Indian Institute of Technology Indore

Discipline of Computer Science & Engineering

CS 403/603 Machine Learning

Lab Assignment - Fuzzy C-Means Clustering Algorithm

Some general instructions:

- Plagiarism in any form will not be tolerated.
- You are not allowed to use in-built libraries related to the topic. Code everything from scratch.
- You are allowed to do only one submission before the deadline. However, in the case of multiple submissions, only the last submitted file will be used for evaluation.
- Submission of the assignment should be made using the Google Classroom platform only.
- In case of any doubts/queries in this assignment, feel free to contact Ms Preeti Jha (Aruna Mam's Scholar) over email.
- Last date for submission of the assignment: **10th Nov 2021**

Problem 1:

Use the following dataset and apply FCM Clustering Algorithm as discussed in the tutorial. Report the accuracy.

- ***Input:*** Number of Objects = 6 Number of clusters = 2

X	Y	C1	C2
1	6	0.8	0.2
2	5	0.9	0.1
3	8	0.7	0.3
4	4	0.3	0.7
5	7	0.5	0.5
6	9	0.2	0.8

Problem 2:

Apply FCM Clustering Algorithm by following the mentioned steps:

1) Load modules and training data from sklearn import datasets
   In this case (wine dataset): from sklearn.datasets import load_wine
2) Define parameters
   Number of Clusters
   k = 5
   Maximum number of iterations
   MAX_ITER = 100
   Number of data points
   n = len(df)

Fuzzy parameter
m = 1.7 #Select a value greater than 1 else it will be crisp clustering

3) Scatter Plots
4) Initialize membership matrix
5) Calculate Cluster Center
6) Update Membership Value
7) Fuzzy C-Means with cluster centres
    i. at origin (When the initialization is at the origin all points converge into one cluster and for the other 2 cases we get the clusters as we have initialized before)
    ii. at random locations within a multi-variate Gaussian distribution with zero-mean and unit variance.
    iii. at random vectors chosen from the data.
8) Calculate the Accuracy
9) Plot Data

Results:

Attach your code file and include a single write-up (pdf) file which includes a brief description explaining what you did. Include any observations and/or plots required by the question in this single write-up file.