Cluster Analysis

MA2233 - Team 5 Project

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What is Clustering or Cluster Analysis

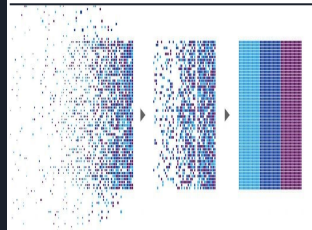
- Clustering is the task of grouping a set of objects in such a way that objects in the same group (cluster) are more similar to each other than to those in other groups (clusters).
- Cluster Analysis can be achieved by various algorithms that differ significantly in their understanding of what constitutes as a cluster and how to efficiently find them.
- Besides the term clustering, there are a number of terms with similar meanings, including *automatic classification, numerical taxonomy, botryology, typological analysis, and community detection. The subtle differences are often in the use of the results.*

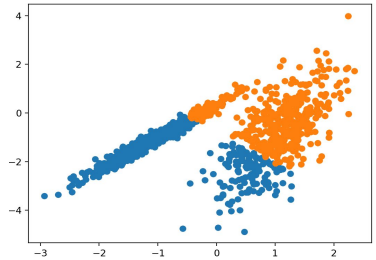
Clustering Algorithms

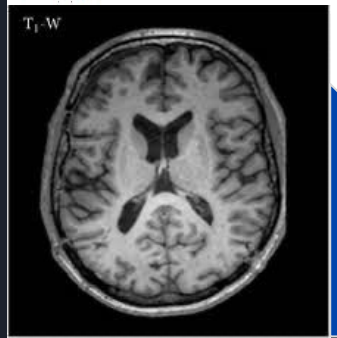
- Prototype-based
  - C-Means, Fuzzy C-Means
- Hierarchical
  - Single/Complete Linkage
- Distribution-based
  - Expectation Maximization
  - Gaussian Mixture Model
- Density-based
  - DBSCAN
  - DenCLUE
- Centroid Models
  - K-Means Algorithm
- MST-based

Real-life Applications

- Main Task in Exploratory Data Analysis
- Common Technique in Statistical Data Analysis
- Pattern Recognition
- Image Segmentation
- Information Retrieval
- Bioinformatics - Gene Expression Data
- Data Compression
- Computer Graphics
- Machine Learning







Problem Statement

01 Generate N points in 2-D that are from *k* number of clusters.

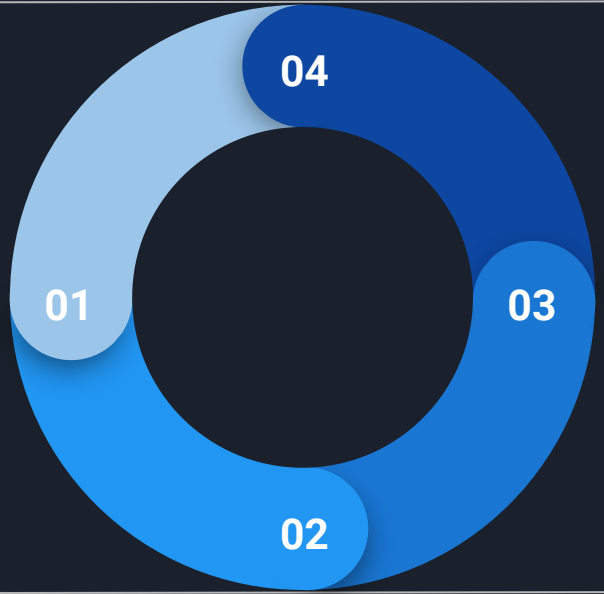
02 Find the MST of the above dataset using Euclidean distance.

03 Implement any 3 of the 5 algorithms for terminating the cluster.

04 A menu-driven MST-based clustering where the user can choose from the 3 algorithms.

Outlook of the Project

Random Points, Complete Graph, and Edges



Clustering based on different criteria

Kruskal's, Prim's and Breadth-First Search

Generating Minimum Spanning Tree

Problems faced in Implementation

- Understanding the termination criteria for clustering.
- Implementation of Minimum Spanning Tree.
- Clustering after formation of MST.
- Ensuring that the code works optimally with minimum Time & Space Complexities.

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Berry Books

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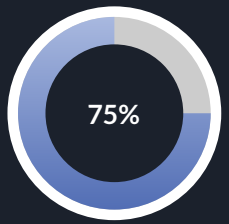

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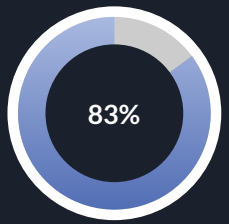

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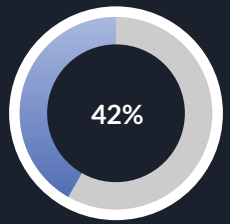

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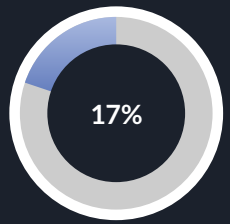

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Market trends

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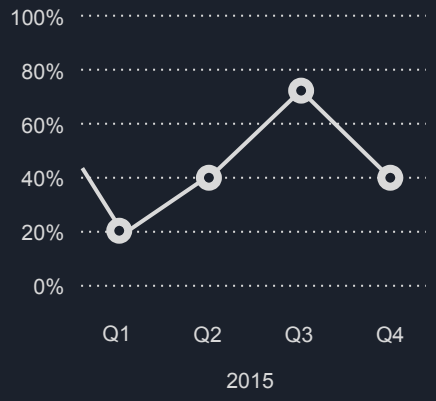

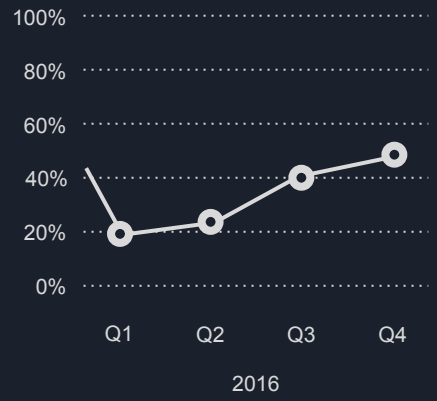

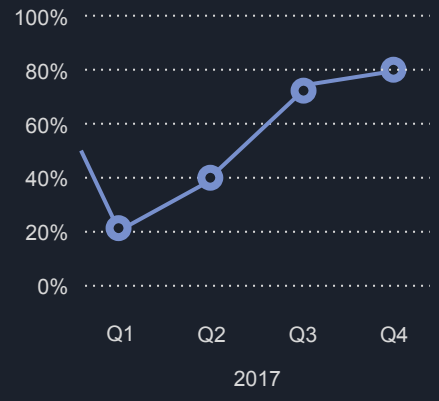

Introducing: Lorem ipsum

Showcase how your tools work across different devices

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QUICK TIP

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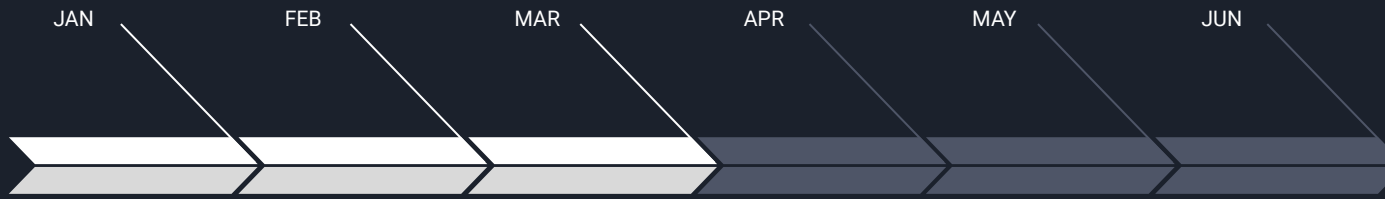
Project timeline



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Thank you!