



VIMAL JYOTHI
ENGINEERING COLLEGE
JYOTHI NAGAR, CHEMPERI - 670632, KANNUR D.T., KERALA
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Assignment Cover Page

Name of the student :- <u>Nandana Sathyanandan</u>			
PRN <u>VML22C813</u>		Admission No. <u>1982</u>	
Subject Name :- <u>Soft computing</u>		Subject Code:- <u>CST444</u>	
Assignment Title/No : <u>02</u>			
Name of the faculty: <u>Dswathi T.V</u>			
Assignment Submitted on <u>23/2/26</u>			
Late submission rules : Max mark will reduced to 50% for 1-5 working day's delay, no mark will be awarded thereafter.			
I am hereby confirming that this assignment is my own and I haven't adopted any unfair means in any steps of its preparation to enhance my performance in this assignment.			
Date : <u>23/2/26</u>		<u>Nandana</u> Sign with Name	
Assignment subdivision	Maximum Mark	Marks awarded	Remarks
A			
B			
C			
<u>Feed back/suggestions :</u>			
Name and sign of the faculty			

2. Define membership function and state its importance in fuzzy logic. Explain the features of fuzzy membership functions with proper diagrams

- A membership function is a curve that defines how each point in the input space (the universe of discourse) is mapped to a membership value (or degree of membership) between 0 & 1.
 - If an element has a value 1, it is entirely in the set.
 - If it has a value of 0, it is not in the set at all.
 - Any value in b/w (eg 0.6) represents a partial membership.

For a fuzzy set A , the membership function is denoted as $\mu_A(x)$.

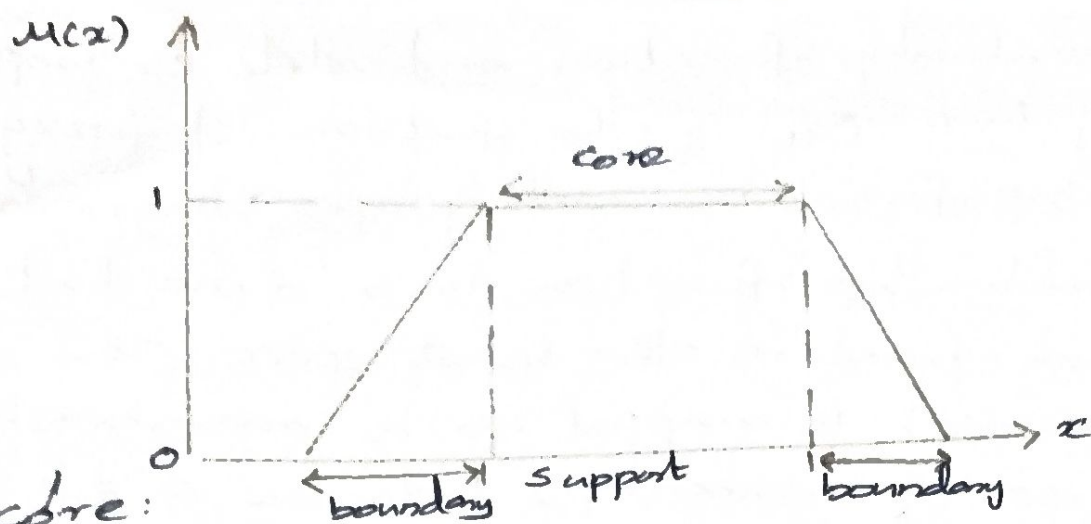
$$\mu_A(x): x \rightarrow [0, 1]$$

Importance in fuzzy logic:

1. Handling uncertainty: It allows the system to model "vague" human concepts like warm, or fast, that don't have sharp boundaries.
2. Fuzzification: It serves as the first step in a fuzzy inference system, converting a "crisp" input data into fuzzy linguistic terms.
3. Smooth transitions: MFs prevent abrupt changes in system behaviour. Instead of a heater suddenly snapping from "off" to "on" an MF allows for a gradual increase in power as the room cools.
4. Mathematical foundation: It provides the quantitative framework needed to perform logical operation (AND, OR, NOT) on subjective data, making it possible for computers to "reason" like humans.

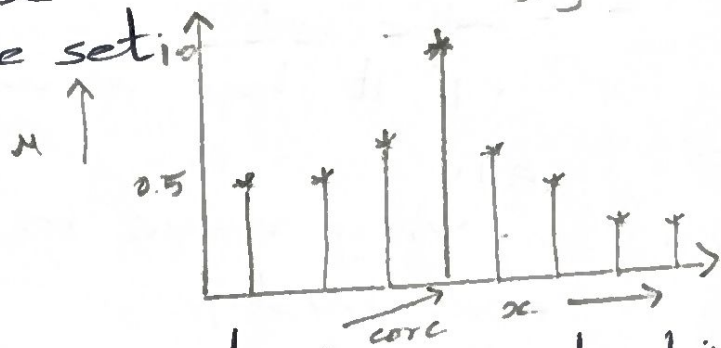
Features of fuzzy membership functions:

- 1) Core 2) Support 3) Boundary 4) Cross over



1) Core:

For a fuzzy set A, the core of a membership function is that region of the universe that is characterized by a full membership in the set i.e. $\mu_A(x) = 1$



2) Support:

For any fuzzy set A, the support of a membership function is the region of the universe that is characterized by a nonzero membership in the set. Hence support consists of all those elements x of the universe of information such that

$$\mu_A(x) > 0$$

A fuzzy set whose support is a single element

$$\mu_A(x) = 1$$

3) Boundary:

For any fuzzy set A, the boundary of a membership function is the universe region characterized by a non-zero but incomplete membership in the set.

Hence the boundary consists of all those elements x of the universe of information such that

$$0 < \mu_A(x) < 1$$

4) Cross over:

It is defined as the elements of a fuzzy set whose membership value is equal to 0.5

