Machine Learning Assignment 3

In Q1 to Q11, only one option is correct, choose the correct option:

1. Which of the following is an application of clustering?

   a) biological network analysis b) Market trend prediction

   c) Topic modelling 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

   Answer – 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

   Answer – c) Reinforcement learning and Unsupervised learning

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

   Answer –b) The tree representing how close the data points are to each other

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

   Answer – 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

   Answer – c) k-nearest neighbour is same as k-means

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

   a) 1 and 2
   b) 1 and 3
   c) 2 and 3
   d) 1, 2 and 3

Answer – d) 1, 2 and 3

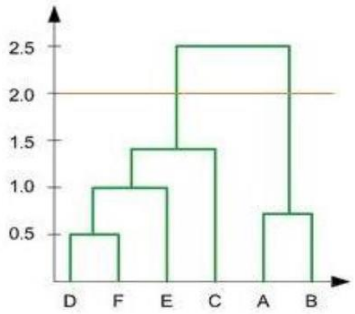
8. Which of the following can act as possible termination conditions in K-Means?

   i. Clustering analysis is negatively affected by multicollinearity of features
   ii. Clustering analysis is negatively affected by heteroscedasticity

   a) 1 Only
   b) 2 only
   c) 1 and 2
   d) None of them

Answer – a) 1 Only

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) 3

Answer – a) 2

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.

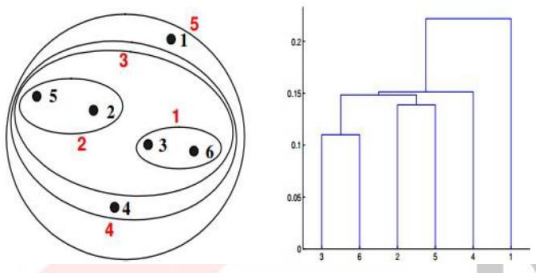
Answer – b) Given a database of information about your users, automatically group them into different market segments.

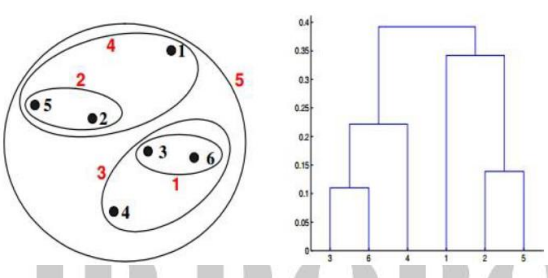
11. Given, six points with the following attributes:

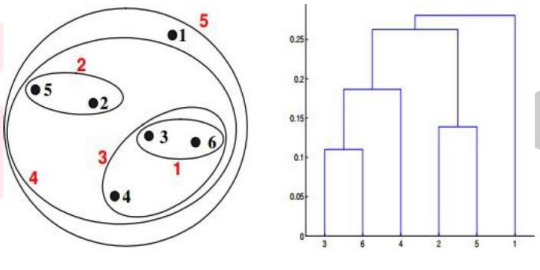
point	x coordinate	y coordinate
p1	0.4005	0.5306
p2	0.2148	0.3854
p3	0.3457	0.3156
p4	0.2652	0.1875
p5	0.0789	0.4139
p6	0.4548	0.3022

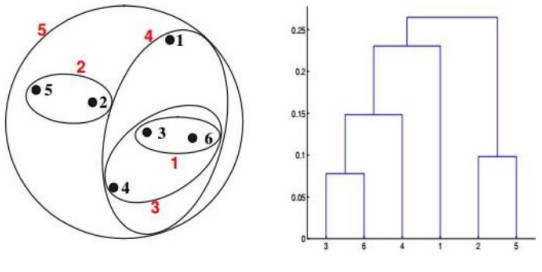
	p1	p2	p3	p4	p5	p6
p1	0.0000	0.2357	0.2218	0.3688	0.3421	0.2347
p2	0.2357	0.0000	0.1483	0.2042	0.1388	0.2540
p3	0.2218	0.1483	0.0000	0.1513	0.2843	0.1100
p4	0.3688	0.2042	0.1513	0.0000	0.2932	0.2216
p5	0.3421	0.1388	0.2843	0.2932	0.0000	0.3921
p6	0.2347	0.2540	0.1100	0.2216	0.3921	0.0000

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. 

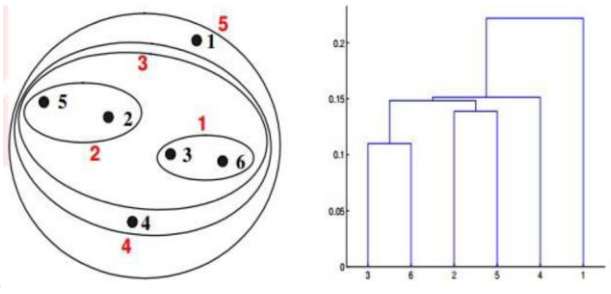
Answer – a)

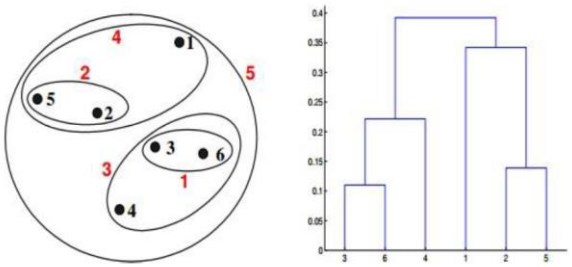
12. Given, six points with the following attributes

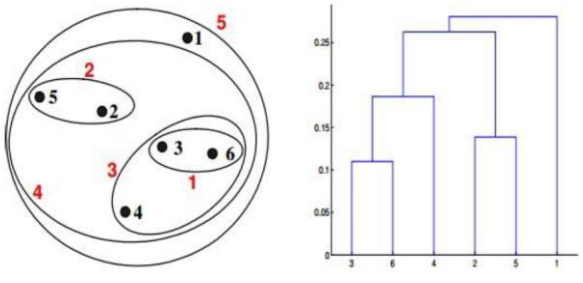
point	x coordinate	y coordinate
p1	0.4005	0.5306
p2	0.2148	0.3854
p3	0.3457	0.3156
p4	0.2652	0.1875
p5	0.0789	0.4139
p6	0.4548	0.3022

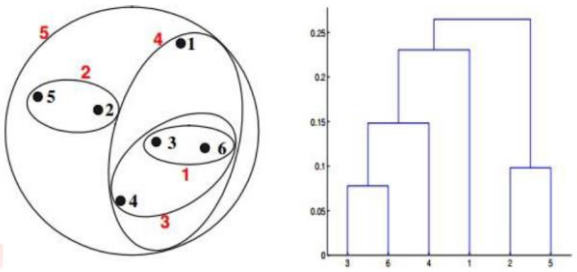
	p1	p2	p3	p4	p5	p6
p1	0.0000	0.2357	0.2218	0.3688	0.3421	0.2347
p2	0.2357	0.0000	0.1483	0.2042	0.1388	0.2540
p3	0.2218	0.1483	0.0000	0.1513	0.2843	0.1100
p4	0.3688	0.2042	0.1513	0.0000	0.2932	0.2216
p5	0.3421	0.1388	0.2843	0.2932	0.0000	0.3921
p6	0.2347	0.2540	0.1100	0.2216	0.3921	0.0000

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

a. 

b. 

c. 

d. 

Answer – b)

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

13. What is the importance of clustering?

Clustering is used to extract information from a large data set and transform it into an understandable form. This transformed information can be used to studying, forecasting, prediction, understanding nature and grouping similar entities.

It groups object of same type based on their available data.

14. How can I improve my clustering performance?

Generally, performance of clustering can be improved with the help of Unsupervised learning. This method includes, applying unsupervised feature learning to input data using either RICA or SFT. Also for some cases, k-means can be used to improve performance.