

## APPLICATION OF FUZZY SET FOR GRADING SYSTEM IN AN EDUCATION SYSTEM IN OMAN

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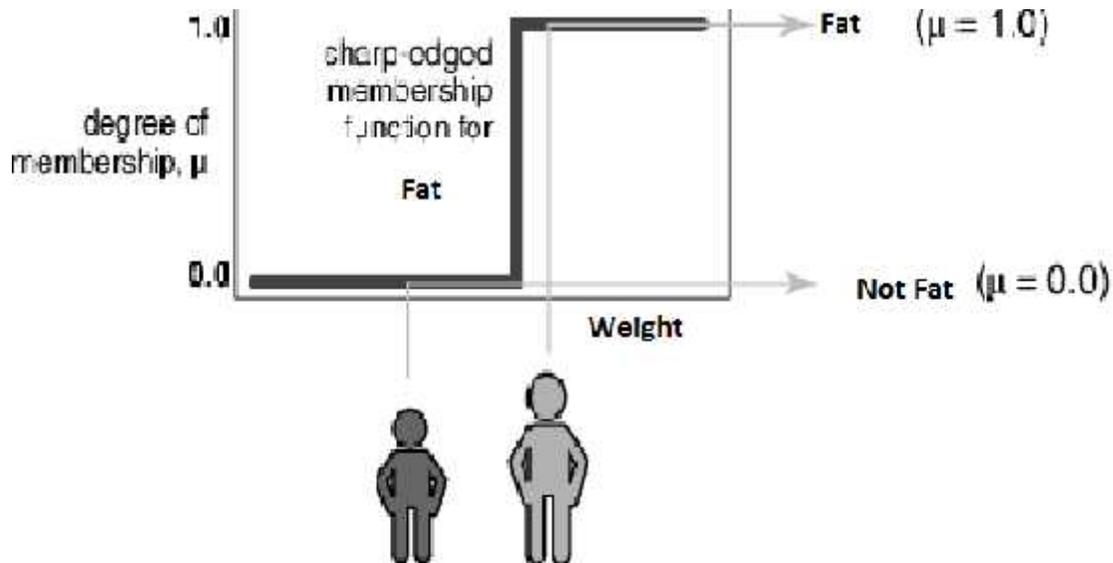
### Abstract

Fuzzy logic is a form of multi-valued logic in which the truth value of a variable belonging to a set may be any real number between 0 and 1. A linguistic variable such as Result may accept values such as Pass and its antonym Fail. But as we know there are different grades of Pass and Fail. We can use the fuzzy set to represent these grades.

Fuzzification operations can map mathematical input values into fuzzy membership functions. That can be then used for decision or control purposes.

### Introduction: Fuzzy Logic

A set, by definition, is a collection of items that belong to some category. Any item either belongs to that set or does not belong to that set. But a fuzzy set is a collection of distinct elements with a varying degree of inclusion. Let us look at an example; the set of fat men. We shall say that people weighing more than or equal to 80 kg are fat. This set can be represented graphically as follows.



If  $X$  is the set of elements  $x$  is a particular element of  $X$ , then a fuzzy set  $A$  defined on  $X$  may be written as a collection of ordered pairs:

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

Where,  $\mu_A(x)$  is called as membership function which associates each element  $x$  with a real number in the interval  $[0,1]$ . The value of  $\mu_A(x)$  at  $x$  represents the grade of membership of  $x$  in  $A$ . Thus nearer the value of  $\mu_A(x)$  to 1, the higher the grade of membership of  $X$  in  $A$ .

### The Student Grade Assessment System

For students grade assessment is generally divided into two major parts. Internal for 60 marks and external for 40 marks. Internal 60 marks are assessed by a series of different activities like, Test 1(20 marks), Test 2( 20 marks), assignment(5 marks), Self Studey(5 marks ) and class activities (10 marks). Fuzzy logic may serve this purpose combining these marks and deciding the grade very effectively and efficiently.



### Applying Fuzzy Logic for Grade Evaluation

Here a generalized fuzzy decision system for marks evaluation modeled and solved. For the marks in Test 1 and Test 2, the possible categories of marks are selected. A fuzzy decision set is formed. Fuzzy set is then defined for item. A fuzzy subset is formed for all the marks category..

The attributes

For example following six items for assessment and considerable corresponding marks categories can be formed.

1. A (90-100)-Grade point 4
2. (85-89) – Grade point 3.7
3. B+ (80-84) –Grade point 3.3
4. B (76-79)-- Gradr point 3
5. (73-75)—Grade point 2.7
6. C+ (70-72) –Grade point 2.3
7. C (67-69)—Grade point 2
8. (60-66) --Grade point 1.7
9. D (55-59) --Grade point 1
10. F (0-55) --Grade point 0

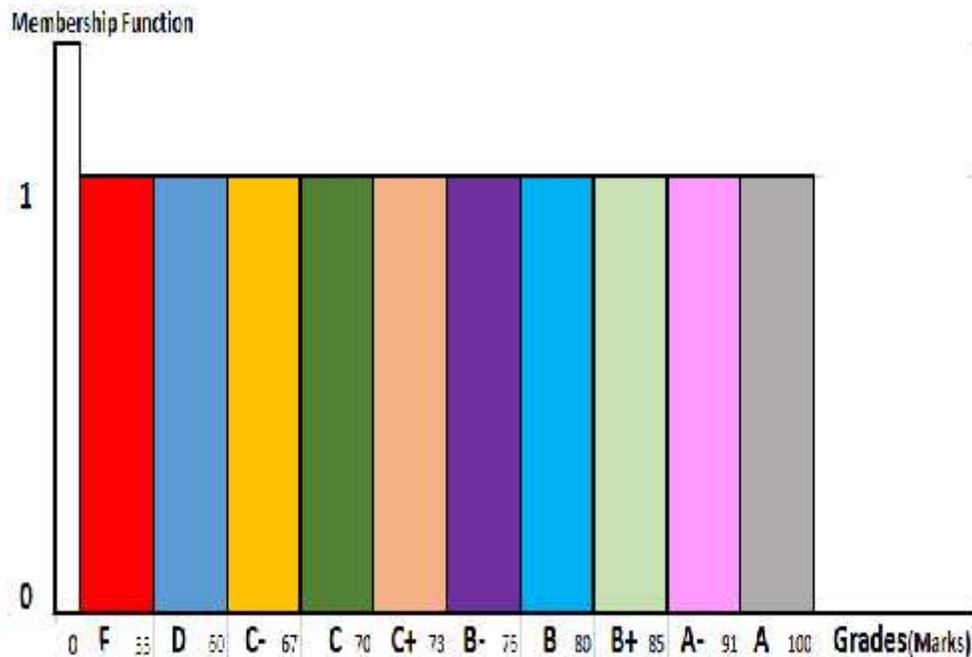
The fuzzy logic model comprises of following stages:

#### A. Crisp Value (Data)

The values for input variables may be collected from the records of the students’ end term result with internal assessment (f1), external Assessment (f2) and overall attendance of the Semester (f3) shown in Table I

**Table I: Grade Representation Of Marks**

Marks	F	D	C-	C	C+	B-	B	B+	A-	A
F1	<55	55-59	60-66	67-69	70-72	73-75	76-79	80-84	85-89	91-100



**Table II: Marks In Terms of Linguistic Variables**

Marks	Very Poor	Poor	Average	Good	Very Good	Excellent
$F_1$	<50	50-59.9	60-69.9	70-79.9	80-89.9	90-100

The Fuzzy set can be used to represent the marking system in terms of linguistic variables.

Let

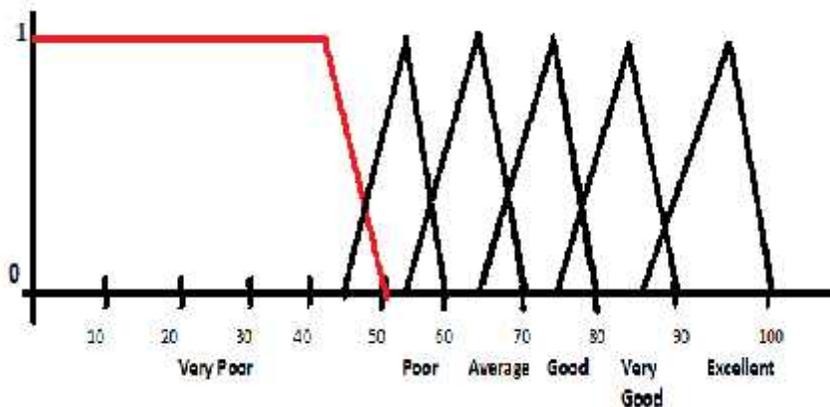
$V = \text{Marks}$

$X = \mathbb{R}^+$

$T_V = \{\text{Very Poor, Poor, Average, Good, Very Good, Excellent}\}$

Define a Fuzzy set  $T_V : X \rightarrow [0, 1]$ .

It can be represented graphically as follows.



If a student gets 55 marks, he is poor, but the degree of membership may be 0.5. Means he is 50% poor. Similarly student getting 95 marks is excellent, but degree of membership is 0.5. and so on..

### Conclusion

This paper presents a framework for grading of students of xyz College of Technology in Oman using Fuzzy Logic. Generally, in educational institutes students are given grades not marks. At first look teachers give linguistic opinion like good, poor, excellent or average etc. later on they calculate the grades. This paper provides a solution to this problem with use of fuzzy logic.

### References

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