

Unsupervised Learning

测验, 5 个问题

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1.

For which of the following tasks might K-means clustering be a suitable algorithm? Select all that apply.

- ☐ Given a set of news articles from many different news websites, find out what are the main topics covered.
 - ☐ From the user usage patterns on a website, figure out what different groups of users exist.
 - ☐ Given historical weather records, predict if tomorrow's weather will be sunny or rainy.
 - ☐ Given many emails, you want to determine if they are Spam or Non-Spam emails.
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2.

Suppose we have three cluster centroids $\mu_1 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$, $\mu_2 = \begin{bmatrix} -3 \\ 0 \end{bmatrix}$ and $\mu_3 = \begin{bmatrix} 4 \\ 2 \end{bmatrix}$. Furthermore, we have a training example $x^{(i)} = \begin{bmatrix} -2 \\ 1 \end{bmatrix}$.

After a cluster assignment step, what will $c^{(i)}$ be?

- ☐ $c^{(i)}$ is not assigned
 - ☐ $c^{(i)} = 2$
 - ☐ $c^{(i)} = 1$
 - ☐ $c^{(i)} = 3$
-

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3.

K-means is an iterative algorithm, and two of the following steps are repeatedly carried out in its inner-loop. Which two?

☐

Randomly initialize the cluster centroids.

☐

Test on the cross-validation set.

☐

Move the cluster centroids, where the centroids μ_k are updated.

☐

The cluster assignment step, where the parameters $c^{(i)}$ are updated.

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4.

Suppose you have an unlabeled dataset $\{x^{(1)}, \dots, x^{(m)}\}$. You run K-means with 50 different random

initializations, and obtain 50 different clusterings of the

data. What is the recommended way for choosing which one of

these 50 clusterings to use?

☐

Manually examine the clusterings, and pick the best one.

☐

Plot the data and the cluster centroids, and pick the clustering that gives the most "coherent" cluster centroids.

☐

Compute the distortion function $J(c^{(1)}, \dots, c^{(m)}, \mu_1, \dots, \mu_k)$, and pick the one that minimizes this.

☐

Use the elbow method.

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5.

Which of the following statements are true? Select all that apply.

☐

Once an example has been assigned to a particular centroid, it will never be reassigned to another different centroid

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☐

A good way to initialize K-means is to select K (distinct) examples from the training set and set the cluster centroids equal to these selected examples.

☐

K-Means will always give the same results regardless of the initialization of the centroids.

☐

On every iteration of K-means, the cost function $J(c^{(1)}, \dots, c^{(m)}, \mu_1, \dots, \mu_k)$ (the distortion function) should either stay the same or decrease; in particular, it should not increase.

☐

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