JAYPEE UNIVERSITY OF INFORMATION TECHNOLOGY, WAKNAGHAT

TEST -1 EXAMINATION- 2024

M.Tech-I Semester (CSE)

COURSE CODE(CREDITS): 13M1WCI331   MAX. MARKS: 15

COURSE NAME: Machine Learning

COURSE INSTRUCTORS: HRI   MAX. TIME: 1 Hour

Note: (a)All questions are compulsory.

(b)Marks are indicated against each question in square brackets.

(c) The candidate is allowed to make Suitable numeric assumptions wherever required for solving problems

(d) Calculator is allowed.

Q1. Given X=[1,2,3,4], and Y=[1.5, 2, 2.5, 5]. If we start with b=0.5 and w=0.5, compute b and w after the first iteration if the learning rate is 0.23. **[CO1][05 Marks]**

Q2. The price of a house y: price ($ 1000) is a function of x_1: Size(feet) and x_2:Number of bed rooms. The x_1 ranges from 300 to 2000 and x_2 ranges from 0 to 5. It is found that the following linear regression best fits to the dataset **[CO1][2x2=04 Marks]**

$f(x) = w_1x_1+w_2x_2+b$; where w_1=0.1, w_2=50, and b=50

Draw scatter plot between x_1 and x_2; contour plot between w_1 and w_2; and convergence path of cost function when gradient descent is applied to

  (a) the described ranges of x_1 and x_2,
  (b) when x_1 and x_2 are normalized in the range 0-1

Q3. Assume a dataset on $x(x_1,x_2,x_3...,x_n)$ as independent parameters and actual output 'y' for 'm' observations. Derive the gradient descent parameters update for logistic regression model for $f=g(z)=\frac{1}{1+e^{-z}}$, where z = wx+b. **[CO1][04 Marks]**

Q4. Describe the impact of bias and variance on underfit and overfit of a linear regression model. How can a generalized model be obtained? **[CO1][03 Marks]**