamma)}(u) = I_{F(e,\gamma)}(u)$ if $(e, \gamma)\in (AX\Gamma) - (BX\Gamma)$
$= I_{G(e,\gamma)}(u)$ if $(e, \gamma)\in (BX\Gamma) - (AX\Gamma)$
$= (I_{F(e,\gamma)}(u)+ I_{G(e,\gamma)}(u))/2$, if $(e, \gamma)\in (AX\Gamma) \cap (BX\Gamma)$
$F_{P(e,\gamma)}(u) = F_{F(e,\gamma)}(u)$ if $(e, \gamma)\in (AX\Gamma) - (BX\Gamma)$
$= F_{G(e,\gamma)}(u)$ if $(e, \gamma)\in (BX\Gamma) - (AX\Gamma)$
$= \min\{ T_{F(e,\gamma)}(u), T_{G(e,\gamma)}(u) \}$ if $(e, \gamma)\in (AX\Gamma) \cap (BX\Gamma)$

3.9 Intersection of Γ- Neutrosophic soft sets: Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U. The union of these two sets is defined by (F, A, Γ)∩(G, B, Γ) = (G, B, Γ) and is defined by (F, A, Γ)∩(G, B, Γ) = (P, (A∩B)XΓ) and the truth membership, indeterminate membership and false membership are defined as

$T_{P(e,\gamma)}(u) = T_{F(e,\gamma)}(u)$ if $(e, \gamma)\in (AX\Gamma) - (BX\Gamma)$
$= T_{G(e,\gamma)}(u)$ if $(e, \gamma)\in (BX\Gamma) - (AX\Gamma)$
$= \text{mix}\{T_{F(e,\gamma)}(u), T_{G(e,\gamma)}(u)\}$ if $(e, \gamma)\in (AX\Gamma) \cap (BX\Gamma)$
$I_{P(e,\gamma)}(u) = I_{F(e,\gamma)}(u)$ if $(e, \gamma)\in (AX\Gamma) - (BX\Gamma)$
$= I_{G(e,\gamma)}(u)$ if $(e, \gamma)\in (BX\Gamma) - (AX\Gamma)$
$= (I_{F(e,\gamma)}(u)+ I_{G(e,\gamma)}(u))/2$, if $(e, \gamma)\in (AX\Gamma) \cap (BX\Gamma)$
$F_{P(e,\gamma)}(u) = F_{F(e,\gamma)}(u)$ if $(e, \gamma)\in (AX\Gamma) - (BX\Gamma)$
$= F_{G(e,\gamma)}(u)$ if $(e, \gamma)\in (BX\Gamma) - (AX\Gamma)$
$= \max\{ T_{F(e,\gamma)}(u), T_{G(e,\gamma)}(u) \}$ if $(e, \gamma)\in (AX\Gamma) \cap (BX\Gamma)$

Preposition 1: Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U then

1. (F, A, Γ)⊆(G, B, Γ) if and only if (F, A, Γ) ∩(G, B, Γ) = (F, A, Γ)
2. (F, A, Γ)⊆(G, B, Γ) if and only if (F, A, Γ)∪(G, B, Γ) = (G, B, Γ)
3. (F, A, Γ)⊆(G, B, Γ) if and only if $(G, B, \Gamma)^c \subseteq (F, A, \Gamma)^c$
4. (F, A, Γ) ∩(G, B, Γ)⊆ (F, A, Γ)⊆ (F, A, Γ)∪(G, B, Γ)

Proof: We can verify easily the proofs of the above statements, so we left the proofs.

Preposition 2: Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U and *P* ((F, A, Γ)) and *P* ((G, B, Γ)) are the power sets of (F, A, Γ) and (G, B, Γ) respectively then

1. *P* ((F, A, Γ)) ∪*P* ((G, B, Γ)) ≠ *P* ((F, A, Γ)∪(G, B, Γ)), and
   P ((F, A, Γ)) ∪*P* ((G, B, Γ)) ⊆*P* ((F, A, Γ)∪(G, B, Γ)).
2. If *P* ((F, A, Γ)) ⊆*P* ((G, B, Γ)) then (F, A, Γ) ⊆(G, B, Γ).

Proof: 1. Let X∈ *P* ((F, A, Γ)) ∪*P* ((G, B, Γ)), by the definition X ∈ *P* ((F, A, Γ)) or
X ∈ *P* ((G, B, Γ)). That we can clearly observe that X cannot be a member of
P ((F, A, Γ)∪(G, B, Γ)).

Also if X ∈ *P* ((F, A, Γ)) ∪*P* ((G, B, Γ)) →X ∈ *P* ((F, A, Γ)) or X ∈ *P* ((G, B, Γ))
∴ X ∈ *P* ((F, A, Γ)∪(G, B, Γ))

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2, Suppose that $P((F, A, \Gamma)) \subseteq P((G, B, \Gamma))$

From the supposition we have to show that $(F, A, \Gamma) \subseteq (G, B, \Gamma)$

Let $\{(e, \gamma), u_1\} \in (F, A, \Gamma)$ then one element set $\{\{(e, \gamma), u_1\}\}$ is sub set of (F, A, Γ) and so $\{(e, \gamma), u_1\}\} \in P((F, A, \Gamma))$

$\Theta\ P((F, A, \Gamma)) \subseteq P((G, B, \Gamma)) \rightarrow \{\{(e, \gamma), u_1\}\} \in P((G, B, \Gamma))$

$\rightarrow \{\{(e, \gamma), u_1\}\} \subseteq (G, B, \Gamma) \rightarrow \{(e, \gamma), u_1\} \in (G, B, \Gamma)$

$\therefore (F, A, \Gamma) \subseteq (G, B, \Gamma)$.

Hence the result.

3.10 Equality of Γ -Neutrosophic Soft Sets: Let (F, A, Γ) and (G, B, Γ) be two Γ -Neutrosophic Soft Sets over a common universe set, U. If (F, A, Γ) is contained in (G, B, Γ) and (G, B, Γ) is contained in (F, A, Γ). Then the two sets (F, A, Γ) and (G, B, Γ) are said to equal Γ -Neutrosophic Soft Sets. It is denoted by F, A, Γ) = (G, B, Γ).

4. APPLICATION OF Γ -NEUTROSOPHIC SOFT SET IN DECISION MAKING

Let us consider Mr. X has to selecta city based on some parameters like high security, pollution free, rich greenery, hygienic hospitality and so on for this selection, Mr. X has to approach two agencies. Therefore based on the report of the agencies he has to select a city for his requirements.

We assume that the cities are denoted by $u_1, u_2, u_3, \ldots$, parameters are denoted by $e_1, e_2, e_3, \ldots$, and agencies are denoted by γ_1, γ_2. We also assume that the ranking of the cities u_i (i=1,2,3,..) corresponding to the parameters e_j (j=1,2,3,..) and γ_m (m=1or 2) is a triode,$c_{ij} = (T_{F(ej,\gamma m)}(u_i), I_{F(ej,\gamma m)}(u_i), F_{F(ej,\gamma m)}(u_i))$ such that for each fixed i the values c_{ij} represents a Γ -Neutrosophic Soft Set.

To solve the above problem by using the following procedure

Procedure:

a) Consider the Γ -Neutrosophic Soft Set (F, A, Γ).
b) Let the set B contains the choice of parameters of Mr. X, which is a sub set of set A.
c) Express the Γ -Neutrosophic Soft Set (F, A, Γ) into tabular form.
d) Compute the comparison table based on this table and evaluate the count T_i of u_i.
e) Calculate $T_k = \max\{T_i\}$, this maximum value of T_i is the preferable choice.

4.1 Comparison matrix: This Matrix is constructed by the rows are named as the article names, $u_1, u_2, u_3, \ldots$, and the columns are named as the parameters, $e_1, e_2, e_3, \ldots$ along with γ_1, γ_2. The entries c_{ij} are calculated by $c_{ij} = p + q - r$, where p is the integer calculated as how many times $T_{F(ej,\gamma m)}(u_i)$ exceeds or equal to $T_{F(ek,\gamma m)}(u_i)$ for $F(e_j, \gamma m) \neq F(e_k, \gamma m)$, q is the integer calculated as how many times $I_{F(ej,\gamma m)}(u_i)$ exceeds or equal to $I_{F(ek,\gamma m)}(u_i)$ for $I(e_j, \gamma m) \neq I(e_k, \gamma m)$ and r is the integer calculated as how many times $F_{F(ej,\gamma m)}(u_i)$ exceeds or equal to $F_{F(ek,\gamma m)}(u_i)$ for $F(e_j, \gamma m) \neq F(e_k, \gamma m), \forall (e_j, \gamma m) \in (F, A, \Gamma) \subseteq U$.

4.2 Count of an article: The count of an article T_i is denoted by $Z_i$and is given by $Z_i = \sum_j c_{jm}$

Consider the Γ -Neutrosophic Soft Set (F, A, Γ), where A = {e_1 = high security, e_2 = pollution free, e_1 = rich greenery} and Γ= {γ_1 = Agency-1, γ_2 = Agency-2}.

The tabular representation of Γ -Neutrosophic Soft Set (F, A, Γ) is defined as follows.

U	Highsecurity (Agency-1)	Pollution free (Agency-1)	Rich greenery (Agency-1)	High security (Agency-2)	Pollution free (Agency-2)	Rich greenery (Agency-2)
u_1	0.3,0.4,0.9	0.5, 0.2, 0.4	0.3,0.2,0.8	0.7, 0.6, 0.9	0.4,0.2,0.2	0.5, 0.3, 0.2
u_2	0.5,0.3,0.5	0.2, 0.4, 0.6	0.4, 0.8, 0.6	0.5, 0.3, 0.5	0.7, 0.9, 0.2	0.4, 0.8, 0.9
u_3	0.6,0.7,0.8	0.7, 0.4, 0.5	0.7, 0.3, 0.2	0.6, 0.2, 0.4	0.4, 0.2, 0.5	0.2, 0.3, 0.2

The comparison matrix of the above Γ -Neutrosophic soft set.

U	High security (Agency-1)	Pollution free (Agency-1)	Rich greenery (Agency-1)	High security (Agency-2)	Pollution free (Agency-2)	Rich greenery (Agency-2)
u_1	1	1	-2	2	1	2
u_2	1	0	2	0	3	1
u_3	3	3	3	0	0	0

The count of each u_i can be calculated as follows:

U	Count (Z_i)	
	Agency-1	Agency-2
u_1	0	5
u_2	3	4
u_3	9	0

From the above Table it is observed that the city, u_3 given by Agency-1because it's count is 9.

Decision: Mr. X has to select the city, u_3 given by Agency-1 to meet his requirements; otherwise he may select the city, u_1 given by Agency-2 due to some reasons.

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5 CONCLUSIONS

In this paper we discussed some basic definitions and prepositions of Γ-neutrosophic soft set and also we presented an Application of Γ -Neutrosophic Soft Set in Decision making problem.

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