MACHINE LEARNING

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

Answers are highlighted in red

1. Which of the following is an application of clustering?
   a. Biological network analysis
   b. Market trend prediction
   c. Topic modeling
   d. All of the above

2. On which data type, we cannot perform cluster analysis?
   a. Time series data
   b. Text data
   c. Multimedia data
   d. None

3. Netflix's movie recommendation system uses-
   a. Supervised learning
   b. Unsupervised learning
   c. Reinforcement learning and Unsupervised learning
   d. All of the above

4. The final output of Hierarchical clustering is-
   a. The number of cluster centroids
   b. The tree representing how close the data points are to each other
   c. A map defining the similar data points into individual groups
   d. All of the above

5. Which of the step is not required for K-means clustering?
   a. A distance metric
   b. Initial number of clusters
   c. Initial guess as to cluster centroids
   d. None

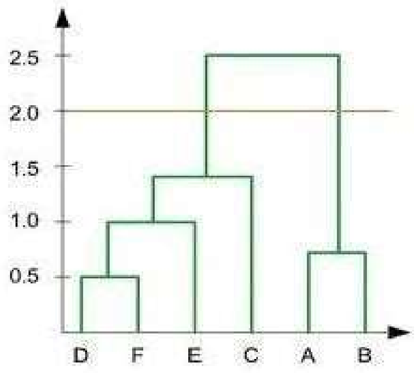
6. Which is the following is wrong?
   a. k-means clustering is a vector quantization method
   b. k-means clustering tries to group n observations into k clusters
   c. k-nearest neighbour is same as k-means
   d. None

7. Which of the following metrics, do we have for finding dissimilarity between two clusters in hierarchical clustering?
   i. Single-link
   ii. Complete-link
   iii. Average-link
   Options:
   a. 1 and 2
   b. 1 and 3
   c. 2 and 3
   d. 1, 2 and 3

8. Which of the following are true?
   i. Clustering analysis is negatively affected by multicollinearity of features
   ii. Clustering analysis is negatively affected by heteroscedasticity
   Options:
   a. 1 only
   b. 2 only
   c. 1 and 2

d. None of them

9. In the figure above, if you draw a horizontal line on y-axis for y=2. What will be the number of clusters formed?



a. 2
b. 4
c. 3
d. 5

10. For which of the following tasks might clustering be a suitable approach?

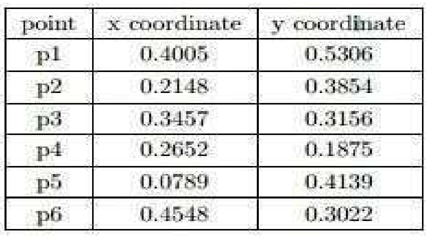
a. Given sales data from a large number of products in a supermarket, estimate future sales for each of these products.

b. Given a database of information about your users, automatically group them into different market segments.

c. Predicting whether stock price of a company will increase tomorrow.

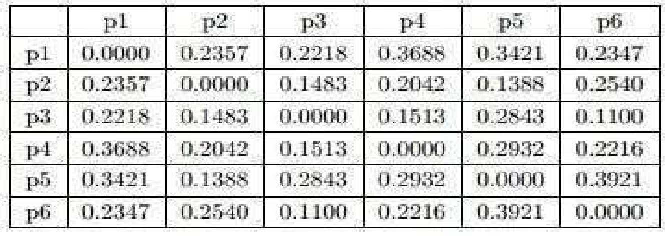
d. Given historical weather records, predict if tomorrow's weather will be sunny or rainy.

11. Given, six points with the following attributes:



point	x coordinate	y coordinate
p1	0.4005	0.5306
p2	0.2148	0.3854
p3	0.3457	0.3156
p4	0.2652	0.1875
p5	0.0789	0.4139
p6	0.4548	0.3022

Table : X-Y coordinates of six points.

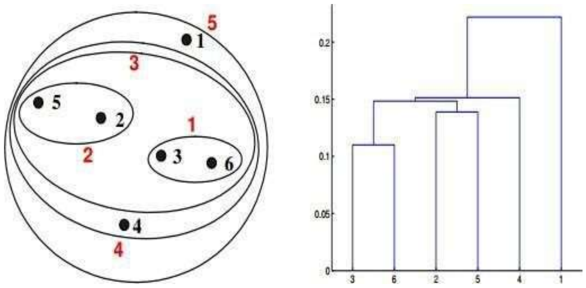


	p1	p2	p3	p4	p5	p6
p1	0.0000	0.2357	0.2218	0.3688	0.3421	0.2347
p2	0.2357	0.0000	0.1483	0.2042	0.1388	0.2540
p3	0.2218	0.1483	0.0000	0.1513	0.2843	0.1100
p4	0.3688	0.2042	0.1513	0.0000	0.2932	0.2216
p5	0.3421	0.1388	0.2843	0.2932	0.0000	0.3921
p6	0.2347	0.2540	0.1100	0.2216	0.3921	0.0000

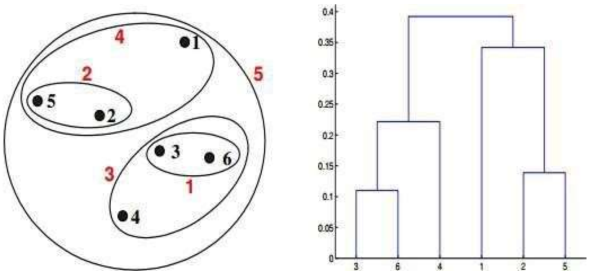
Table : Distance Matrix for Six Points

MACHINE LEARNING

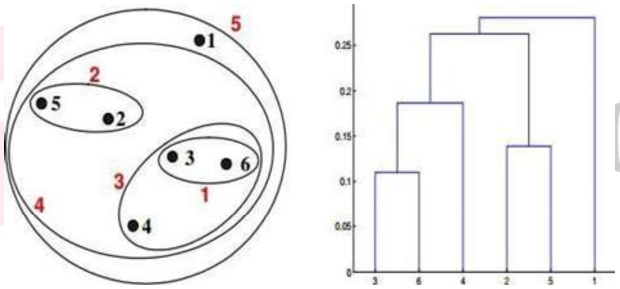
Which of the following clustering representations and dendrogram depicts the use of MIN or Single link proximity function in hierarchical clustering:



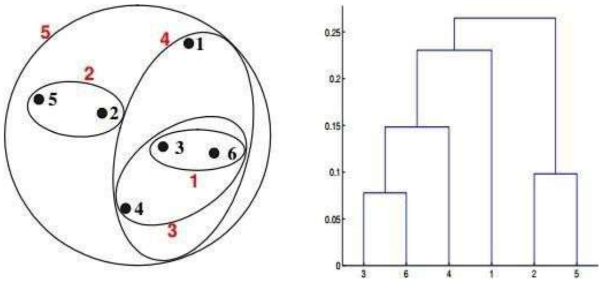
a.



b.



c.



d.

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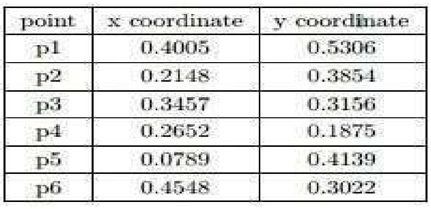
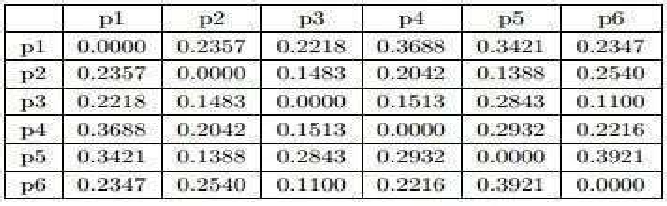
12. Given, six points with the following attributes:



point	x coordinate	y coordinate
p1	0.4005	0.5306
p2	0.2148	0.3854
p3	0.3457	0.3156
p4	0.2652	0.1875
p5	0.0789	0.4139
p6	0.4548	0.3022

Table : X-Y coordinates of six points.

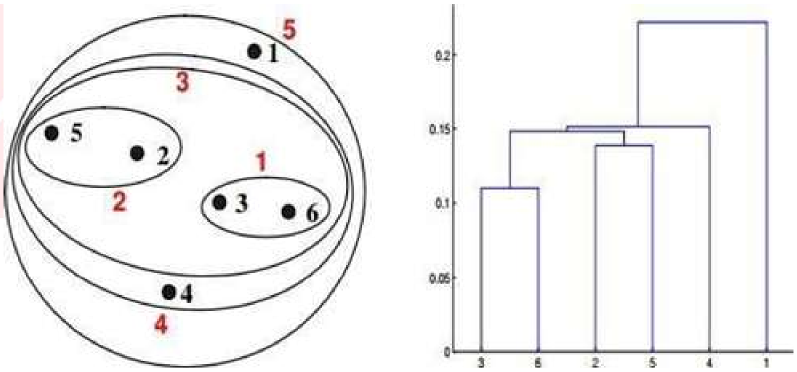


	p1	p2	p3	p4	p5	p6
p1	0.0000	0.2357	0.2218	0.3688	0.3421	0.2347
p2	0.2357	0.0000	0.1483	0.2042	0.1388	0.2540
p3	0.2218	0.1483	0.0000	0.1513	0.2843	0.1100
p4	0.3688	0.2042	0.1513	0.0000	0.2932	0.2216
p5	0.3421	0.1388	0.2843	0.2932	0.0000	0.3921
p6	0.2347	0.2540	0.1100	0.2216	0.3921	0.0000

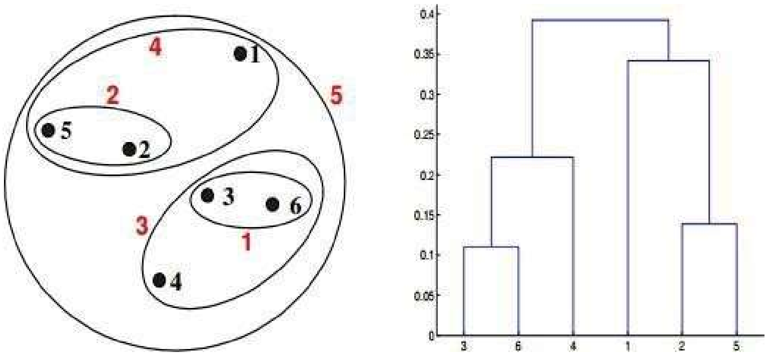
Table : Distance Matrix for Six Points

Which of the following clustering representations and dendrogram depicts the use of MAX or Complete link proximity function in hierarchical clustering.

a.



b



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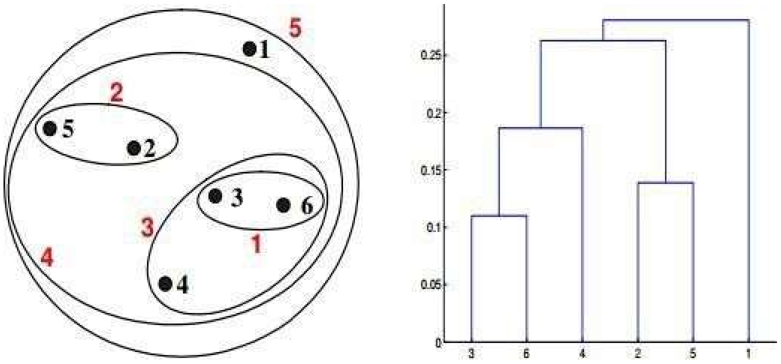
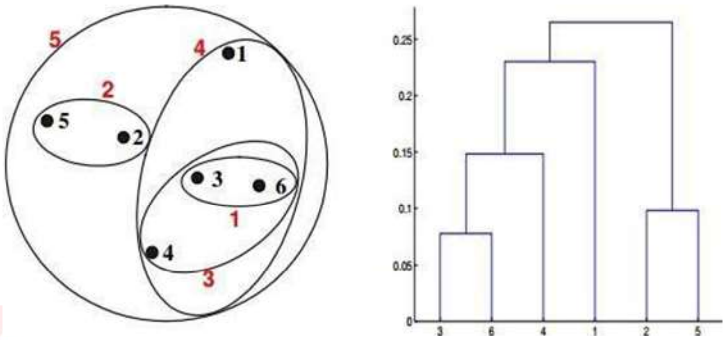
c.



d.



Q13 to Q14 are subjective answers type questions, Answers them in their own words briefly

13. What is the importance of clustering?

Answers:

clustering is the task of dividing the population or data points into several groups such that data points in the same groups are more like other data points in the same group and dissimilar to the data points in other groups.

In other way we can say it means segregating data points with similar traits and making them into different clusters or groups. It is basically a collection of objects based on similarity and dissimilarity between them. It basically groups data sets with common characteristics

It is very important because it helps in determining the inner structure of the data. Clustering plays a vital role in user segregation, market trends, image processing, etc. They are also widely used in detecting outliers to detect credit card fraudulence. It helps in understanding natural grouping in a dataset.

The main use of clustering in ML is to extract valuable inferences from many unstructured data sets. If we are working with large amounts of data which is not structured, it is only logical to organize that data to make it helpful in so many other ways, and clustering helps us do that. Thus, we can find it very important.

14. How can I improve my clustering performance?

Answers:

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Initialization is an important step in Clustering. Using better initialization technique helps in improving the cluster performance. For example, instead of random initialization, choose the first center randomly. All others are calculated with proportional to their squared distance from all current centers.

Another step is to repeat the algorithms.