ML3 (Unsupervised Machine learning)

Unsupervised learning is a great solution when we want to discover the underlying structure of data. In contrast to supervised learning, we cannot apply unsupervised methods to classification or regression style problems. This is because unsupervised ML algorithms learn patterns from unlabeled data whereas, we need to know the input-output mappings to perform classification or regression. Essentially, our unsupervised learning algorithm will find the hidden patterns or groupings within the data without the need for a human to label the data or intervene in any other way.

Course Objectives

The Participants will be able to,
- · Understand the Unsupervised clustering concepts
- · Clustering algorithms like K-Means, DBSCAN
- · Understand the need of dimensionality reduction
- · Learn Recommendation systems
- · Market basket analysis, Association rules, Apriori algorithm.

Pedagogy
The objectives in this course will be met through Interactive Lectures and hands on exercises and practice sessions

Course Content

Session -1: Introduction to unsupervised Learning, Clustering and k-Means Algorithm
- Supervised Learning & Unsupervised Learning
- Clustering
- K-means Algorithm
    - o Visiting Basics - Proximity measure
    - o Visiting Basics - Distance measure
    - o Cluster Formation
    - o Optimal value of K - Elbow method
    - o Optimal value of K - Silhouette method

Session -2: Hierarchical Clustering & Density Based Clustering
- Hierarchical Clustering
    - o Distance Matrix
    - o Linkage Methods
    - o Dendogram
- Density Based Clustering
    - o DBSCAN

Session -3: Dimensionality Reduction & PCA
- Curse of dimensionality
- Principal Component Covariance Matrix
- Principal Component Analysis (Signal to noise ratio)

- Case Study on PCA

(note : removed LDA from last syllabus)

Session -4: Recommendation System
- Recommendation System Overview
- Types of recommendation systems
- Popularity based recommendation systems
- Content based recommendation systems
- Similarity fundamentals
- Collaborative filtering
- Types of collaborative filtering
- User-user, item-item
- Challenges of Collaborative filtering
- Steps of Collaborative filtering
- Matrix Factorization - SVD
- SVD for collaborative filtering
- Surprise library

Session -5: Apriori based & Hybrid Recommendation System
- Market basket analysis
- Common terms
- Association rule
- Apriori algorithm
- Hybrid Methods
- Evaluation metrics
- Key points