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HANDLE INCONSISTENT DATA USING NEW METHOD OF NEUTROSOPHIC LOGIC FOR PROPER OUTCOME

Soumitra De[1] , Jaydev Mishra[2]

[1]*CSE Department, College of Engineering and Management, Kolaghat, (India)*

[2] *CSE Department, College of Engineering and Management, Kolaghat, (India)*

ABSTRACT

We have introduced a method using Neutrosophic logic to take the decision. This logic is consists of three members. Neutrosophic data is capable of handling indeterministic part of a data along with the truth and false membership value. We have focused to draw an outcome using neutrosophic logic about a patient who is suffering from a disease. Fuzzy and vague both logics are unable to handle fuzzy data where indeterminacy is present. So only neutrosophic data can handle indeterminacy part of a fuzzy data for making proper decision.

Keywords: Neutrosophic Logic, Neutrosophic Data, Method Of Neutrosophic .

I. INTRODUCTION

Problems including uncertainties are a major issue in different fields of real life such as engineering, medical sciences. Uncertain data in these fields could be caused by difficulties in classical mathematical modelling. The fuzzy sets [1, 2, 3] and vague set [4, 5, 6, 7] are applied in various real problems in uncertain and incomplete information based environment. Few cases it may be very difficult to assign the membership value for fuzzy sets. The vague set is only used for incomplete operation considering the truth and false membership values. It does not handle the indeterminacy oriented information which presents in our daily life. Smarandache [8, 9, 10] first proposed the neutrosophic logic for dealing problems of imprecise data. A lot of literature can be found in this regard in [11,12, 13, 14]. We are introduced a method using neutrosophic logic to take more accurate decision rather than fuzzy or vague based system. We are basically applied this method to solve the problem.

II. BASIC DEFINITIONS

2.1 Definition

A fuzzy set *FS* in a universe of discourse *U is* characterized by a membership function $\mu_{FS}: U \rightarrow [0,1]$ and *FS* is defined as the set of ordered pairs $\{(u, \mu_{FS}(u)): u \epsilon U\}$, where $\mu_{FS}(u)$ for each $u \epsilon U$ denotes the grade of membership of *u* in the fuzzy set *FS* .

Note that a classical subset *B* of *U* can be viewed as a fuzzy subset with membership function μ_{FS} taken binary values, i.e.,

μ_B =1 if $u \epsilon B$

=0 otherwise

A neutrosophic set X on U is defined as X = {< a_1, $T_X(a_1)$, $I_X(a_1)$, $F_X(a_1)$ >, $a_1 \epsilon$ U }, where $T_X(a_1) \rightarrow [0,1]$; $I_X(a_1) \rightarrow [0,1]$; $F_X(a_1) \rightarrow [0,1]$ and $T_X(a_1) + I_X(a_1) + F_X(a_1) \leq 2$ and U is the discourser of world.

From realistic observation, the neutrosophic set will consider the data from the closed interval of [0, 1]. Truth or False membership value cannot exceed 1 and if anyone is zero (0) other may reach maximum one (1). Here separately indeterminacy membership value also can reach maximum 1, which will play crucial role for taking proper decision.

2.2 Example

Now consider books (U_1) and parameters (P) two sets. Consider P = {physics, chemistry, biology}.Suppose that, there are three books in U_1 which is given by, U_1 = {b, c, d} and the set of parameters P = {p_1, p_2, p_3}, where p_1 stands for the parameter 'physics', p_2 stands for the parameter 'chemistry', p_3 stands for the parameter 'biology'. We are expressing the knowledge from **Table 1**.

Neutrosophic set with parameter name	Neutrosophic representation of three books
B(physics)	< b,0.5, 0.7, 0.3 >,< c, 0.3, 0.7, 0.5 >,< d, 0.5, 0.2, 0.3 >
B(chemistry)	< b,0.8, 0.4, 02 >,< c, 0.7, 0.4, 0.3 >,< d, 0.6, 0.5, 0.3 >
B(biology)	< b,0.5, 0.4, 0.3 >,< c, 0.3, 0.5, 0.6 >,< d, 0.6, 0.7, 0.3 >

Table 1: Neutrosophic set with parameter names which are containing neutrosophic values (T, I, F) of three existing books.

III. NEUTROSOPHIC LOGIC BASED NEW METHOD

3.1 METHOD

Step1: If T > = I and T > F.

If the above condition is true at least 50% among the number of inconsistent data then we tell that patient has a disease.

If step 1 fails then step 2

Step 2: If total '+ve' differences between (T, I) at least 50% then we tell that patient is suffering from disease.

If step 2 fails then step 3

Step 3: If sum of T values + sum of I values greater than sum of F values + sum of I values then we can say that patient has a disease.

If all steps are true the n we can say patient is 100% affected.

If two steps are true the n we can say patient is 70% affected.

If only step is true the n we can say patient is 35% affected.

Otherwise we can say that patient is totally free from disease.

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3.2 Problem

We have taken a neutrosophic data from the different doctors to take the decision whether the patient is suffering from disease or not.

Patient	Doctor supplied data (T, I, F)
D_1	(0.8,0.6,0.3)
D_2	(0.6,0.3,0.2)
D_3	(0.35,0.1,0.46)
D_4	(0.4,0.5,0.55)
D_5	(0.6,0.3,0.34)

Table 2: Problem data

3.2.1 Solution

Step 1: First calculate $T \geq I$ and $T > F$ from problem data given by doctor.

D_1 = (0.8, 0.6, 0.3); $0.8 \geq 0.6$ and $0.8 > 0.3$ (true)

D_2 = (0.6, 0.3, 0.2); $0.6 \geq 0.3$ and $0.6 > 0.2$ (true)

D_3 = (0.35, 0.1, 0.46); $0.35 \geq 0.1$ and $0.35 < 0.46$ (false)

D_4 = (0.4, 0.5, 0.55); $0.4 \leq 0.5$ and $0.4 < 0.55$ (false)

D_5 = (0.6, 0.3, 0.34); $0.6 \geq 0.3$ and $0.6 > 0.34$ (true)

Here above condition is true for at least 50%.

So, the patient is suffering from disease.

Step 2: If total '+ve' differences between (T, I) at least 50% then we tell that patient is suffering from disease.

D_1 = (0.8, 0.6, 0.4); T- I = 0.8- 0.6 (+ve)

D_2 = (0.6, 0.3, 0.2); T - I = 0.6- 0.3 (+ve)

D_3 = (0.35, 0.1, 0.46); T - I = 0.35- 0.1 (+ve)

D_4 = (0.4, 0.5, 0.55); T - I = 0.4- 0.5(-ve)

D_5 = (0.6, 0.3, 0.34); T - I = 0.6- 0.3 (+ve)

So we can say that patient is suffering from disease.

Step 3: If (sum of T values + sum of I values) > (sum of F values + sum of I values) then we tell that patient is suffering from disease.

From the **Table2** **we** can calculate these values.

Total values of T = 0.8 + 0.6 + 0.35 + 0.4 + 0.6 = 2.75

Total values of I = 0.6 + 0.3 + 0.1 + 0.5 + 0.3 = 1.8

Total values of F = 0.4 + 0.2 + 0.46 + 0.55 + 0.34 = 1.95

From the step 3 condition we can write that, $2.75 + 1.8 > 1.8 + 1.95 \equiv 4.55 > 3.75$

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So we can say that patient is suffering from disease.

At last we can take the decision that the patient has been suffering from disease (100%).

IV. CONCLUSION

A method of inconsistent data has been applied to solve the problem and to take valid decision about the real life problem of a person, with the neutrosophic logic and concepts. In different application field, the neutrosophic logic based data will be used in a database for handling inconsistent data through query. Our method is only used for solving the problem based on indeterminacy data in the form of neutrosophic data. This method should not be applicable on fuzzy and vague data related problems because these two type of data unable to handle indeterminacy membership value of a inconsistent data.

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