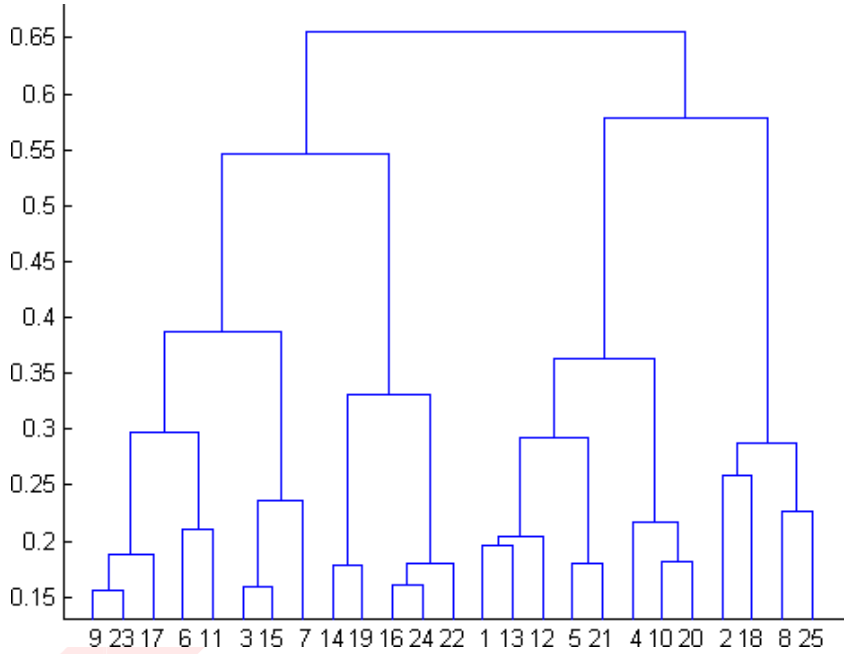
MACHINE LEARNING

Q1 to Q12 have only one correct answer. Choose the correct option to answer your question.

1. What is the most appropriate no. of clusters for the data points represented by the following dendrogram:



a) 2
b) 4
c) 6
d) 8

2. In which of the following cases will K-Means clustering fail to give good results?
   1. Data points with outliers
   2. Data points with different densities
   3. Data points with round shapes
   4. Data points with non-convex shapes

   Options:
   a) 1 and 2
   b) 2 and 3
   c) 2 and 4
   d) 1, 2 and 4

3. The most important part of____is selecting the variables on which clustering is based.
   a) interpreting and profiling clusters
   b) selecting a clustering procedure
   c) assessing the validity of clustering
   d) formulating the clustering problem

4. The most commonly used measure of similarity is the____or its square.
   a) Euclidean distance
   b) city-block distance
   c) Chebyshev's distance
   d) Manhattan distance

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5. ___is a clustering procedure where all objects start out in one giant cluster. Clusters are formed by dividing this cluster into smaller and smaller clusters.
   a) Non-hierarchical clustering
   b) Divisive clustering
   c) Agglomerative clustering
   d) K-means clustering

6. Which of the following is required by K-means clustering?
   a) Defined distance metric
   b) Number of clusters
   c) Initial guess as to cluster centroids
   d) All answers are correct

7. The goal of clustering is to-
   b) Classify the data point into different classes
   c) Predict the output values of input data points
   d) All of the above

8. Clustering is a-
   a) Supervised learning
   b) Unsupervised learning
   c) Reinforcement learning
   d) None

9. Which of the following clustering algorithms suffers from the problem of convergence at local optima?
   b) Hierarchical clustering
   c) Diverse clustering
   d) All of the above

10. Which version of the clustering algorithm is most sensitive to outliers?
    a) K-means clustering algorithm
    b) K-modes clustering algorithm
    c) K-medians clustering algorithm
    d) None

11. Which of the following is a bad characteristic of a dataset for clustering analysis-
    a) Data points with outliers
    b) Data points with different densities
    c) Data points with non-convex shapes
    d) All of the above

12. For clustering, we do not require-
    a) Labeled data
    b) Unlabeled data
    c) Numerical data
    d) Categorical data

Q13 to Q15 are subjective answers type questions, Answers them in their own words briefly.

13. How is cluster analysis calculated?
14. How is cluster quality measured?
15. What is cluster analysis and its types?

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13.
According to their shared traits or qualities, comparable data points are grouped together using the cluster analysis approach. It involves calculating the similarity between the data points using a distance metric and visualising the grouping using a dendrogram or tree diagram. To do cluster analysis, a number of techniques are utilised, including K-means, hierarchical clustering, and DBSCAN. To find significant patterns and insights within the data, the clustering findings are then evaluated.

14.The degree of similarity between clusters and the degree of dissimilarity between clusters are used to determine the quality of a cluster. Cluster quality is assessed using a number of criteria, including the silhouette score, Dunn index, and Calinski-Harabasz index. The quality of the clusters improves as the score rises.

15.Creating clusters or segments out of similar objects or data points is a statistical technique known as cluster analysis. Finding patterns in the data points' similarities and differences allows cluster analysis to organise the data into meaningful segments.

Two primary cluster analysis models exist:

By combining smaller clusters into larger ones (agglomerative) or breaking up larger clusters into smaller ones, hierarchical clustering creates clusters (divisive).
Partitional clustering divides the data points into distinct, non-overlapping groups or clusters, with each data point belonging to a single cluster. Algorithms like K-means and K-modes are examples of partitional clustering algorithms.