



Sardar Patel Institute of Technology

Bhavan's Campus, Munshi Nagar, Andheri (West), Mumbai-400058, India

(Autonomous College Affiliated to University of Mumbai)

End Semester Examination- Make up

Max. Marks: 60

Class: M.TECH

Course Code: ETE91C

Subject: Machine Learning and Artificial Intelligence

Duration: 3 Hr.

Semester: I

Date: 09/01/2020

Time: 10 - 1 pm

Instructions:

- (1) All questions are compulsory
- (3) Use of scientific calculator is allowed
- (2) Assume any necessary data but justify the same.

| Q No. | Questions | Max. Marks | CO-BL | | | | | | | | | | | | | | |
|----------------|---|------------|--------|----|---|---|----------------|----|----|----|----|----------------|---|---|---|---|----|
| Q.1 | A) State how accuracy is calculated from a confusion matrix. | 03 | CO1-L1 | | | | | | | | | | | | | | |
| | B) Distinguish between discriminative and generative algorithm with examples. | 04 | CO1-L4 | | | | | | | | | | | | | | |
| | C) Describe the steps of Candidate Elimination algorithm. | 05 | CO1-L2 | | | | | | | | | | | | | | |
| Q.2 | A) Sketch a flowchart to implement a genetic algorithm. | 2 | CO4-L3 | | | | | | | | | | | | | | |
| | B) Identify the items to be put in a bag with a capacity of 10 kg to maximize the profit 'v'. The items are indivisible. Use dynamic programming to solve the problem. <table><tr><td>i</td><td>1</td><td>2</td><td>3</td><td>4</td></tr><tr><td>v_i</td><td>10</td><td>40</td><td>30</td><td>50</td></tr><tr><td>w_i</td><td>5</td><td>4</td><td>6</td><td>3</td></tr></table> | i | 1 | 2 | 3 | 4 | v _i | 10 | 40 | 30 | 50 | w _i | 5 | 4 | 6 | 3 | 10 |
| i | 1 | 2 | 3 | 4 | | | | | | | | | | | | | |
| v _i | 10 | 40 | 30 | 50 | | | | | | | | | | | | | |
| w _i | 5 | 4 | 6 | 3 | | | | | | | | | | | | | |
| Q.3 | Using back-propagation algorithm, calculate the new weights after 1 epoch for the following network. For the input pattern [1 4 5], the target output is [0.1 0.05]. Use learning rate 0.01 and unipolar sigmoid activation function. <pre>graph LR x1((x1)) -- "W1=0.1" --> h1((h1)) x1 -- "W2=0.2" --> h2((h2)) x2((x2)) -- "W3=0.3" --> h1 x2 -- "W4=0.4" --> h2 x3((x3)) -- "W5=0.5" --> h1 x3 -- "W6=0.6" --> h2 h1 -- "W7=0.7" --> o1((o1)) h1 -- "W8=0.8" --> o2((o2)) h2 -- "W9=0.9" --> o1 h2 -- "W10=0.1" --> o2 b1((1)) -- "b1=0.5" --> h1 b2((1)) -- "b2=0.5" --> h2</pre> | 12 | CO4-L3 | | | | | | | | | | | | | | |

| | | | |
|-----|--|----------|------------------|
| Q.4 | A) i) List down the types of learning with examples. ii) Describe the steps of designing a machine learning problem for a robot to learn how to answer to a set of questions asked. | 02 10 | CO2-L1 CO2-L2 |
| | OR | | |
| | B) Group the following data using single link hierarchical clustering algorithm. Use Euclidean distance to form distance matrix and draw a dendrogram. | 12 | CO2-L4 |

| Student_ID | Marks |
|------------|-------|
| 1 | 10 |
| 2 | 7 |
| 3 | 28 |
| 4 | 20 |
| 5 | 35 |

Q.5 B) Classify the test case using Naive Bayes classification algorithm. 12 CO2-L4

| chills | runny nose | headache | fever | flu? |
|--------|------------|----------|-------|------|
| Y | N | Mild | Y | N |
| Y | Y | No | N | Y |
| Y | N | Strong | Y | Y |
| N | Y | Mild | Y | Y |
| N | N | No | N | N |
| N | Y | Strong | Y | Y |
| N | Y | Strong | N | N |
| Y | Y | Mild | Y | Y |

Figure 1: Training data set. Y = yes, N = no

| chills | runny nose | headache | fever | flu? |
|--------|------------|----------|-------|------|
| Y | N | Mild | N | ? |

Figure 2: Test case