

## Manipal Institute of Technology, MAHE, Manipal II semester MTech (Computer Science and Engineering) End Semester Examination, May 2024 Subject: PE-I Advanced Machine Learning (CSE5401) (5/5/24)

## Time: 3 Hours (9.30 am - 12.30 pm)

Note:

- Answer ALL Questions.
- Missing data may be suitable assumed.
- Mathematical equations and notations are to be properly explained.

## Qn Questions Marks

no.

- 1 A Let X is the set of all points (x, y) in a plane and H= {h a, b, c (x, y) =1
  3M if ax +by +c>0 and 0 otherwise, where a, b, c are real numbers. Prove the VCD(H) is 3.
- 1 B Consider the following dataset.

Person	Х	Y
1	2	10
2	4	20
3	6	25
4	8	30

Predict slope and intercept using linear regression and construct the best fit line.

- 1 C Discuss the necessity of dimensionality reduction in machine learning and 3 M discuss any one dimensionality reduction technique steps.
- 2 A Cluster the following 6 points with (x, y) representing locations) into 2
  4M clusters: (1,1), (2,1), (2,3), (3,2), (4,3), (5,5). Use Euclidean distance and Initial cluster centres are (2,1) and (2,3). Apply K-Means Algorithm and predict the two cluster centres after the "first iteration".
- 2 B Determine the output Y of a three-input neuron with bias. The input feature 3M vector is (x1, x2, x3) = (0.8, 0.6, 0.4) and weight values are [w1, w2, w3, b] = [0.2, 0.1, -0.3, 0.35]. use binary sigmoid function and bipolar sigmoid as activation functions.

4 M

Max. Marks: 50

2 C	2 C Compare filter method and wrapper methods with neat diagram.	
3 A	Elaborate RNN and ANN With neat diagram.	3M

3 B Assume that neuron have a sigmoid activation function, perform forward 5M pass and backward pass on the network. Assume that the actual output of Y is 0.5 and learning rate is 1. Calculate the error after the forward pass.



- 3 C Compare Single linkage and Complete Linkage clustering methods. 2M
- 4 A Consider the training data in the following table where play is the class 5M attribute.

Humidity	Sunny	Wind	Play
Low	No	Strong	No
High	No	Weak	Yes
High	Yes	Strong	Yes
High	No	Weak	Yes
low	Yes	Strong	No

Predict the class label (Yes or No) for the following day "Humidity=Low, Sunny=No, Wind=Weak" according to Naïve bayes classification.

4 B Compare batch gradient and stochastic gradient descend method.

- 4 C Discuss the steps of LDA.
- 5 A Consider the following set of training data, find which attribute must be 5M selected as root node and construct the tree based on decision tree algorithm.

ID	Credit_History	Salary	Property	Loan_Status
1	medium	high	no	no
2	medium	high	yes	no
3	high	high	no	yes
4	low	medium	no	yes
5	low	low	no	yes
6	low	low	yes	no
7	high	low	yes	yes
8	medium	medium	no	no
9	medium	low	no	yes
10	low	medium	no	yes
11	medium	medium	yes	yes
12	high	medium	yes	yes
13	high	high	no	yes
14	low	medium	yes	no

5 B Given the data in Table, Using PCA compute the covariance matrix.

Features	Sample 1	Sample 2	Sample 3	Sample 4
X1	2	1	0	-1
X2	4	3	1	0.5

5 C Discuss the different operations of CNN.

2M

3M