

JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -3 EXAMINATION- 2023

B.Tech-VI Semester (CSE/IT)

COURSE CODE (CREDITS): 18B1WCI634 (2)

MAX. MARKS: 35

COURSE NAME: Machine Learning

MAX. TIME: 2 Hours

COURSE INSTRUCTORS: Dr. Yugal Kumar, Dr. Abhilasha Sharma & Dr. Vipul Sharma

Note: All questions are compulsory. Marks are indicated against each question in square brackets.

- Q1 CO-3 a. For the given dataset and a new instance = (Red, SUV, Domestic), find out whether it will be stolen or not using Naïve Bayes classifier. [5,2]

Instance	Colour	Type	Origin	Stolen
1	Red	Racing	Domestic	Yes
2	Red	Racing	Domestic	No
3	Red	Racing	Domestic	Yes
4	Yellow	Racing	Domestic	No
5	Yellow	Racing	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Racing	Imported	Yes

- b. What is cosine similarity and how is it related to cosine distance?

- Q2 CO-4 a. Give geometric intuition behind gradient descent algorithm? What will happen if learning rate is too high or too low? [5,2]

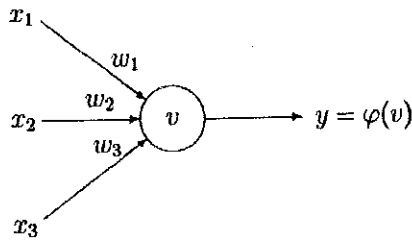
- b. What is vanishing gradient problem? Which activation function can be used to solve it?

- Q3 CO-2 a. Consider the following 8 data points with (x, y) representing locations. Use k-means clustering algorithm to group these into three clusters. A1(2, 10), A2(2, 6), A3(11, 11), A4(6, 9), A5(6, 4), A6(1, 2), A7(5, 10), A8(4, 9). Use L1 norm to compute the distance. Initial cluster centers are A1, A4 and A7. [5,2]

- b. What is a dendrogram? How can we measure the goodness of clusters in hierarchical clustering algorithm?

[P.T.O]

- Q4 CO-5 a. Consider the following diagram of a single artificial neuron. The node has three inputs $x = (x_1, x_2, x_3)$ that receive only integers. [5,2]



Suppose that the weights corresponding to the three inputs have the values $w_1 = 5$, $w_2 = -6$ and $w_3 = 3$ and the activation of the unit is sigmoid function.

Calculate the output value y of the unit for each of the following input patterns.

Pattern	P1	P2	P3	P4	P5
x_1	1	2	3	4	8
x_2	4	3	2	1	9
x_3	1	2	3	4	10

- b. What will happen if learning rate is kept same while training a neural network? How will you solve the problem that arises because of it?
- Q5 CO-1 a. How will you represent a perceptron as a linear regression model? Write down the optimization problem to represent it and mention the steps needed to solve it. [5,2]
- b. What is the difference between clustering and regression?