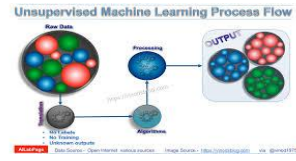


Unsupervised Learning

Agenda

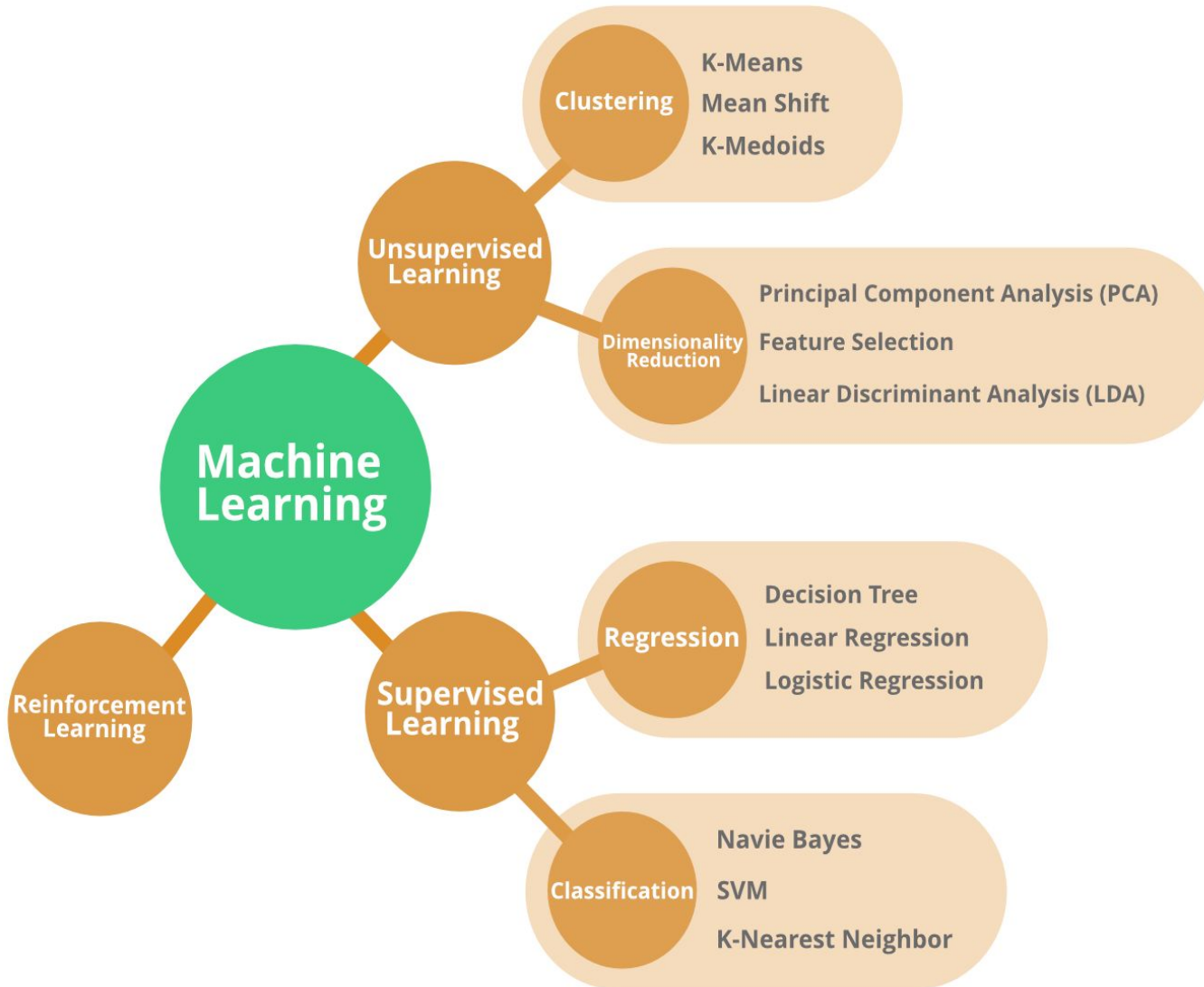


- Difference between Supervised and Unsupervised learning
- K-means Clustering
- Finding optimal number of clusters
- Hierarchical clustering

Recap- ML Algorithms



INTERNSHIPSTUDIO



Recap – ML Methods



INTERSHIPSTUDIO

Classical Machine Learning

Task Driven

Supervised Learning

(Pre Categorized Data)

Classification

(Divide the socks by Color)

Eg. Identity
Fraud Detection

Regression

(Divide the Ties by Length)

Eg. Market
Forecasting

Data Driven

Unsupervised Learning

(Unlabelled Data)

Clustering

(Divide by Similarity)

Eg. Targeted
Marketing

Association

(Identify Sequences)

Eg. Customer
Recommendation

Dimensionality Reduction

(Wider Dependencies)

Eg. Big Data
Visualization

Obj: Predications & Predictive Models

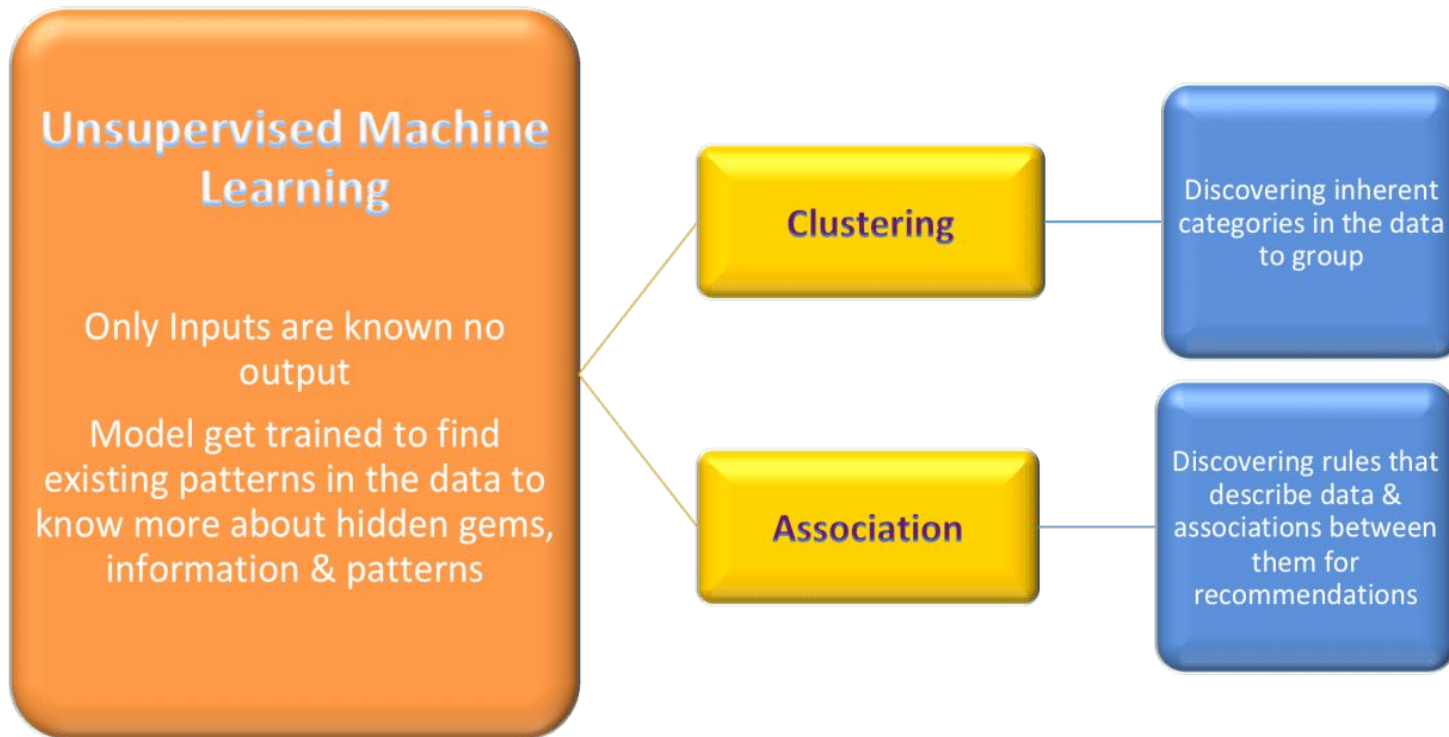
Pattern/ Structure Recognition



Unsupervised Machine Learning – Screen Shot



INTERNSHIPSTUDIO



AI LabPage

Source - Open Internet various sources

Image Source - <https://vinodsblog.com>

via @vinod1975

Unsupervised Machine Learning Types

Clustering

Grouping of objects - Similar or related to and different or unrelated to others
Inter-cluster distances are maximized
Intra-cluster distances are minimized

Unsupervised Learning

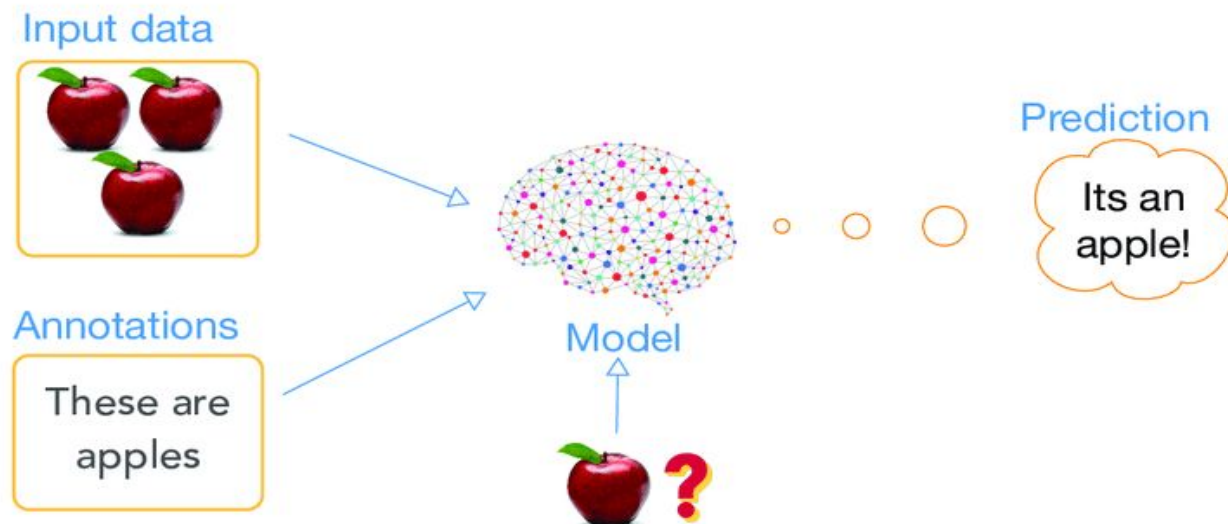
Learning useful structure *without* labeled classes, optimization criterion, feedback signal, or any other information beyond the raw data

Association

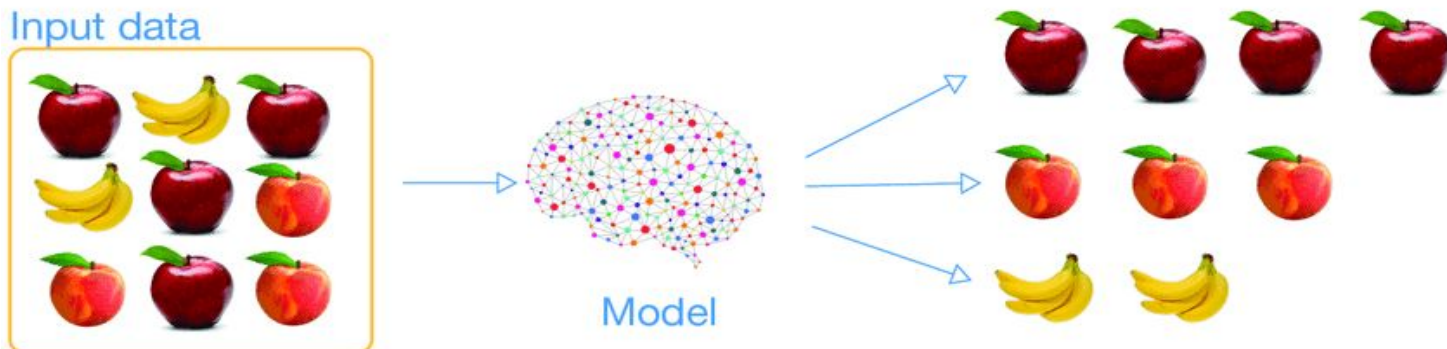
Algorithm looks for strong association among features in data

Examples - Unsupervised learning

supervised learning



unsupervised learning



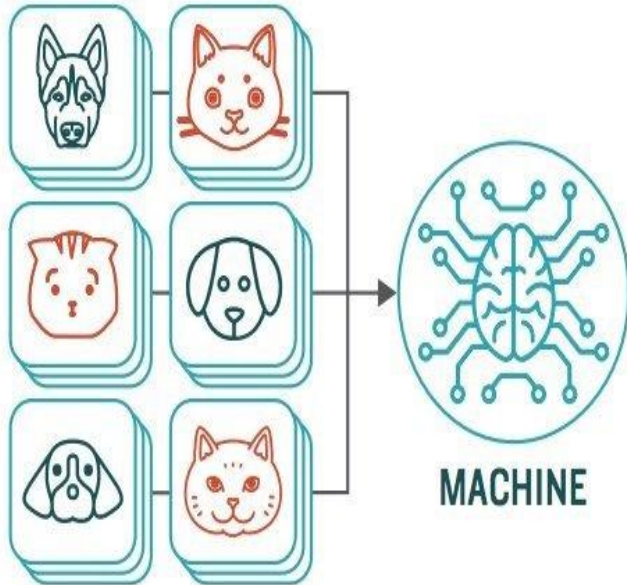
How **Unsupervised** Machine Learning Works



INTERNSHIPSTUDIO

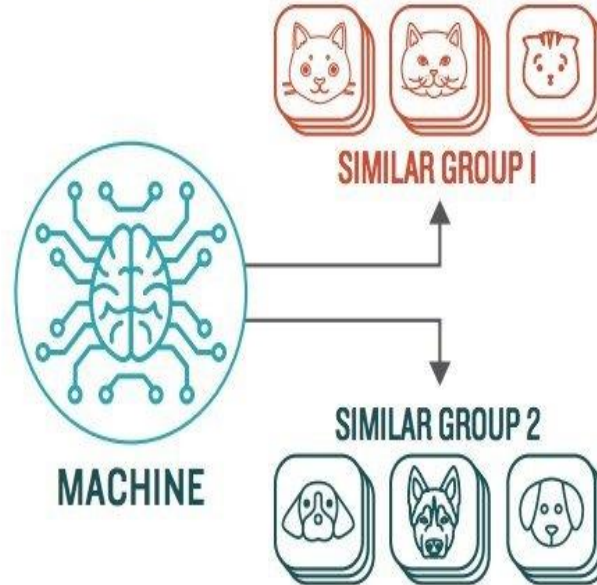
STEP 1

Provide the machine learning algorithm uncategorized, unlabeled input data to see what patterns it finds



STEP 2

Observe and learn from the patterns the machine identifies



TYPES OF PROBLEMS TO WHICH IT'S SUITED

CLUSTERING

Identifying similarities in groups

For Example: Are there patterns in the data to indicate certain patients will respond better to this treatment than others?

ANOMALY DETECTION

Identifying abnormalities in data

For Example: Is a hacker intruding in our network?

Difference between Supervised and Unsupervised learning

#1. Method

Supervised Learning



Input variables and output variables will be given.

Unsupervised Learning



Only input data will be given.

#2. Goal

Supervised Learning



Supervised learning goal is to determine the function so well that when new input data set given, can predict the output.

Unsupervised Learning



Unsupervised learning goal is to model the hidden patterns or underlying structure in the given input data in order to learn about the data.



Parameters	Supervised machine learning technique	Unsupervised machine learning technique
Process	In a supervised learning model, input and output variables will be given.	In unsupervised learning model, only input data will be given
Input Data	Algorithms are trained using labeled data.	Algorithms are used against data which is not labeled
Algorithms Used	Support vector machine, Neural network, Linear and logistics regression, random forest, and Classification trees.	Unsupervised algorithms can be divided into different categories: like Cluster algorithms, K-means, Hierarchical clustering, etc.
Computational Complexity	Supervised learning is a simpler method.	Unsupervised learning is computationally complex
Use of Data	Supervised learning model uses training data to learn a link between the input and the outputs.	Unsupervised learning does not use output data.
Accuracy of Results	Highly accurate and trustworthy method.	Less accurate and trustworthy method.
Real Time Learning	Learning method takes place offline.	Learning method takes place in real time.
Number of Classes	Number of classes is known.	Number of classes is not known.
Main Drawback	Classifying big data can be a real challenge in Supervised	You cannot get precise information regarding data sorting, and the output



Q.1 What is Unsupervised learning?

Q.2 What are the types of Supervised and Unsupervised learning?

Q.3 What is difference between the Supervised and Unsupervised learning?

Q.4 What are the advantages and disadvantages of Supervised and Unsupervised learning?

Q.5 Provide few example of Unsupervised learning?