Student Dropout Analysis via Normalized Euclidean Distance Method

[1]G Vasanti, [2]K Lakshmi
[1]Professor, [2]Assitant Professor
[12]Department of Basic Sciences & Humanities
[12]Aditya Institute of Technology & Management, Tekkali, A.P, India.

Abstract : This article presents a model to elaborate uncertainty and vagueness involved in determining the feasibility of a student to be a dropout in a course using normalized Euclidean distance technique by using fuzzy set theory and Fuzzy inference System

Keywords **- Fuzzy sets, intuitionistic fuzzy sets, student dropout.**

I. INTRODUCTION

Fuzzy set was introduced by (Zadeh, 1965) with enormous applications in all fields. To overcome the uncertainty levels, Probability Theory and Fuzzy Set Theory is used.

In 1983, Atanassovpresented the modified form of Zadeh fuzzy subset by introducing a non membership functionν, withadditional conditions on μ and ν, which he called intuitionistic fuzzy subsets. Szmidt and Kacprzyk (2001) presented useful applications of linguistic variable presented for associating function.Atanassov (1999, 2012) performed rigorous research on the developments in Fuzzy Set Theory where both association, non-association values are included along with its applications. Distance measurement based research using fuzzy set theory was proposed and performed in recent years (Szmidt and etal., 1997, 2000 and Wang and Xin, 2005) , also applied by (Szmidt and etal., 2001, 2004) in medical diagnosis also.An important submission regarding Fuzzy based decision making is to identify the chance of a student to be a dropout. The student performance for some courses in different internal examinations are P1 (1st mid), P2(2nd mid), P3(3rd mid)&(attendance) P4. The problem description uses the concept of IFS values of P1, P2, P3 &P4 (attendance) of each subject performance which varies for each student. Normalized Euclidean distance concept is used as in (Szmidt and Kacprzyk, 1997, 2000, 2014) to estimate the gap between each student and their course. The result helps in the analysis of a dropout student.

A. BASIC DEFINITIONS

Definition 1 (Zadeh, 1965): A fuzzy set A of a non empty set X is presented as $\{\langle x, \mu_A(x)\rangle : x \in X\}$, $\mu_A(x)$is the association function of the fuzzy set A.

Definition 2(Atanassov, 1999):An intuitionistic fuzzy set A in X is a pair A presented as a pair (μ_A, ν_A), where μ_A, ν_A are functions mapping from the set X to the closed interval [0, 1] of real numbers such that for each $x \in X$, $0 \leq \mu_A x + \nu_A x \leq 1$, where μ_A is called the association function of A and ν_A is called the non-association function of A.

Definition 3 (Szmidt and etal., 2014): The Normalized Euclidean distance $d\ (A,B)$ between two Intuitionistic Fuzzy Sets A and B is defined as $d\ (A,B) = \left[\frac{1}{2n}\sum_{i=1}^{n}\left[\left(\mu_A(x_i)-\mu_B(x_i)\right)^2+\left(\nu_A(x_i)-\nu_B(x_i)\right)^2\right]\right]^{1/2}$ where X = {x_1, x_2, …, x_n} for i = 1, 2,…, n.

II.APPLICATION OF INTUITIONISTIC FUZZY SETS FOR DROPOUT STUDENT

The essence of presenting a student's expected chance to be a dropout in the course is of great consequence on future. And it is vital for the institution possessing sufficient information regarding the dropouts of their college.

An intuitionistic fuzzy set incorporated as the membership value (i.e. the internal examination marks and fraction of classes attended), the non-membership degree (i.e. the not scored internal examinations and fraction of classes not attended).

Let S = {S1, S2, S3… S10} be the set of students, Performance = {P1, P2, P3, P4} be the internal exam1, 2, 3, and Subjects = {Linear Algebra & Calculus (LA&C), Chemistry (Chem), Engineering Drawing (ED), Engineering Mechanics (E.Mech)}. It is assumed that the students attempt a midterm internal examination of 40 marks the subjects considered for the performance analysis at the end of the semester and P4 is course attendance of the student.

Table 1: Presents Subjects and success criteria

	P1	P2	P3	P4
LA&C	(0.9,0.1)	(0.8,0.1)	(0.7,0.1)	(0.8,0.2)
Chem	(0.9,0.3)	(0.7,0.2)	(0.8,0.1)	(0.8,0.1)
ED	(0.8,0.2)	(0.7,0.3)	(0.8,0.2)	(0.7,0.2)
E.Mech	(0.8,0.3)	(0.8,0.1)	(0.8,0)	(0.8,0.2)

Table 2**:** Students Vs Performance

	P1	P2	P3	P4
S1	(0.8,0.2,0)	(0.6,0.4,0)	(0.5,0.5,0)	(0.7,0.3,0)
S2	(0.6,0.4,0)	(0.7,0.3,0)	(0.6,0.4,0)	(0.9,0.1,0)
S3	(0.9,0.1,0)	(0.9,0.1,0)	(0.8,0.2,0)	(0.9,0.1,0)
S4	(0.7,0.3,0)	(0.9,0.1,0)	(0.5,0.4,0.1)	(0.9,0.1,0)
S5	(0.8,0.2,0)	(0.9,0.1,0)	(0.8,0.2,0)	(0.9,0.1,0)
S6	(0.8,0.2,0)	(0.8,0.2,0)	(0.8,0.2,0)	(0.9,0.1,0)
S7	(0.6,0.4,0)	(0.7,0.3,0)	(0.6,0.4,0)	(0.8,0.2,0)
S8	(0.6,0.4,0)	(0.6,0.4,0)	(0.6,0.4,0)	(0.9,0.1,0)
S9	(0.6,0.4,0)	(0.7,0.3,0)	(0.5,0.5,0)	(0.9,0.1,0)
S10	(0.5,0.5,0)	(0.7,0.3,0)	(0.6,0.4,0)	(0.9,0.1,0)

Using definition 3 above to calculate the distance between each student and each performance with reference to the subjects, we get the table below:

Table 3: Students Vs Subjects:

	LA&C	Chem	ED	E.Mech	Average
S1	0.1768	0.2151	0.1620	0.25	0.6164
S2	0.2092	0.1768	0.1620	0.20	0.5980
S3	0.07905	0.11726	0.1369	0.12297	0.3639
S4	0.173205	0.18708	0.18708	0.16583	0.5888
S5	0.09354	0.10606	0.12747	0.10	0.1068
S6	0.09354	0.07905	0.0935	0.3162	0.1456
S7	0.0642	0.1768	0.1458	0.1936	0.1451
S8	0.2318	0.1904	0.1696	0.2236	0.2038
S9	0.2449	0.2236	0.18708	0.2475	0.2259
S10	0.2475	0.6614	0.1968	0.2236	0.3323

From the above table, the greatest distance gives the least performance. The student S1 performance from best performance to least for the above courses is likely in the order ED, LA&C, Chem, E.Mech. The student S2 performance from best performance to least for the above courses is likely in the order ED, Chem, E.Mech, LA&C. The student S3 performance from best presentation to least for the above courses is likely in the order LA&C, Chem, E.Mech, ED. The student S4 performance from best performance to least for the above courses is likely in the order E.Mech, LA&C, Chem, E.D. The student S5 performance from best performance to least for the above courses is likely in the order LA&C, E.Mech, Chem, E.D. The student S6 performance from best performance to least for the above courses is likely in the order Chem, ED, LA&C, E.Mech…

III.CONCLUSION

The above application of intuitionistic fuzzy sets provides sufficient knowledge about the estimated performance in different courses of a candidate. In the proposed method, using normalized Euclidean distance, the distance of each student from the required performance is calculated and from table 3 we can conclude that Student 1 has maximum distance from the target which implies that he is the expected candidate to be a dropout.

REFERENCES

[1] Atanassov. K. T (1983), Intuitionistic fuzzy sets, VII ITKR's Session, Sofia,.

[2] Atanassov. K. T (1986), Intuitionistic fuzzy sets, Fuzzy Sets and Systems 207-96.

[3] Atanassov. K.T (1994), New operations defined over intuitionistic fuzzy sets, Fuzzy Sets and Systems Vol. 61, 2 137-142.

[4] Atanassov. K.T (1999), Intuitionistic fuzzy sets:theory and application, Springer.

[5] Atanassov.K.T (2012), On Intuitionistic fuzzy sets, Springer.

[6] De. S. K, R. Biswas, Roy. A.R (2001), An application of intuitionistic fuzzy sets in medical diagnostic, Fuzzy sets and systems 117 (2) 209-213.

[7] Shinoj. T. K, Sunil. J.J (2012), Intuitionistic Fuzzy multisets and its application in medical diagnosis, International journal of mathematical and computational sciences 634-38.

[8] Szmidt. E, Kacprzyk. J (1997), On measuring distances between intuitionistic fuzzy Sets, Notes on IFS, 3 (4) 1-3.

[9] Szmidt. E, Kacprzyk.J (2000), Distances between intuitionistic fuzzy Sets, Fuzzy Sets and Systems 114 (3) 505-518.

[10] Szmidt.E, Kacprzyk.J (2001), Intuitionistic fuzzy sets in some medical applications, Note on IFS 7 (4) 58-64.

[11] Szmidt. E, Kacprzyk.J (2004), Medical diagnostic reasoning using a similarity measure for intuitionistic fuzzy sets, Note on IFS 10 (4) 61-69.

[12] Szmidt. E (2014), Distances and similarities in intuitionistic fuzzy sets, Springer.

[13] Zadeh. L.A. (1965), Fuzzy sets, Information and Control 8 338-353.

[14] Murthy. N.V.E.S. and Vasanti.G (2012), Properties of Images (Inverse) Images of Intutionistic L-Fuzzy Subsets And Correspondence And Isomorphism Theorems For Intutionistic L-Fuzzy Subgroups, International Journal of Computational Cognition, VOL. 10, NO. 1.

[15] Ejegwa. P. A., Akubo .A. J., Joshua. O. M.(2014), Intuitionistic Fuzzy Set and its application in careers determination via normalized eulidean distance method, European Scientific Journal May edition vol.10, No.15 ISSN: 1857 – 7881 (Print).

[16] Ejegwa. P. A., Akubo. A. J., Joshua. O. M.(2014), Intuitionistic Fuzzy sets in career Determination, Global Journal of Science Frontier Research: F Mathematics and Decision Sciences, Volume 14, Issue 3.

[17] Vasanti.G (2013), More On L-Intuitionist Fuzzy Or L-Vague Quotient Rings, Advances In Fuzzy Sets & Systems, Vol.No. 16, No.2, Pages 65-91, ISSN No: 0973-421X.

[18] Wang.W, Xin.X (2005), Distance measure between intuitionistic fuzzy sets. Pattern Recognition Letters 26, 2063-2069.