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2811N847

Candidate's Seat No :_____

IM.Sc AIML Sem.-5 Examination

CC 304

Supervised Machine Learning

Time : 2-30 Hours] **November-2024** **[Max. Marks : 70**

Instructions: All questions are compulsory. Use of non-programmable scientific calculator is allowed.

Q.1 **(a)** Explain in detail : What is Artificial Intelligence? (07)

(b) Give the difference between Supervised and Unsupervised Machine Learning. (07)

OR

(a) Explain any five applications of Machine Learning. (07)

(b) What is Supervised Machine Learning? Explain with Example. (07)

Q.2 **(a)** What is Logistic Regression? Explain in detail. (07)

(b) What is Regularization? Explain types of regularization (07)

OR

(a) What is Classification? Explain in detail. (07)

(b) Using Naïve Bayes estimate the conditional probabilities of each attribute (color, legs, height, smelly) for the species classes ('M','H') using the data given in the table. (07)

Using these probabilities estimate the probability values for the new instance : (color = Green, legs = 2, Height = Tall, and smelly = No).

Conclude new instance belongs to which species?

Sr. No.	Color	Legs	Height	Smelly	Species
1	White	3	Short	Yes	M
2	Green	2	Tall	No	M
3	Green	3	Short	Yes	M
4	White	3	Short	Yes	M
5	Green	2	Short	No	H
6	White	2	Tall	No	H
7	White	2	Tall	No	H
8	White	2	Short	Yes	H

Q.3 **(a)** What is Gradient Descent? Explain in detail. (07)

(b) What is performance measurement? Explain four performance measurements. (07)

OR

(a) What is Over fitting and Under fitting ? Explain with appropriate example. (07)

(b) Explain in detail : Advantages & Disadvantages of AI. (07)

Q.4 **(a)** Explain in detail : CART algorithm (07)

(b) What is Random Forest? Explain detail. (07)

OR

(P.T.O)

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(a) What is Decision Tree? Explain in detail. What are the limitations of Decision Tree? (07)

(b) Consider the following dataset for a binary classification task involving animals: (07)

Animal	Color	Size	Endangered
Lion	Yellow	Large	No
Elephant	Grey	Large	Yes
Rabbit	White	Small	No
Tiger	Orange	Large	Yes
Fox	Red	Medium	No
Panda	Black	Medium	Yes
Parrot	Green	Small	No
Giraffe	Yellow	Large	No

1. Calculate the Gini impurity for the entire dataset.
2. Evaluate the potential split based on the "Color" feature and calculate the Gini impurity for the resulting subsets, along with the overall Gini impurity after the split.

Q.5 Attempt any **SEVEN** out of **TWELVE:** (14)

(1) Define: Confusion Matrix
(2) Explain : Overfitting & Underfitting
(3) What is Scaling of data?
(4) Explain: Elastic-Net Regression
(5) Define: Kernel trick
(6) What is hard margin classifier and soft margin classifier
(7) Explain the terminologies of SVM.
(8) What are the four assumptions of Linear Regression?
(9) What is Random Forest?
(10) Define : Bagging
(11) Define : Performance Measurement
(12) What is ID3 Algorithm?

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