University of Central Punjab

Faculty of Information Technology

Introduction to Data Science

Assignment # 4 – Affinity Propagation

Instructions:

1 - Complete the following tasks in a single Jupyter Notebook with .ipynb extension. Use separate cells for separate tasks. Zip the file and then upload it on the portal.

2 The title of the file should be your rollnumber and name.

3 - Deadline of this assignment is January 30, 2022 11:00 pm.

Question 01:

For the following table, implement Affinity Propagation algorithm on python without using sklearn library.

Table 1: Preferences of Five Participants

Participant	Tax Rate	Fee	Interest Rate	Quantity Limit	Price Limit
Alice	3	4	3	2	1
Bob	4	3	5	1	1
Cary	3	5	3	3	3
Doug	2	1	3	3	2
Edna	1	1	3	2	3

a) Calculate and save the contents of similarity matrix in a numpy array called similarity_matrix and display its contents.

5 marks

b) Calculate and save the contents of the responsibility matrix in a numpy array called responsibility_matrix and display its contents.

5 marks

c) Calculate and save the contents of diagonal and non-diagonal values of the availability matrix in a numpy array called availability_matrix and display its contents.

5 marks

d) Calculate and save the contents of criterion matrix in a numpy array called criterion_matrix and display its contents.

5 marks

e) Based on the clusters' labels formed in criterion_matrix values, display the clusters using a plot.

5 marks

Question 02)

For the attached Mall_Customers.csv file, implement the Affinity Propagation algorithm without using sklearn library.

a) Calculate and save the contents of similarity matrix in a numpy array called similarity_matrix_customers and display its contents.

5 marks

b) Calculate and save the contents of the responsibility matrix in a numpy array called responsibility_matrix_customers and display its contents.

5 marks

c) Calculate and save the contents of diagonal and non-diagonal values of the availability matrix in a numpy array called availability_matrix_customers and display its contents.

5 marks

d) Calculate and save the contents of criterion matrix in a numpy array called criterion_matrix_customers and display its contents.

5 marks

e) Based on the clusters' labels formed in criterion_matrix_customers values, display the clusters using a plot.

5 marks