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Unit 4 Unsupervised Learning (2

Course > weeks)

> Homework 5 > 1. K-means and K-medoids

## 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]).

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#### **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 [(4,4),(-5,2)] and [(0,-6),(0,0)].
- At this point we have converged.

You have used 1 of 3 attempts

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# Clustering 2

4.0/4 points (graded)

K-medoids algorithm with  $l_2$  norm.

Cluster 1 Center:

**✓** Answer: [0, 0] \*\*

**✓ Answer**: [4, 4]; [-5, 2]; [0, 0] \*\*

Cluster 2 Center:

**✓ Answer**: [0, -6] \*\*

Cluster 2 Members: [0, -6]

**✓** Answer: [0, -6] \*\*

**Solution:** 

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• At this point, we will have converged.

Submit

You have used 1 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] \*\*

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#### JUIULIUII.

- 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 1 of 3 attempts

**1** Answers are displayed within the problem

## Discussion

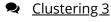
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2	<u>Manhattan distance</u>	
	Whenever we're asked to use I1 norm, or manhattan distance, shall we always assume to sum the coordinates but never take the sqrt()?	1
?	Clustering 1  I'd like to discuss Clustering 1 before moving to the final exam. Initially I input (-5,2) as the center of the first cluster. Then I got correct cluster me	3
?	[Staff] How to update cluster center in K-medoids  Hi Staff, Could you please explain how the cluster center has to be update in K-medoids?. I can't find an example in internet, just "PAM Algortihm	3
2	Closed again before deadline? [STAFF]  Hey there We got an update email saying that lectures 14-16 would be open until 11:59 UTC today, but now they closed earlier again? Could we g	4
?	L1 norm and L2 norm?  I am a bit confused about clustering questions. In the lecture we talked about the different similarity functions, but we never talked about I1 or I2	4
2	My certificate is officially mine!  I'm a little sad that I rushed to get it with homework problems (because they're worth more than lecture exercises) instead of finishing the last tw	11
?	[staff] Lecture 13-16 Extension not reflected  Hi, I received e-mail from you that the deadline of unit 4 has been be extended for 1 day including Lecture 13-16. But the deadline for lecture 13	3
<b>∀</b>	Extension for this homework by 1 day please!!!  could you give us an extension by 1 day for this homework, please?	58
<b>∀</b>	Grader 1 and 3 bug?  My answers in Q1 and Q3 of class members are green, but both centers are red. Is it possible? In Q2 everything is green.	12

KMeans/KMedoid with L1/L2 distance on a dataset

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