Exploring Evaluation System by Type -2 Fuzzy Set

Kundlik Gaware

Department of Mathematics, Vidya Pratishthans Arts Science and Commerce College,

Vidyanagari Baramati .

Tal.:- Baramatii, Dist.:-Pune. (M.S.), India -413133.

Abstract

Generally evaluation process is either subjective or objective . Each having few advantages or disadvantages and some limitations. Most of the competitive examinations having evaluation process is of objective type . Main purpose of competitive examination is to select the candidate having not only best subject knowledge but also more confident and also having power of quick decision at any circumstances . For that purpose there is procedure to conduct objective examination along with personal interview and group discussion etc. after result of objective examination .That is very lengthy process . To avoid all these on some extent we use type -2 fuzzy evaluation system .

Keywords :-Fuzzy set , Type-2 fuzzy set etc.

1 Definition of Type -1 fuzzy set

1.1 T1FS For Discrete

Let X be the universe .The Type-1 Fuzzy set (T1FS) A is defined as [1, 2, 6]

$$A = \{ (x, \mu_A(x)) | x \in X \}$$
(1)

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where function

$$\mu_A: X \longrightarrow [0,1] \tag{2}$$

Here μ_A is a membership function (MF).

Let X be any finite universe . The T1FS F is some time define by using summation as follows

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$$A = \sum_{x \in X} \frac{\mu_A(x)}{X} \tag{3}$$

1.2 T1FS For Continuous

Let X be any infinite universe . The type-1 fuzzy set A is some time define by using integration as follows

$$A = \int \frac{\mu_A(x)}{X}.$$
 (4)

Example:

Let X = R, the set of real numbers The type-1 fuzzy set is defined as A = x is real number very near to 7. The membership function for type-1 fuzzy set is given as

$$\mu_A(x) = \frac{1}{1 + (x - 7)^2} \tag{5}$$

Type-1 fuzzy evaluation system :

There are some finite questions having each question with four alternatives. Among these four alternatives only one is correct and other three are not correct. We have to choose correct one alternative for each question. Most of the examination having marking scheme is '0 ' mark for not correct alternative and '1 ' mark for correct alternative . By probability theory for choosing correct alternative 0.25 and not correct alternatives is 0.75.

Due to this there are some limitations for choosing appropriate candidate for appropriate job. For avoid this limitations on some extent use Type -1 fuzzy evaluation system. Type – 1 fuzzy evaluation system has criteria to choose maximum three alternatives and minimum single alternative for answer of each question. Let A be a fuzzy set as set of multiple alternative variables as , three wrong , two wrong , one wrong , three with one correct , two with one correct , one correct . and corresponding mark as membership values . the T1FS

is defined as					
Sr. No.	Alternatives	T1FS (Marks)			
1	three wrong	-1			
2	two wrong	- 0.5			
3	one wrong	- 0.25			
4	three with one correct	0.25			
5	two with one correct	0.5			
6	one correct	1			

Definition 1.1. A Type-2 fuzzy set , denoted as \overline{A} , is defined as by type-2 membership function $\mu_{\overline{A}}(x, u)$ where $x \in X$ and $\forall u \in J_x \subseteq [0, 1]$ where [3, 4, 5]]

$$\bar{A} = \{((x,u), \mu_{\bar{A}}(x,u)) | \forall x \in X, \forall u \in J_{x \in X} \subseteq [0,1]\}$$

$$\tag{6}$$

Here $0 \le \mu_{\bar{A}}(x, u) \le 1$. \bar{A} can also be rewritten as

$$\bar{A} = \int_{x \in X} \int_{u \in J_x} \mu_{\bar{A}}(x, u) / (x, u).$$

$$\tag{7}$$

 $J_{x \in X}(x, u) \subseteq [0, 1]$

Type-2 Fuzzy Evaluation System:

Type -2 fuzzy evaluation system is Type -2 fuzzy set .The Type-1 fuzzy set is one dimensional space . Type-2 fuzzy set is two dimensional space . Using definition of type -2 fuzzy set is an extension of above fuzzy set system is defined as membership having again membership with probability of getting such mark for choosing the corresponding alternatives .

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Sr. No.	Alternatives	T1FS (Marks)	T2FS (Knowledge)	T2FS (Confidence)
1	three wrong	-1	0	0
2	two wrong	-0.5	0.25	0.5
3	one wrong	- 0.25	0.333	1
4	three with one correct	0.25	0.5	0
5	two with one correct	0.5	0.75	0.5
6	one correct	1	1	1

Conclusion :

Type-2 fuzzy evaluation system use to evaluate various parameters once at time .The given system is easy to handle and user-friendly . We also considered time span parameter and preference of choosing the alternative whenever use online examination process .

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