International Islamic University Chittagong
Department of Computer Science & Engineering
Final Examination Autumn-2018
Course Code: CSE-4877 Course Name: Machine Learning and Data Mining
Marks: 50 Time: 2.5 Hours

[Answer any ***two*** questions from **Group-A** and any ***three*** questions from **Group-B;**
Separate answer script must be used for Group-A and Group-B]

Group A

1.a What do you mean by Data Warehouse? Do you think if you have proper database, still you need data warehouse? Justify your answer. 5

b Consider about Agora Super Shop. Based on "Agora" develop and draw a sample data cube. 4

c Why do we need data mart? 1

2.a Present the strength and weakness of k-medoids in comparison with the k-means algorithm. 3

b Suppose that the machine learning task is to cluster the following six points (with (x,y) representing location) into three clusters: 7

A1(2,10), A2(2,5), B1(5,8), B2(8,5), C1(4,9), C2(3,2).

The distance function is Manhattan distance. Suppose initially we assign A1, B1, and C1 as the center of each cluster, respectively. Use k-means algorithm to produce proper clusters, step by step.

3. a Briefly discuss the polynomial regression model with necessary equation and figure. 3

b Explain the working procedure of K- Nearest Neighbors (KNN) algorithm. 3

c Calculate accuracy, precision, recall, and F-measure for the above Confusion Matrix. 4

		Predicted	
		0	**1**
Actual	**0**	**1000**	**200**
	1	**20**	**80**

Group B

4. a Let's consider a scenario that we have data on 1000 pieces of different fruits. The fruits are Banana, Orange or some other fruits and imagine it's given 3 features of each fruit in the following table. 8

Fruit	Long	Sweet	Yellow	Total
Banana	400	350	450	500
Orange	0	150	300	300
Other	100	150	50	200
Total	500	650	800	1000

Consider, you are given an additional fruit, Now from the given table, you have to find how the probability of the given additional fruit is banana or orange or other fruit if it's long, sweet and yellow?

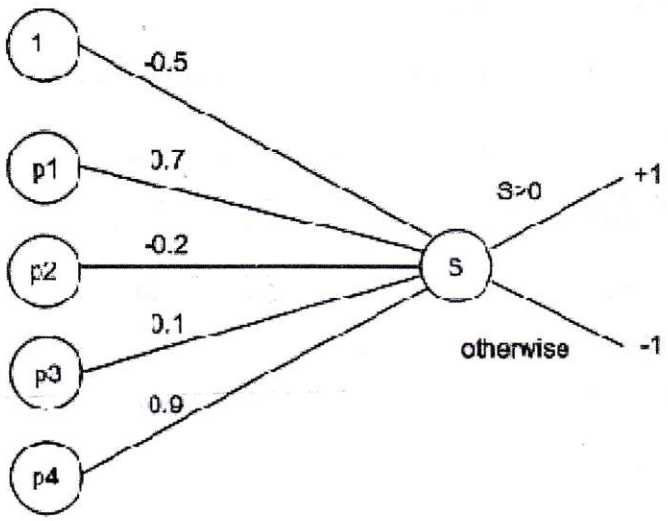
b Why the theorem is called Naïve Bayes Theorem? What are the conditions in theorem? 2

5.a Explain the key difference of Support Vector Machine (SVM) with other classification algorithms. 3

b Suppose we are given the following positively labeled data points in 2D space: {(3,1), (3,-1), (6,1), (6,-1)} and the following negatively labeled data points in 2D space: {(1,0), (0,1), (0,-1), (-1,0)}. In addition, three support vectors are {(1,0), (3,1), (3,-1),} Apply Support Vector Machine to classify data objects (2,1). 7

6 a Write the names of the different types of neural network architecture. Why we use learning rate in back propagation algorithm? 3

b Suppose we have following network with learning rate 0.25, and p1= -1, p2= 1, p3= 1, p4= -1. Initially for this network, output would be -1, but it should be 1. Train the network twice to adjust weight, and for desire output. 7



7 Write short notes on (any four) 10

I. Elbow method
II. Fact-Constellation schema
III. Decision Tree
IV. Information Entropy
V. Reinforcement learning