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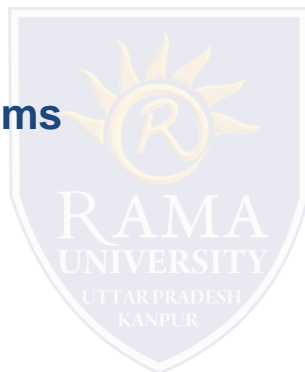
FACULTY OF ENGINEERING AND TECHNOLOGY

Soft Computing LECTURE -31

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OUTLINE

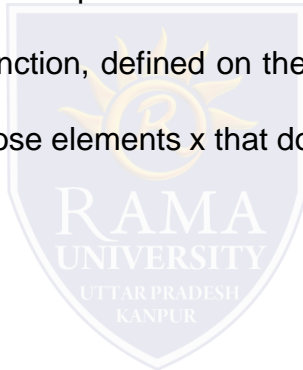
- **Classical Set Theory**
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CLASSICAL SET THEORY

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

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

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

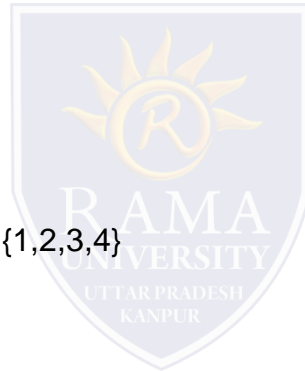
E.g.. Set $A = \{1,2,3\}$, Set $B = \{2,3,4\}$, then $A \cap B = \{2,3\}$

Difference Operation

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

Complement Operation:

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

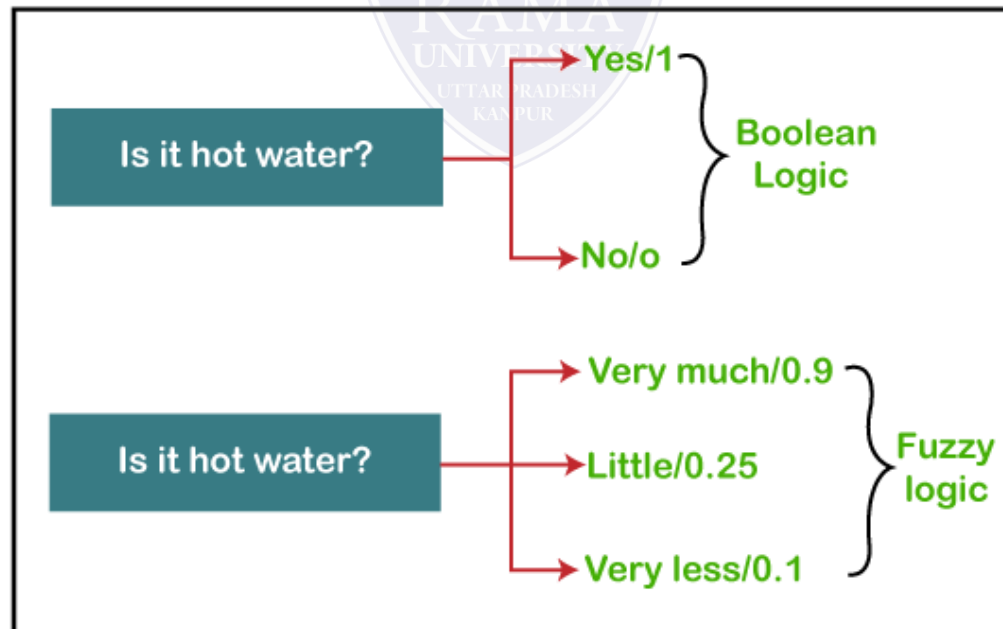


FUZZY LOGIC

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

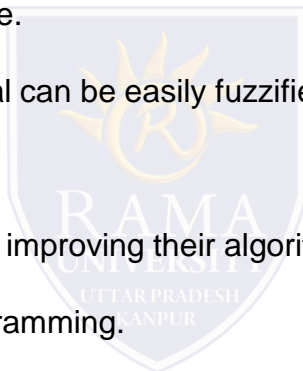
Example : Fuzzy decision Support System



Characteristics of Fuzzy Logic

Following are the characteristics of fuzzy logic:

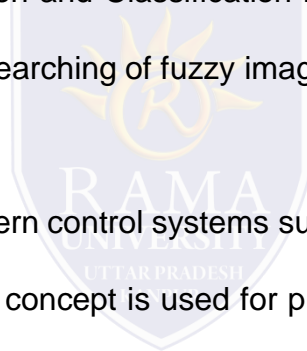
1. It allows users to build or create the functions which are non-linear of arbitrary complexity.
2. In fuzzy logic, everything is a matter of degree.
3. In the Fuzzy logic, any system which is logical can be easily fuzzified.
4. It is based on natural language processing.
5. It is also used by the quantitative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



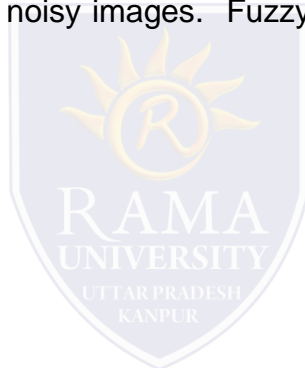
Disadvantages of Fuzzy Logic

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.

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

6. What is the size of the insert that can be accommodated in the head of bacteriophage PI?

- a) 30-40 kbp
- b) 80-95 kbp
- c) 110-115 kbp
- d) 200-300 kbp

7. What is the function of the pac site in the bacteriophage PI?

- a) It is responsible for the initiation of packaging
- b) It is responsible for the termination of packaging
- c) It is responsible for the initiation of replication
- d) It is responsible for the termination of replication

8. What is the function of loxP sites?

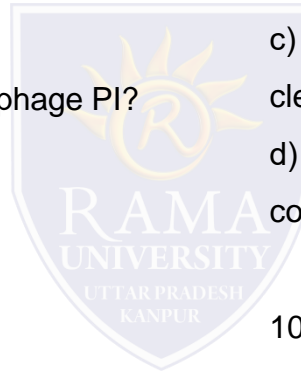
- a) It is responsible for linearization of DNA in the host bacterium
- b) It is responsible for circularization of DNA in the host bacterium
- c) It is responsible for conversion of single stranded DNA into double stranded DNA
- d) It is responsible for conversion of double stranded DNA into single stranded DNA

9. Which of the following is not included as a step in cloning in bacteriophage PI?

- a) The growth of vector is done as a plasmid by using pBR322 origin of replication
- b) Cleaving with BamH1 is done and then products cleaved with Sau3A are ligated
- c) Incubation with mutant lysogen is done which doesn't cleaves the recombinants at pac sites
- d) Incubation is done with mutant lysogen which doesn't contains head and tail proteins

10. What happens after packaging is carried out in the phage head?

- a) A sequence dependent cleavage of DNA is carried out
- b) A sequence independent cleavage of DNA is carried out
- c) They are linearized before they are infected into the bacterial cells
- d) They are circularized before they are infected into the bacterial cells



REFERENCES

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