July-August 2020
ISSN:0193-4120 Page No. 4061 – 4063

An Application in Total Quality For Active Teaching By Using Fuzzy Soft Sets

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Abstract:
One of the many applications of fuzzy soft sets which produced by Maji et al [3] and its generalization by Majumder and Samanta to solve the uncertainty problems in real life. In this study the concept of fuzzy soft sets is applied in total quality in active teaching process as an application.

Article Info
Volume 83
Page Number: 4061 – 4063
Publication Issue:
July-August 2020

Article History
Article Received: *06 June 2020*
Revised: *29 June 2020*
Accepted: *14 July 2020*
Publication: *30 August 2020*

INTRODUCTION

L. Zadeh [1] initiated the fuzzy sets concept to deal with the vagueness and uncertainty in real life problems , A plenty of researchers applied the concept of fuzzy sets and soft computing [2] to treat many problems in different branch of sciences. Many theories are dealt with the uncertainty problems , like vague set theory , probability theory , rough set theory . Each one of these theories have its inherent difficulties .Molodtsov [4] introduced the concept of soft set theory , and Maji et al [3] initiated the fuzzy soft sets. In our study, by using the fuzzy soft set, as an application in total quality for active teaching.

Preliminaries

In this section some definitions related to our study are presented.

Definition 2.1:[1] A fuzzy set A of a non-empty set X is characterized by a membership function $\mu_A : X \rightarrow I$ whose value $\mu_A(x)$ represents the degree of membership or grade of x in A for $x \in X$

Definition 2.2: [4] Let X be an initial universe set and E be a set of parameters . Let P(X) denotes the power set of U and A⊂ E ,A pair (F, A) is called a soft set over X where F is a mapping given by F:A→P(X) . In other words a soft set over X be a parameterized family of subsets of the universe X. For $\varepsilon \in A$, $F(\varepsilon)$ may be considered as the set of ϵ-approximate elements of the soft set (F,A).

Definition 2.3 [3,5]

Let X be an initial universe set and E be a set of parameters . Let P(X) denotes the set of all fuzzy sets of X . Let A⊂ E. A pair (F , A) is called a fuzzy soft set over X , where F is a mapping given by F:A→ $p(X)$.

Definition 2.4 [7]

For two fuzzy soft sets (F,A) and (G,B) in a fuzzy soft (F,A) is a fuzzy soft subset of (G,B) if

(i) A⊆B
(ii) $\forall \varepsilon \in A , F(\varepsilon) \subseteq G(\varepsilon)$ and is written (F,A)$\tilde{\subseteq}$(G,B)

Definition 2.5 [6,7]

The union of two fuzzy soft sets (F,A) and (G,B) is a fuzzy soft set (H,C) where
C=A∪B and $\forall \varepsilon \in C$

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

Which is written (F,A)$\tilde{\cup}$(G,B)=(H,C)

Definition 2.6 [6,7]

The intersection of two fuzzy soft sets (F,A) and (G,B) is a fuzzy soft set (H,C).
where C=A$\cap B$ with A$\cap B \neq \emptyset$ and $\forall \varepsilon \in C$, $H(\varepsilon) = F(\varepsilon) \cap G(\varepsilon)$ and written as (F,A)$\tilde{\cap}$(G,B)=(H,C)

Definition 2.7 [7]

The complement of a fuzzy soft set (F,A) is denoted by $(F,A)^c$ and defined by $(F,A)^c$=(F^c,A) where
$F^c : A \rightarrow \tilde{P}(X) is\ given$ by $F^c(\alpha)$=$[F(\alpha)]^c \forall \alpha \in A$.)

3. Application

The following example is an application in total quality for active teaching by using an uncertainty tool**.**

suppose F is the fuzzy soft set represent the teaching rendering of six teachers in the universal set X where
X={$t_1, t_2, t_3,\ t_4, t_5, t_6,$} and E be the set of parameters representing specific skills for the teachers.

E={
e_1(Reinforcement), e_2(using illustrative examples), e_3(presenting an active lesson), *e*$_4$ *(probative questions),* *e*$_5$ *(take care with the individual differences),* *e*$_6$ *(Explanation)*}

TEST Engineering & Management

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Let $A \subseteq E$ where A={e_1, e_2, e_5 } be the standard parameters to choice the teacher.

Let $\mu : A \rightarrow [0,1]$ be a fuzzy subset of A defined as follows : $\mu(e_1) = 0.3$, $\mu(e_2) = 0.6$, $\mu(e_5) = 0.4$ and defined a mapping

$F_\mu : E \rightarrow P(X) \times [0,1]$

And consider the fuzzy soft set F_μ for the elements of A as the following :

$$F_\mu(e_1) = (\{t_1/0.3, t_2/0.2, t_3/0.4, t_4/0.4, t_5/0.5, t_6/1,\}0.3)$$

$$F_\mu(e_2) = (\{t_1/0.5, t_2/1, t_3/0.4, t_4/0.2, t_5/0.7, t_6/0.3,\}0.6)$$

$$F_\mu(e_5) = (\{t_1/0.2, t_2/0.6, t_3/0.3, t_4/0.5, t_5/0.8, t_6/0.2,\}0.4)$$

Now, the steps of the solution are:

I. We tabulate F_μ in the table below:

Table 1 : Table of F_μ

	e_1	e_2	e_5
t_1	0.3	0.5	0.2
t_2	0.2	1	0.6
t_3	0.4	0.4	0.3
t_4	0.4	0.2	0.5
t_5	0.5	0.7	0.8
t_6	1	0.3	0.2

II. Finding the complement of F_μ where ${F_\mu}^c = 1 - F_\mu$ as shown in the table 2:

Table 2 :Table of ${F_\mu}^c$

	e_1	e_2	e_5
t_1	0.7	0.5	0.8
t_2	0.8	0	0.4
t_3	0.6	0.6	0.7
t_4	0.6	0.8	0.5
t_5	0.5	0.3	0.2
t_6	0	0.7	0.8

III. Multiplying every entry of the table (1) of F_μ by the corresponding values of $\mu(e)$ with the row sum which represent the membership score and denoted it by x.

Table 3: Membership Score Table

	$e_1(0.3)$	$e_2(0.6)$	$e_5(0.4)$	Row sum x
t_1	0.09	0.30	0.08	0.47
t_2	0.06	0.06	0.24	0.36
t_3	0.12	0.24	0.12	0.48
t_4	0.12	0.12	0.20	0.44
t_5	0.15	0.42	0.32	0.89
t_6	0.30	0.18	0.08	0.56

IV. Repeating the step (3) for the table of F_μ^c with the row sum which represent the non-membership score and denoted by y:

Table 4: Non – Membership Score Table

	$e_1(0.7)$	$e_2(0.4)$	$e_5(0.6)$	Row sum y
t_1	0.49	0.20	0.48	1.17
t_2	0.56	0	0.24	0.80
t_3	0.42	0.24	0.42	1.80
t_4	0.42	0.32	0.30	1.40
t_5	0.35	0.12	0.12	0.59
t_6	0	0.28	0.48	0.76

V. Finally, we calculate x+y-xy and takes the minimum score which determine the teacher has the best teaching rendering among all the other teachers under study.

Table 5: Table of x+y-xy

	x	y	xy	x+y-xy
t_1	0.47	1.17	0.54	1.64 – 0.54 = 1.10
t_2	0.36	0.80	0.28	1.16 – 0.28 = 0.88
t_3	0.48	1.80	0.86	2.28 – 0.86 = 1.42
t_4	0.44	1.40	0.61	1.84 – 0.61 = 1.32
t_5	0.89	0.59	0.52	1.48 – 0.52 = 0.96
t_6	0.56	0.76	0.42	1.32 – 0.42 = 0.90

Hence from table (5) above, t_2 valid the best teaching rendering since the min (x+y-xy)=0.88 which represents the active one.

Conclusion

By applying the fuzzy soft sets as a useful tool to solve different uncertainty problems like total quality for active teaching evaluation process to determine the teacher who has the best teaching rendering which sharing the development of teaching methodology.

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