1. K-means and K-medoids

Extension Note: Homework 5 due date has been extended by 1 day to **August 17 23:59UTC** .

Assume we have a 2D dataset consisting of $(0,-6)$, $(4,4)$, $(0,0)$, $(-5,2)$ We wish to do k-means and k-medoids clustering with $k=2$. We initialize the cluster centers with $(-5,2)$, $(0,-6)$.

For this small dataset, in choosing between two equally valid exemplars for a cluster in k-medoids, choose them with priority in the order given above (i.e. all other things being equal, you would choose $(0,-6)$ as a center over $(-5,2)$).

For the following scenarios, give the clusters and cluster centers after the algorithm converges. Enter the coordinate of each cluster center as a square-bracketed list (e.g. `[0, 0]`); enter each cluster's members in a similar format, separated by semicolons (e.g. `[1, 2]; [3, 4]`).

Clustering 1

4.0/4 points (graded)
K-medoids algorithm with l_1 norm.

Cluster 1 Center: [0, -6] ✔ **Answer:** [4, 4] **

Cluster 1 Members: [0, -6]; [0, 0] ✔ **Answer:** [4, 4]; [-5, 2] **

Cluster 2 Center: [4, 4] ✔ **Answer:** [0, -6] **

Cluster 2 Members: [4, 4]; [-5,2] ✔ **Answer:** [0, -6]; [0, 0] **

Solution:

- First we will (arbitrarily) assign $(-5,2)$ to cluster 1, and $(0,-6)$ to cluster 2 **(**note that your solution may have these assignments flipped!)**
- Then, we update the clusters to be $[\mathbf{(4,4)},(-5,2)]$ and $[\mathbf{(0,-6)},(0,0)]$.
- At this point we have converged.

Submit You have used 3 of 3 attempts

Answers are displayed within the problem

Clustering 2

4.0/4 points (graded)
K-medoids algorithm with l_2 norm.

Cluster 1 Center: [0, 0] ✔ **Answer:** [0, 0] **

Cluster 1 Members: [4, 4]; [0, 0]; [-5,2] ✔ **Answer:** [4, 4]; [-5, 2]; [0, 0] **

Cluster 2 Center: [0, -6] ✔ **Answer:** [0, -6] **

Cluster 2 Members: [0, -6] ✔ **Answer:** [0, -6] **

Solution:

- First we will assign $(-5, 2)$ to cluster 1, and $(0, -6)$ to cluster 2. **(**note that your solution may have these assignments flipped!)**
- Then, we update the clusters to be $[(4, 4), (-5, 2), \mathbf{(0,0)}]$ and $[\mathbf{(0,-6)}]$.
- At this point, we will have converged.

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

Clustering 3

4.0/4 points (graded)
K-means algorithm with l_1 norm

Cluster 1 Center: [-0.5, 3] ✔ **Answer:** [-0.5, 3] **

Cluster 1 Members: [4, 4]; [-5,2] ✔ **Answer:** [4, 4]; [-5, 2] **

Cluster 2 Center: [0, -3] ✔ **Answer:** [0, -3] **

Cluster 2 Members: [0, -6]; [0, 0] ✔ **Answer:** [0, -6]; [0, 0] **

Solution:

- First we will assign $(-5, 2)$ to cluster 1, and $(0, -6)$ to cluster 2. **(**note that your solution may have these assignments flipped!)**
- Then, we update the clusters to be $[(4, 4), (-5, 2)]$ with center $(-0.5, 3)$.
- We update $[(0, -6), (0, 0)]$ with center $(0, -3)$.
- At this point, we will have converged.

Submit You have used 2 of 3 attempts

Answers are displayed within the problem

Discussion

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