Started on	Saturday, 10 February 2024, 12:56 PM
State	Finished
Completed on	Sunday, 11 February 2024, 7:08 PM
Time taken	1 day 6 hours
Grade	**10.00** out of 10.00 (**100**%)

Question **1**

Correct

Mark 1.00 out of 1.00

Consider the table below

	$x_2 = 0$	$x_2 = 1$
$y = 0$	3	9
$y = 1$	6	12

The quantity $p(x_2 = 0 | y = 1)$ is given as

- ○ $\frac{2}{3}$
- ○ $\frac{1}{2}$
- ◉ $\frac{1}{3}$ ✔
- ○ $\frac{1}{4}$

Your answer is correct.

The correct answer is:
$\frac{1}{3}$

Consider the table below

	$x_2 = 0$	$x_2 = 1$
$y = 0$	3	9
$y = 1$	6	12

The quantity $p(y = 1)$ is given as

- ◉ $\dfrac{3}{5}$ ✔
- ○ $\dfrac{3}{4}$
- ○ $\dfrac{1}{3}$
- ○ $\dfrac{2}{5}$

Your answer is correct.

The correct answer is:

$\dfrac{3}{5}$

The K −means algorithm is a/an

- ○ Supervised learning algorithm
- ○ Reinforcement learning algorithm
- ◉ Unsupervised learning algorithm   ✔
- ○ Deep learning algorithm

Your answer is correct.

The correct answer is:
Unsupervised learning algorithm

Unsupervised learning

○ Both data and labels

○ Neither data nor labels

◉ Requires data, but NO labels ✔

○ Labels but not data

Your answer is correct.

The correct answer is:
Requires data, but NO labels

Clustering can be used to

○ Group emails or search results

◉ All of these ✔

○ Analyze Customer shopping patterns

○ Image segmentation

Your answer is correct.

The correct answer is:
All of these

The cluster assignment indicator $\alpha_2(3)$

○ Equals 0 when $\bar{x}(3)$ belongs to $\mathcal{C}_2$ and 1 otherwise

○ Equals 1 when $\bar{x}(2)$ belongs to $\mathcal{C}_3$ and 0 otherwise

○ Equals 0 when $\bar{x}(2)$ belongs to $\mathcal{C}_3$ and 1 otherwise

◉ Equals 1 when $\bar{x}(3)$ belongs to $\mathcal{C}_2$ and 0 otherwise ✔

Your answer is correct.

The correct answer is:
Equals 1 when $\bar{x}(3)$ belongs to $\mathcal{C}_2$ and 0 otherwise

The K −means **cost-function** to minimize is given as

○ $\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j) \|\bar{\mathbf{x}}(j) - \bar{\mu}_i\|^2$ ✔

○ $\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j) \|\bar{\mathbf{x}}(j) - \bar{\mu}_i\|$

○ $\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j)(\bar{\mathbf{x}}(j) - \bar{\mu}_i)(\bar{\mathbf{x}}(j) - \bar{\mu}_i)^T$

○ $\min \sum_{i=1}^{K} \alpha_i(j) \|\bar{\mathbf{x}}(j) - \bar{\mu}_i\|^2$

Your answer is correct.

The correct answer is:
$\min \sum_{i=1}^{K} \sum_{j=1}^{M} \alpha_i(j) \|\bar{\mathbf{x}}(j) - \bar{\mu}_i\|^2$

To determine the cluster in iteration l,

○ We assign $\bar{\mathbf{x}}(j)$ to the closest centroid $\bar{\mu}_i^{(l-1)}$ ✔

○ We assign $\bar{\mathbf{x}}(j)$ to the farthest centroid $\bar{\mu}_i^{(l-1)}$

○ We assign $\bar{\mathbf{x}}(j)$ to the centroid $\dfrac{\sum_{j:\bar{\mathbf{x}}(j)\in c_i} \bar{\mathbf{x}}(j)}{\sum_{j:\bar{\mathbf{x}}(j)\in c_i} 1}$

○ We assign $\bar{\mathbf{x}}(j)$ to the centroid $\dfrac{\sum_{j:\bar{\mathbf{x}}(j)\in c_i} \bar{\mathbf{x}}(j)}{M}$

Your answer is correct.

The correct answer is:
We assign $\bar{\mathbf{x}}(j)$ to the closest centroid $\bar{\mu}_i^{(l-1)}$

The centroids for the given clusters can be determined as

○ $\dfrac{\sum_{j:\bar{x}(j)\in c_i} \bar{x}(j)}{M}$

○ $\dfrac{\sum_{j:\bar{x}(j)\in c_i} \bar{x}(j)}{K}$

◉ $\dfrac{\sum_{j:\bar{x}(j)\in c_i} \bar{x}(j)}{\sum_{j:\bar{x}(j)\in c_i} 1}$ ✔

○ $\dfrac{\sum_j \bar{x}(j)}{M}$

Your answer is correct.

The correct answer is:
$$\dfrac{\sum_{j:\bar{x}(j)\in c_i} \bar{x}(j)}{\sum_{j:\bar{x}(j)\in c_i} 1}$$

The centroids of the clusters are determined as

○ Average of all points assigned to all clusters in iteration l

◉ Average of all points assigned to cluster i in iteration l ✔

○ Average of only the new points assigned to cluster i in iteration l

○ Average of outliers assigned to cluster i in iteration l

Your answer is correct.

The correct answer is:
Average of all points assigned to cluster i in iteration l