QP Code: R22A31AI011F

R22

Anurag University

B Tech III Year I -Semester End Examinations, Oct/Nov-2024
Course: Essentials of Machine Learning
(Common to AI & AIML)

Time: 10 AM to 12.30 PM **Max Marks: 50**

Section – A (Short answer type questions)

- **Answer all questions:** **(5 x 2 =10 Marks)**

1. What is Overfitting and Underfitting in Machine Learning?
2. List any two performance evaluation metrics of classification and regression models?
3. What is the difference between supervised and unsupervised Machine learning?
4. What do you mean by ensemble learning and what types of ensemble learning exist?
5. What are the different phases in back propagation?

Section—B (Essay answer type questions)

- **Answer all questions** **(5 x 8 =40 Marks)**

6. A) Explain the bias-variance tradeoff in machine learning? Additionally, how does this concept relate to model underfitting and overfitting?

OR

B) In a study to predict heart disease in a group of patients using a classification model, the following results were obtained:
a. Correct predictions – 20 positive (heart disease), 80 negative (no heart disease)
b. Incorrect predictions – 5 positive (heart disease), 10 negative (no heart disease)
Calculate the error rate, accuracy, sensitivity, precision, and F-measure of the model.

7. A) Consider the following 2D dataset with two features (Feature 1 and Feature 2) and three classes (A, B, and C):

Point	Feature 1	Feature 2	Class
1	2	3	A
2	3	3	A
3	6	5	B
4	7	8	B
5	5	4	C
6	3	1	C

classify a new point: (4, 5) using K-NN algorithm by considering K=3. If there is a tie among the classes then find the next higher value of K for which there is a decisive outcome.

OR

B) Perform Decision Tree Algorithm on the given synthetic dataset using Information Gain. (16 Records are given in the dataset).

No	Attr_1	Attr_2	Attr_3	Label
1	A	C	G	L1
2	A	C	H	L1
3	A	D	G	L1
4	A	D	H	L1
5	A	C	G	L2
6	A	C	H	L2
7	A	D	G	L2
8	A	D	H	L2
9	B	C	G	L1
10	B	C	H	L1
11	B	D	G	L1
12	B	D	H	L1
13	B	C	G	L2
14	B	C	H	L2
15	B	D	G	L2
16	B	D	H	L2

8. A) What is clustering? Explain K-Means clustering with suitable example.

OR

B) Explain about Hierarchical clustering algorithms with suitable examples.

9. A) Classify the instance [Red, SUV, Domestic] using bayesian classification method. (10 Records are given in the dataset. It consists of vehicle features such as Color, Vehicle Type and Build inside the country or Imported. The Output category is Stolen or Not).

No	COLOUR	TYPE	ORIGIN	STOLEN ?
1	Red	Sports	Domestic	Yes
2	Red	Sports	Domestic	No
3	Red	Sports	Domestic	Yes

4	Yellow	Sports	Domestic	No
5	Yellow	Sports	Imported	Yes
6	Yellow	SUV	Imported	No
7	Yellow	SUV	Imported	Yes
8	Yellow	SUV	Domestic	No
9	Red	SUV	Imported	No
10	Red	Sports	Imported	Yes

OR

B) Differentiate between Bagging and Boosting. Write the implementation steps for Bagging

10. A) What is an Artificial Neural Network? Explain architecture of artificial neural network. How is it differs to a biological neural network?

OR

B) Discuss the concept of activation function and list any three activation functions along with the equation and graphs.