Assignment_06

Wednesday, October 6, 2021 6:26 PM

Assignmen...

Homework Assignment 6 [30 points]

STAT430 Unsupervised Learning - Fall 2021

Due: Friday, October 8 on Compass at 11:59pm CST.

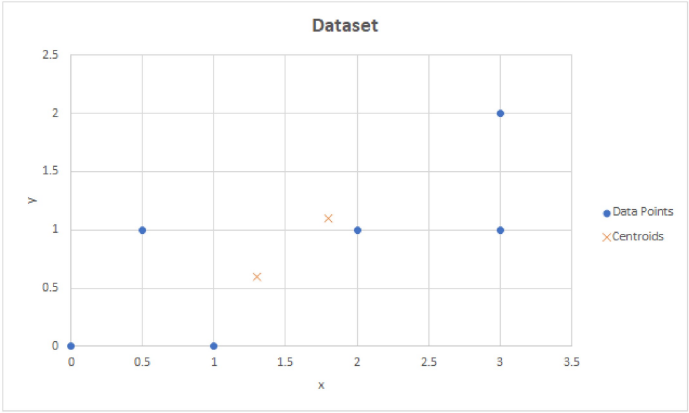
Problem	Points
1	0.5
2.1	0.25
2.2	2
2.3	1.5
2.4	1
3.1	1
3.2	3
4	0.5
5.1	0.75
5.2	0.75
5.3	0.75
5.4	0.75
5.5	1
6.1	1.5
6.2	2
6.3	0.5
6.4	1
6.5	1.5
6.6	0.75
6.7	0.5
6.8	1
6.9	0.75
6.1	1
6.11	1
6.12	1.5
6.13	0.5
7	2.5

Questions #1-#6: Answer the questions in the jupyter notebook.

Question #7:

We would like to cluster the dataset below using Fuzzy c-Means using $c = 2$ clusters and $p = 3$. The *current* centroids for the two cluster are (1.3, 0.6) and (1.8, 1.1). In the second table below, we have provided the squared distance that each object is to each of the *current* centroids. Determine what the *new* centroids will be in the next iteration of the algorithm. Show your work.

	Dataset	
	x	y
Object 1	0	0
Object 2	1	0
Object 3	0.5	1
Object 4	3	1
Object 5	3	2
Object 6	2	1



$$w_{ik} = \frac{\left(\frac{1}{dist.(x_i, c_k)^2}\right)^{\frac{1}{p-1}}}{\sum_{j=1}^{k}\left(\frac{1}{dist.(x_i, c_j)^2}\right)^{\frac{1}{p-1}}}$$

	Additional Information	
	Squared Distance to Centroid 1 (1.3, 0.6)	Squared Distance to Centroid 12 (1.8, 1.1)
Object 1	2.05	4.45
Object 2	0.45	1.85
Object 3	0.8	1.7
Object 4	3.05	1.45
Object 5	4.85	2.25
Object 6	0.65	0.05

Object	Cluster 1 Membership Scores	Cluster 2 Membership Scores	x	y	Centroid 1 W1*x, W1*y		Centroid 2 W2*x, W2*y	
Object 1	0.761804184	0.238195816	0	0	0	0	0	0
Object 2	0.892883588	0.107116412	1	0	0.893	0	0.107	0
Object 3	0.755960256	0.244039744	0.5	1	0.378	0.756	0.122	0.244
Object 4	0.246871659	0.753128341	3	1	0.741	0.247	2.259	0.753
Object 5	0.240110694	0.759889306	3	2	0.72	0.48	2.28	1.52
Object 6	0.020888965	0.979111035	2	1	0.042	0.021	1.958	0.979
Sum	**2.918519344**	**3.081480656**			**2.774**	**1.504**	**6.726**	**3.496**
					C1		**C2**	
					0.95	0.515	2.183	1.135