
RAMA UNIVERSITY

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# FACULTY OF EGINEERING AND TECHNOLOGY

## Soft Computing

## LECTURE -04

Umesh Kumar Gera
Assistant Professor
Computer Science & Engineering

# OUTLINE

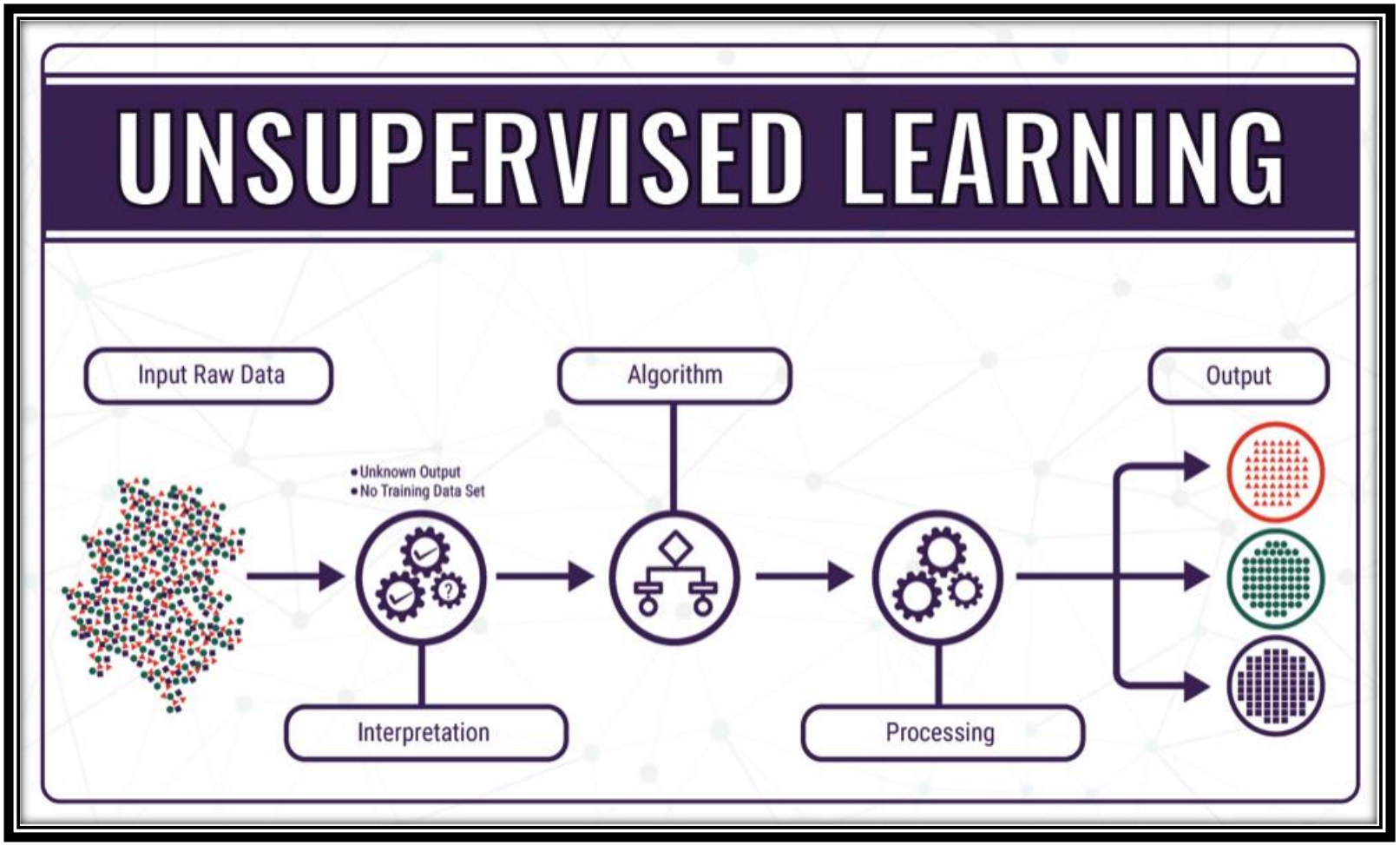
- Unsupervised Learning
- Mathematical Model of unsupervised Learning
- Why used unsupervised learning
- Types of Unsupervised learning
- Advantages and Disadvantages of Unsupervised Learning
- Multiple Choice Question

# FEATURES OF UNSUPERVISED LEARNING

## Unsupervised learning

- Unsupervised learning is a type of learning in which models are trained using unlabeled dataset and are allowed to act on that data without any supervision.
- In this learning only input is given on the basis of input model or machine identify output on the knowledge of past.
- Error prediction is difficult in it because only input is provide output is missing.
- Example of this learning techniques is students learn without teacher.

# MATHEMATICAL MODEL OF UNSUPERVISED LEARNING



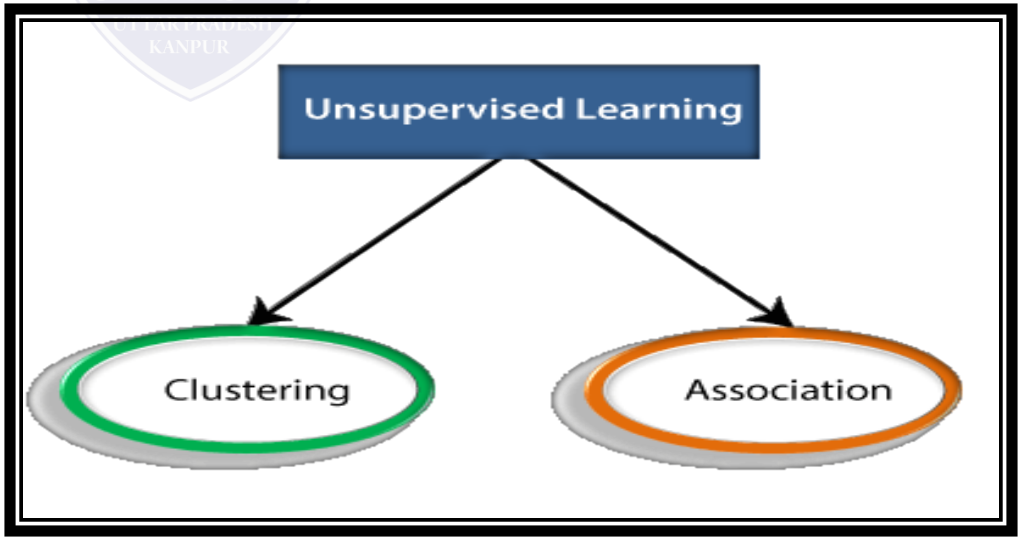
# FEATURES OF SUPERVISED LEARNING

## Why use Unsupervised Learning?

**Below are some main reasons which describe the importance of Unsupervised Learning:**

- ❑ Unsupervised learning is helpful for finding useful insights from the data.
- ❑ it works as human brain like brain learn for its past experience.
- ❑ Unsupervised learning works on unlabeled and uncategorized data which make unsupervised learning more important.
- ❑ In real-world, we do not always have input data with the corresponding output so to solve such cases, we need unsupervised learning.

## Types of Unsupervised Learning



# TYPES OF UNSUPERVISED LEARNING

## Clustering:

Clustering is a method of grouping the objects into clusters such that objects with most similarities remains into a group and has less or no similarities with the objects of another group. Cluster analysis finds the commonalities between the data objects and categorizes them as per the presence and absence of those commonalities.

## Association:

An association rule is an unsupervised learning method which is used for finding the relationships between variables in the large database. It determines the set of items that occurs together in the dataset. Association rule makes marketing strategy more effective. Such as people who buy X item (suppose a bread) are also tend to purchase Y (Butter/Jam) item. A typical example of Association rule is Market Basket Analysis.

# ALGORITHM OF UNSUPERVISED LEARNING

- K-means clustering
- KNN (k-nearest neighbors)
- Hierarchal clustering
- Anomaly detection
- Neural Networks
- Principle Component Analysis
- Independent Component Analysis
- Apriori algorithm
- Singular value decomposition

# PRONS AND CONS OF UNSUPERVISED LEARNING

## Advantages of Unsupervised Learning

- Because of unlabeled data set unsupervised learning is used for solving more complex problem.
- Unsupervised learning is preferable as it is easy to get unlabeled data in comparison to labeled data.

## Disadvantages of Unsupervised Learning

- Unsupervised learning is intrinsically more difficult than supervised learning due to absence of output.
- The result of the unsupervised learning algorithm might be less accurate as input data is not labeled, and algorithms do not know the exact output in advance so that error prediction is difficult as compare to supervised learning.

# MCQ

1. Which is not a desirable property of a logical rule-based system?

a) Locality

b) Attachment

c) Detachment

d) Truth-Functionality

2. How is Fuzzy Logic different from conventional control methods?

a) IF and THEN Approach

b) FOR Approach

c) WHILE Approach

d) DO Approach

3. In an Unsupervised learning _____

a) Specific output values are given

b) Specific output values are not given

c) No specific Inputs are given

d) Both inputs and outputs are given

4. Inductive learning involves finding a _____

a) Consistent Hypothesis

b) Inconsistent Hypothesis

c) Regular Hypothesis

d) Irregular Hypothesis

5. Computational learning theory analyzes the sample complexity and computational complexity of _____

a) Unsupervised Learning

b) Inductive learning

c) Forced based learning

d) Weak learning

# MULTIPLE CHOICE QUESTION

- https://www.technative.io/why-unsupervised-machine-learning-is-the-future-of-cybersecurity/
- https://static.javatpoint.com/tutorial/machine-learning/images/unsupervised-machine-learning-2.png