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FACULTY OF EGINEERING AND TECHNOLOGY

Soft Computing

LECTURE -32

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OUTLINE

- Classical Set Theory
- Operations On Classical Set
- What is Fuzzy Logic?
- Two frameworks for Fuzzy Systems
- Characteristics of Fuzzy Logic
- Applications of Fuzzy Logic
- Advantages of Fuzzy Logic
- Disadvantages of Fuzzy Logic
- Reference
- MCQ

Classical Set Theory

Sets are defined by a simple statement describing whether an element having a certain property belongs to a particular set. − When set A is contained in an universal space X,

then we can state explicitly whether each element x of space X "is or is not" an element of A. − Set A is well described by a function called characteristic function A. This function, defined on the universal space X, assumes : value 1 for those elements x that belong to set A, and value 0 for those elements x that do not belong to set A.

Operations on Classical Set Theory

Following are the various operations which are performed on the classical sets:

1. Union Operation
2. Intersection Operation
3. Difference Operation
4. Complement Operation

Union

$A \cup B = \{ x \mid x \in A \text{ OR } x \in B \}$.

E.g.. Set A = {1,2,3}, Set B = {2,3,4}, then $A \cup B$ = {1,2,3,4}

Intersection

$A \cap B = \{ x \mid x \in A \text{ AND } x \in B \}$.

E.g.. Set A = {1,2,3}, Set B = {2,3,4}, then $A \cap B$ = {2,3,}

Difference Operation

$A - B = \{ x \mid x \in A \text{ AND } x \notin B \}$.

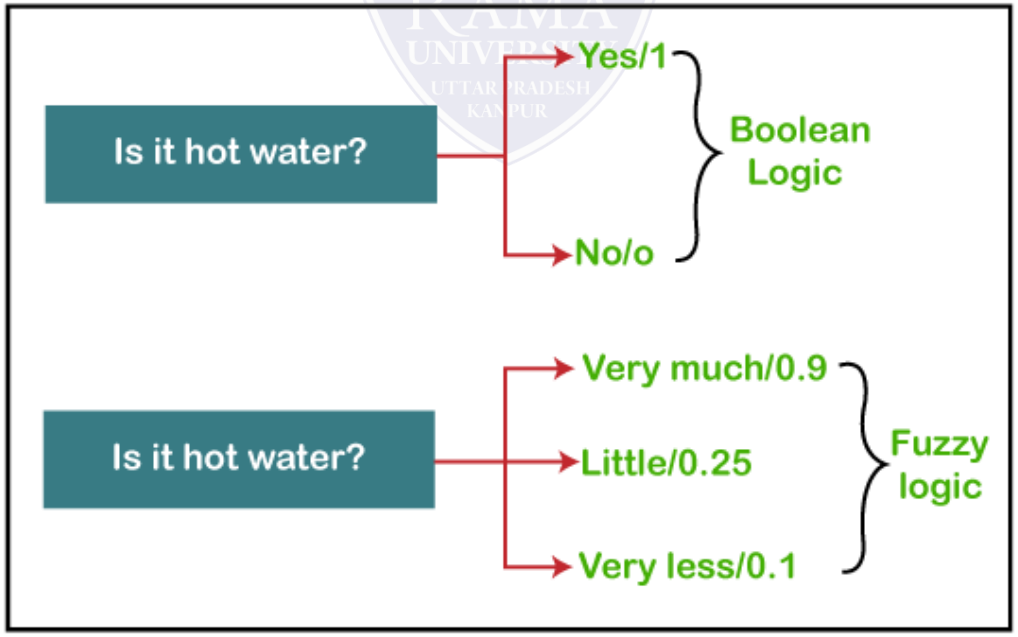
Complement Operation:

$A' = \{x \mid x \notin A\}$.

What is Fuzzy Logic?

The **'Fuzzy'** word means the things that are not clear. Sometimes, we cannot decide in real life that the given problem or statement is either true or false. At that time, this concept provides many values between the true and false and gives the flexibility to find the best solution to that problem.

Example of Fuzzy Logic as comparing to Boolean Logic



TWO FRAMEWORK OF FUZZY SYSTEM

Two frameworks for Fuzzy Systems

1) Development based on Crisp mathematical model and fuzzifying some quantities

Model 1 : Fuzzy Mathematical Model

Example : Fuzzy – K means clustering

2) Development based on Fuzzy Inference rules

Model 2 : Fuzzy Logical Model

Example : Fuzzy decision Support System

Characteristics of Fuzzy Logic

Following are the characteristics of fuzzy logic:

1. It allows users to build or create the functions which are non-linear of arbitrary complexity.
2. In fuzzy logic, everything is a matter of degree.
3. In the Fuzzy logic, any system which is logical can be easily fuzzified.
4. It is based on natural language processing.
5. It is also used by the quantitative analysts for improving their algorithm's execution.
6. It also allows users to integrate with the programming.

Applications of Fuzzy Logic

Following are the different application areas where the Fuzzy Logic concept is widely used:

1. It is used in Businesses for decision-making support system.
2. It is also widely used in the Pattern Recognition and Classification in the form of Fuzzy logic-based recognition and handwriting recognition. It is also used in the searching of fuzzy images.
3. Fuzzy logic systems also used in Securities.
4. This technique is also used in the area of modern control systems such as expert systems.
5. Finance is also another application where this concept is used for predicting the stock market, and for managing the funds.

ADVANTAGES AND DISADVANTAGES

Advantages of Fuzzy Logic

1. Fuzzy Logic has various advantages or benefits. Some of them are as follows:
2. The methodology of this concept works similarly as the human reasoning.
3. Any user can easily understand the structure of Fuzzy Logic.
4. The development time of fuzzy logic is short as compared to conventional methods.
5. Due to its flexibility, any user can easily add and delete rules in the FLS system.

Disadvantages of Fuzzy Logic

Fuzzy Logic has various disadvantages or limitations. Some of them are as follows:

1. Many researchers give various ways for solving a given statement using this technique which leads to ambiguity.
2. Fuzzy logics are not suitable for those problems that require high accuracy.
3. The systems of a Fuzzy logic need a lot of testing for verification and validation.

REASONING VS PROBABILITY

Fuzzy Reasoning and Probability

They are related , but complimentary to each other. Say, for example , if we have to define the probability of appearance of an edge in few frames of images, we have to define, what is an edge. Certain threshold for rate of variation has to be taken, which may not be true for other images or noisy images. Fuzzy logic, unlike probability, handles imperfection in the informational content of the event.

MULTIPLE CHOICE QUESTION

11. Circularization must take place in the bacterial cells before the replication starts.

a) True

b) False

12. How many origins of replication are there once the cyclization is carried out by loxP sites?

a) 1

b) 2

c) 3

d) 4

13. Choose the incorrect statement for PAC vectors.

a) In these vectors, the phage packaging signals are removed but the two P1 origin of replication persist

b) They resemble BAC vectors

c) They accept an insert of upto 300 kbp

d) Instability is observed

14. Choose the correct statement in respect to sacB gene?

a) The cloning site for PAC lies on the side of sacB gene

b) It is responsible for producing an enzyme which is responsible for catalysing sucrose into glucose and fructose

c) Expression of sacB in the presence of sucrose is beneficial

d) Levan is non-toxic for E. coli

15. Selection of molecules by lack of inserts on the basis of the sacB gene is known as:

a) positive selection

b) negative selection

c) counter selection

d) sacB selection

REFERENCES

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