Single valued Neutrosophic soft set for the segregation to elect progressive mode of student in the bias of etiquette in Neutrosophic environment

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Abstract

This article proposed a novel method to categorize the best student in all progressive studies by using the single valued Neutrosophic soft set-in variable sense. An ambivalence set of multi-observer data which is related to analyse the students, taken as input for categorizing the best student identification. Neutrosophic soft set is an immense application to find out the choice-making problem in the Neutrosophic area. The creation of an analogous table has shaped the classification investigation. It helps to put up things, people into groups according to their quality, ability, performance etc., in Neutrosophic environment

Keywords: Neutrosophic soft sets; Score function; Progressive table; Progressive mode of student; Parametric sense

1. Introduction

While numerous applications involving insecure information can be modelled using classical mathematics, defining and applying the idea of ambiguity can be difficult. There are various methods that can be used to model these fields, such as the ambiguous set theory [10], neutrosophic set theory [14], and probability theory [11]. In 1999, Molodtsov [15, 16] presented a brand-new computational paradigm called the soft set concept which is useful for handling ambiguity. The primary reason for creating this approach was the previous the idea that ambiguous and uncertain sets had not been appropriate for dealing ambiguous characteristics. While intuitionistic fuzzy sets are capable of handling missing data, they cannot handle inconsistent and indeterminate data. However, because each value is distinct and its uncertainty is expressly defined, neutrosophic sets are capable of handling this kind of input [17]. Furthermore, Maji initially suggested a technique that eliminated the different challenges associated with putting this concept into practice because neutrosophic sets have the capacity to handle such varieties of information [18].

Neutrosophic soft sets were originally used in difficulties involving choice-making. Neutronosophic sets may handle a wide variety of data types because they need to have each operator and set described in order to be used in everyday situations [19]. To address ambiguity in complex decision-making, the neutrosophic soft set evolved. Mumtaz Ali established a system for making decisions depending on the bipolar neutrosophic soft sets [1]. This paper presents an overview of the several procedures for the bipolar neutrosophic soft sets and their feasibility. In

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another paper, Irfan Deli suggested a fresh approach to the interval-valued neutrosophic soft sets problem [2]. An analysis is conducted on some of the properties of the different sets. Next, Broumi introduced the theory of expanded neutrosophic soft sets. Some properties and operations on this concept are established [3]. A generalized Neutrosophic soft set is applied in choice making problems. Broumi presented a concept called generalized neutrosophic soft sets [4]. In another manuscript, he suggested a fresh approach for analyzing the stock market's uncertainty environment using the neutrosophic soft sets. In addition, a method was developed by Sudhan Jha to find the most common issues related to the stock market [5]. Broumi defined the relation between neutrosophic soft sets and equivalent neutrosophic sets [6]. This study explains the relationship among identical sets with neutrosophic properties and neutrosophic soft sets. Additionally, a strategy for yielding decisions depending upon the neutrosophic soft set is introduced. In addition, the properties of soft sets are discussed. Also, Ali describes the properties of soft sets. [6-2]. He then introduced the concept of the limited variance and the confined intersection. Shuker Mahmood established the notion of the difference imprecise soft point [7]. Kandil proposed the properties of distinct soft elements in a variety of unconstrained soft topology spaces [8].

2. Preliminaries

Definition 2.1: In the context of discourse Y, neutrosophic set A is described as $A = \{(y, T_A(y), I_A(y), F_A(y))/ y \in Y\}$ where $T_A, I_A, F_A : Y \to [0,1^+]$

And $0^- \le T_A(y) + I_A(y) + F_A(y) \le 3^+$

Definition 2.2: Now we shall examine a non-empty collection $R, R \subseteq T$, a collections (S, R) is known as a soft set on Y, with 'S' being the mapping provided by $S: R \to P(y)$

Definition 2.3: A collection graded expression through R to P(Y) is called a soft set S on Y. A collection of sequential pairs could be created with it.

$S = \{z, S(z)/ z \in Z\}$

The component (t,S(t)) does not occur within S when S(t)=∅.

Definition 2.4: Y should be a entire collection. Let T be an array of variables. Let $R \subset T$. Let P(Y) be the set comprising all sets related to Y that are Neutrosophic. A representation of S:R→P(Y) is used to identify the set (S, R) as the soft Neutrosophic sets on Y.

Definition 2.5: Consider (K, E) & (L, F) are two single-valued soft sets on the entire realm Y that are Neutrosophic, then joint of (K, E) & (L, F) this is decided through (K, E)∩(L, F) = (M, 0) where

0 = $E \cap$ F as well as the memberships in falsity, indeterminacy, and truth of (M,0) are as follows

$$T_{M(c)}(m) = \min\{T_{K(c)}(m), T_{L(c)}(m)\} \ if \ \ c \in E \cap F$$

$$I_{M(c)}(m) = \min\{I_{K(c)}(m), I_{L(c)}(m)\} \ if \ \ c \in E \cap F$$

$$F_{M(c)}(m) = \max\{F_{K(c)}(m), F_{L(c)}(m)\} \ if \ \ c \in E \cap F$$

Definition 2.6: consider (K, E) & (L, F) in the ordinary universe X, there are two single-valued Neutrosophic soft sets. The union of these (K, E) & (L, F) is expressed by (K, E)∪(L, F) = (M, 0) where 0 = $E \cup$ F as well as the following are (M,0)'s the truth, ambiguity and untruth membership:

$$T_{M(c)}(m) = \max\{T_{K(c)}(m), T_{L(c)}(m)\} \ if \ \ c \in E \cup F$$

$$I_{M(c)}(m) = \max\{I_{K(c)}(m), I_{L(c)}(m)\} \ if \ \ c \in E \cup F$$

$$F_{M(c)}(m) = \min\{F_{K(c)}(m), F_{L(c)}(m)\} \ if \ \ c \in E \cup F$$

Definition 2.7: The neutrosophic number's single-valued score function is provided by

$$S(\widehat{SN}) = \frac{1 + T_{\widehat{SN}} - 2I_{\widehat{SN}} - F_{\widehat{SN}}}{2}$$

Where $T_{\widehat{SN}}$ = Truth membership function

$I_{\widehat{SN}} \ = Indeterminacy\ membership\ function$

$F_{\widehat{SN}}$ =Falsity membership function

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3. Utilization of single valued Neutrosophic soft set in the area of the decision-making process

Consider $S = \{s_1, s_2, s_3, s_4, s_5, s_6\}$ represent the group of students having different grades, skills & etiquette.

The parameter set $T =$ {outstanding, excellent, very good, fair, analytical skill, management skill, ethical skill, relationship skill, logical / lateral thinking skills, mannerism, behavioural statistics, performances & socialism}

Consider three subsets E, F, G of the set of parameters T.

E represents grades of student.

F represents skills

G represents etiquette of students.

The single valued Neutrosophic soft set (K, E) expresses the students with grades. The single valued Neutrosophic soft set (L, F) defines the students with skills, the single valued Neutrosophic soft set (M, G) depicts the students with etiquette.

The single valued Neutrosophic soft set (K, E) is specified in the following table:

Table 1: The single valued Neutrosophic soft set (K, E)

S	Outstanding (e_1)	Excellent (e_2)	Very Good (e_3)	Fair (e_4)
S_1	(.7, .5, .1)	(.6, .4, .3)	(.4, .2, .1)	(.3, .4, .4)
S_2	(.8, .4, .2)	(.5, .4, .3)	(.3, .4, .3)	(.2, .4, .4)
S_3	(.9, .5, .3)	(.8, .4, .2)	(.6, .5, .3)	(.5, .4, .2)
S_4	(.8, .4, .2)	(.9, .5, .1)	(.7, .4, .2)	(.4, .3, .1)
S_5	(.4, .2, .2)	(.8, .4, .3)	(.9, .5, .5)	(.7, .4, .2)
S_6	(.8, .4, .5)	(.7, .5, .6)	(.9, .4, .2)	(.9, .3, .2)

The single valued Neutrosophic soft set (L, F) is specified in the following table:

Table 2: The single valued Neutrosophic soft set (L, F)

S	Analytical Skills (f_1)	Management Skills (f_2)	Ethical Skills (f_3)	Relationship Skills (f_4)	Logical Skills (f_5)
S_1	(0.9, 0.4,0.3)	(0.3,0.9,0.2)	(0.4,0.9,0.3)	(0.8,0.5,0.3)	(0.7,0.4,0.3)
S_2	(0.8,0.3,0.2)	(0.7,0.5,0.4)	(0.8,0.5,0.3)	(0.9, 0.4,0.3)	(0.7,0.4,0.5)
S_3	(0.9, 0.4,0.1)	(0.2,0.9,0.5)	(0.3,0.9,0.4)	(0.4,0.8,0.7)	(0.3,0.7,0.8)
S_4	(0.6,0.4,0.3)	(0.5,0.9,0.2)	(0.4,0.7,0.6)	(0.3,0.8,0.2)	(0.9, 0.5,0.2)
S_5	(0.5,0.3,0.2)	(0.9, 0.8, ,0.2)	(0.3,0.8,0.4)	(0.2,0.9,0.5)	(0.4,0.85,0.61)
S_6	(0.8,0.7,0.3)	(0.7,0.4,0.2)	(0.9,0.3,0.4)	(0.8,0.7,0.3)	(0.3,0.8,0.5)

The single valued Neutrosophic soft set (M, G) is specified in the following table:

Table 3: The single valued Neutrosophic soft set (M, G)

S	Mannerism (g_1)	Behavioural Statistics (g_2)	Performances (g_3)	Socialism (g_4)
S_1	(.8, .4, .2)	(.9, .5, .1)	(.4, .9, .3)	(.3, .8, .1)
S_2	(.6, .3, .1)	(.8, .4, .4)	(.9, .3, .3)	(.2, .6, .2)
S_3	(.7, .4, .2)	(.6, .2, .5)	(.5, .3, .2)	(.4, .3, .1)
S_4	(.9, .6, .5)	(.8, .5, .2)	(.1, .8, .5)	(.2, .9, .7)
S_5	(.6, .4, .5)	(.9, .6, .3)	(.8, .4, .2)	(.6, .9, .3)
S_6	(.8, .3, .2)	(.9, .4, .2)	(.4, .8, .2)	(.5, .9, .3)

If we perform (K, E) ^ (L, F) thus twenty factors will be obtained. The structure's specifications t_{mn} were $t_{mn} = e_m \wedge f_n$ for all $m = 1,2,3,4$ & $n = 1,2,3,4,5$ In order to determine the settings for the single-valued Neutrosophic soft set $O = \{t_{12}, t_{23}, t_{25}, t_{34}, t_{35}, t_{42}, t_{44}, t_{45}\}$ subsequently (M, O) (say) will represent the final single valued Neutrosophic soft set that includes Neutrosophic sets (K, E) & (L, F).

The resulting Single valued Neutrosophic soft set will be presented in the following manner:

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Table 4: The resulting Single valued Neutrosophic soft set

S	t_{12}	t_{23}	t_{25}	t_{34}	t_{35}	t_{42}	t_{44}	t_{45}
S_1	(0.3,0.5,0.2)	(0.4,0.4,0.3)	(0.6,0.4,0.3)	(0.4,0.2,0.3)	(0.4,0.2,0.3)	(0.3,0.4,0.4)	(0.3,04,0.4)	(0.3,0.4,0.4)
S_2	(0.7,0.4,0.4)	(0.5,0.4,0.3)	(0.5,0.4,0.5)	(0.3,0.4,0.5)	(0.3,0.4,0.5)	(0.2,0.4,0.5)	(0.2,0.4,0.4)	(0.2,0.4,0.5)
S_3	(0.2,0.5,0.5)	(0.3,0.4,0.4)	(0.3,0.4,0.8)	(0.4,0.5,0.7)	(0.3,0.5,0.8)	(0.2,0.4,0.5)	(0.4,0.4,0.7)	(0.3,0.4,0.8)
S_4	(0.5,0.4,0.3)	(0.4,0.5,0.6)	(0.9,0.5,0.2)	(0.3,0.4,0.2)	(0.7,0.4,0.2)	(0.4,0.3,0.2)	(0.3,0.3,0.2)	(0.4,0.3,0.2)
S_5	(0.4,0.2,0.2)	(0.3,0.4,0.4)	(0.4,0.4,0.6)	(0.2,0.5,0.5)	(0.4,0.5,0.6)	(0.7,0.4,0.2)	(0.2,0.4,0.5)	(0.4,0.4,0.6)
S_6	(0.7,0.4,0.5)	(0.7,0.3,0.6)	(0.3,0.5,0.6)	(0.8,0.4,0.3)	(0.3,0.4,0.5)	(0.7,0.3,0.2)	(0.8,0.3,0.3)	(0.3,0.3,0.5)

4. Algorithm

Step 1: Through the use of the single-valued Neutrosophic soft set, the input sets (K, E), (L, F), (M, G) is soft set the input set (K, E), (L, F), (M, G) is processed in the respective field.

Step 2: The monitor is going to report regarding the input variable set T.

Step 3: Determining the process of (K, E), (L, F), (M, G) is figure out the resultant single valued Neutrosophic soft set (S, P) originating from the evaluation of Neutrosophic single valued soft sets where place it in tabular form.

Step 4: By setup the progressive table of single valued Neutrosophic soft set (S, P) P_i & C_i for every student S_i

Step 5: Tabular analysis is going to be used to analyze each S_i's grade. Tabular analysis will be used to analyze each S_i 's score.

Step 6: The final outcome is $S_k = Max\ S_i$ by using the above algorithm. Applying the aforementioned technique yields $S_k = Max\ S_i$ as the end result. The result in the end is $S_k = Max\ S_i$. We have resolved the issue by applying the aforementioned procedure. Assume that a spectator's selection of variables equals

$$P = \{\hat{t_{12}} g_1, \hat{t_{23}} g_2, \hat{t_{25}} g_3, \hat{t_{34}} g_4, \hat{t_{35}} g_2, \hat{t_{42}} g_4, \hat{t_{44}} g_2, \hat{t_{45}} g_1 \}$$

We must choose a choice among the entire set S based on the previously mentioned criteria. The resulting single-valued Neutrosophic soft set (S, P) has the following tabular form, which is described below:

Table 5: The resulting single-valued Neutrosophic soft set (S, P)

S	$\hat{t_{12}} g_1$	$\hat{t_{23}} g_2$	$\hat{t_{25}} g_3$	$\hat{t_{34}} g_4$	$\hat{t_{35}} g_2$	$\hat{t_{42}} g_4$	$\hat{t_{44}} g_2$	$\hat{t_{45}} g_1$
S_1	(0.3,0.4,0.2)	(0.4,0.4,0.3)	(0.4,0.4,0.3)	(0.3,0.2,0.3)	(0.4,0.2,0.3)	(0.3,0.4,0.4)	(0.3,0.4,0.4)	(0.3,0.4,0.4)
S_2	(0.6,0.3,0.4)	(0.5,0.4,0.4)	(0.5,0.3,0.5)	(0.2,0.4,0.5)	(0.3,0.4,0.5)	(0.2,0.3,0.5)	(0.2,0.4,0.4)	(0.2,0.3,0.5)
S_3	(0.2,0.4,0.5)	(0.3,0.2,0.5)	(0.3,0.3,0.8)	(0.4,0.3,0.8)	(0.3,0.2,0.8)	(0.2,0.3,0.5)	(0.4,0.2,0.7)	(0.3,0.4,0.8)
S_4	(0.5,0.4,0.5)	(0.4,0.5,0.6)	(0.1,0.5,0.5)	(0.2,0.4,0.7)	(0.7,0.4,0.2)	(0.2,0.3,0.7)	(0.3,0.3,0.2)	(0.4,0.3,0.5)
S_5	(0.4,0.2,0.5)	(0.3,0.4,0.4)	(0.4,0.4,0.6)	(0.2,0.5,0.6)	(0.4,0.5,0.6)	(0.6,0.4,0.3)	(0.2,0.4,0.5)	(0.4,0.4,0.6)
S_6	(0.7,0.3,0.5)	(0.7,0.3,0.6)	(0.3,0.5,0.6)	(0.5,0.4,0.5)	(0.3,0.4,0.5)	(0.5,0.3,0.3)	(0.8,0.3,0.3)	(0.3,0.3,0.5)

The following is the definition of the tabular structure of the single-valued neutrosophic soft set following deneutrosophication:

Table 6: The definition of the tabular structure of the single-valued neutrosophic soft set

S	$\hat{t_{12}} g_1$	$\hat{t_{23}} g_2$	$\hat{t_{25}} g_3$	$\hat{t_{34}} g_4$	$\hat{t_{35}} g_2$	$\hat{t_{42}} g_4$	$\hat{t_{44}} g_2$	$\hat{t_{45}} g_1$
S_1	0.15	0.15	0.15	0.3	0.35	0.05	0.05	0.05
S_2	0.3	0.15	0.2	0	0	0.45	0	0.05
S_3	0	0.2	0	0	0.05	0.05	0.15	0
S_4	.1	0	0	0	.35	0	.25	.15
S_5	.25	.05	0	0	0	.25	0	0
S_6	.3	0.25	0	0.1	0	.3	0.45	0.1

The following is the progress table for the fuzzy set that was produced above.

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Table 7: The progress table for the fuzzy set that was produced above

	S_1	S_2	S_3	S_4	S_5	S_6
S_1	8	3	6	6	6	3
S_2	5	8	5	5	8	4
S_3	3	4	8	4	6	2
S_4	3	4	6	8	5	3
S_5	2	3	5	5	8	3
S_6	5	5	7	6	8	8

ρ_i represents a student's row total, this formula is used to estimate it.

$$\rho_i = \sum_{j=1}^{n} P_{ij}$$

The overall amount of characteristics that are present when S_i leads all of S's components is indicated by the symbol ρ_i.

C_j represents a student's columns total, S_j.

$$C_j = \sum_{i=1}^{n} P_{ij}$$

In this case, C_j denotes the overall amount of variables for which every element of S dominates S_j, Every pupil's row summary, columns summary, and cumulative rating is represented as

$R_i = \rho_i - C_j$

Table 8: Every pupil's row summary, columns summary, and cumulative rating

	Summation of Rows ρ_i	**Summation of Columns C_j**	**Progressive S_i**
S_1	32	26	6
S_2	35	27	8
S_3	27	37	-10
S_4	29	34	-5
S_5	26	41	-15
S_6	39	23	16

5. Conclusion

By the view of a given progressive table, it is pinpoint that a greater number of scores is quoted around 16, secured by S_6 henceforth, the best progressive report comes in the student list of S_6. In the existing paper, we have worked and focused on the single valued Neutrosophic soft set-in order to deliberate the progressive categorization. The progressive plan of action depends on the outcome of the information set for the multi viewer feedback variable. The procedure had been involved to establish the balancing Showing the comparative table derived from the Neutrosophic soft set evolution for single values. We can carry out this research to create a bipolar interval valued Neutrosophic set for use in decision-making in future periods.

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