PRESIDENCY UNIVERSITY

BENGALURU

School of Engineering

Mid - Term Examinations – Nov 2024

Semester: VII

Course Code: ECE3051

Course Name: ML and DL using FPGA

Program: B Tech ECE

Date: 05/11/2024

Time: 02:00pm – 03:30pm

Max Marks: 50

Weightage: 25%

Instructions:
 (i) Read all questions carefully and answer accordingly.
 (ii) Do not write anything on the question paper other than roll number.

Part A

Answer ALL the Questions. Each question carries 2marks.   **5QX2M=10M**

1	Compare the unsupervised learning with the reinforcement learning in Machine learning.	2 Marks	L3	CO1
2	Explain the posterior probability and prior probability in Naïve Bayes	2 Marks	L2	CO1
3	Distinguish between the Linear Regression and Logistic Regression.	2 Marks	L3	CO1
4	List the applications of the Decision Tree Algorithm with examples.	2 Marks	L1	CO2
5	Show the role of the K value in the KNN algorithm	2 Marks	L2	CO2

Part B

Answer ALL Questions. Each question carries 10 marks.   **4QX10M=40M**

6	6a	Illustrate the applications of machine learning algorithms	4 Marks	L2	CO1
	6b	List the applications of the KNN algorithm with examples.	6 Marks	L1	CO2

Or

7	7a	Demonstrate the Kernal Trick in Support Vector Machines	4 Marks	L3	CO1

| 7b | The data set sample for the KNN algorithm is given in Table 1. Solve for the decision of Tuhina Joseph, if her age is 5 assuming the value of K = 3. | 6 Marks | L3 | CO2 |

Table 1 Dataset for the KNN algorithm example with 2 attributes and 1 outcome

Sl. No	Name	Age	Gender	Game
1	Albert	32	Male	Football
2	Mark	40	Male	None
3	Louisa	16	Female	Cricket
4	Natasha	34	Female	Cricket
5	Stephen	55	Male	None
6	Robin	40	Male	Cricket
7	Angelina	20	Female	None
8	Smith	15	Male	Cricket
9	Marie	55	Female	Football
10	Michael	15	Male	Football

| 8a | Illustrate the advantages and disadvantages of the Support Vector Machine algorithm | 4 Marks | L2 | CO1 |

| 8b | A thief has been stealing luxury cars from an area for the past 2 years. An investigation has been initiated to identify the culprit regressively for the past 1 year. One day, a car owner from the same area complained about the missing of the car. The details of the car are: Color = Red; Type = SUV; Origin = Domestic. Using the Naïve Bayes algorithm, predict whether the thief has stolen the car or not. | 6 Marks | L3 | CO1 |

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Table 2 Dataset to predict whether the car is stolen or not using

Naïve Bayes Classifier

Sl. No	COLOR	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

| 9a | Develop the VHDL code for the following | 4 Marks | L3 | CO2 |

| 9b | Biologists have invented new species say M and N in their laboratories. They have started their investigations based on the parameters namely color, height, number of Legs, and smell. As of now, 10 numbers of species have been identified as either M or N category. What would be the decision for the 11th sample with the Color = Green; Leg = 2; Height = Tall; Smell = No? Use the Naïve Bayes Algorithm to predict. Z | 6 Marks | L3 | CO1 |
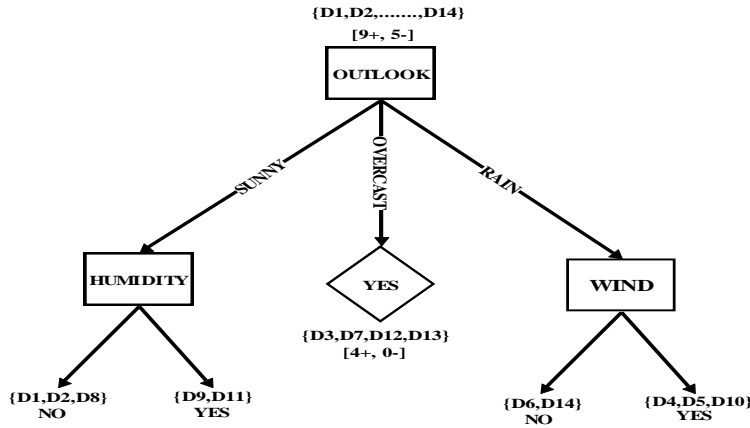
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Table 3 Dataset to predict the species using Naïve Bayes Classifier

Sl.No	Color	Legs	Height	Smell	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	N
6	White	2	Tall	No	N
7	White	2	Tall	No	N
8	White	2	Short	Yes	N

10	10a	Develop the VHDL Code for the 8 bit synchronous UP/ DOWN counter using the if else construct	4 Marks	L3	CO2
	10b	Solve the linear regression for the dataset as given in Table 4	6 Marks	L3	CO1

Table 4 Dataset two classes X and Y for linear regression

X	2	4	6	8	10	12	14	16
Y	1	3	5	7	9	11	13	?

Or

11	11a	Discuss the advantages and disadvantages of Logistic Regression	4 Marks	L2	CO1
	11b	Illustrate the steps involved in the development of the KNN algorithm with a suitable example.	6 Marks	L3	CO2

12	12a	Construct the VHDL code for the 3: 8 Decoder using the lower order design in Dataflow modeling with its test-bench	4 Marks	L3	CO2
	12b	Solve the linear regression for the dataset shown in Table 5	6 Marks	L3	CO1

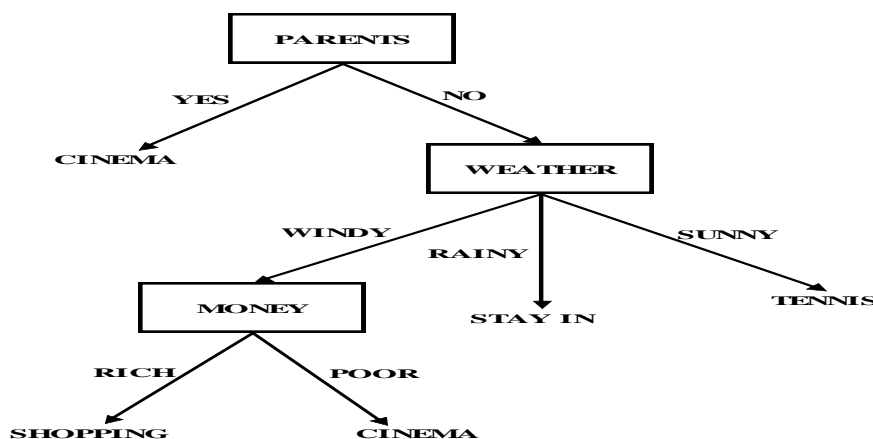*Table 5 Dataset two classes Age and Sugar Level for linear regression*

Sl.No	Age (X)	Sugar Level (Y)
1	43	99
2	21	65
3	25	79
4	42	75
5	57	87
6	59	81
7	55	?

Or

13	13a	Develop the VHDL code for the following	5 Marks	L3	CO2

13b From the given data-set in Table 6, find (x,y) = 57,170 whether 5 Marks L3 CO2 belongs to Under or Normal Weight

Table 6 Data set for weight categorization with 2 classes

Height (CM)	Weight (Kg)	Class
167	51	Underweight
182	62	Normal
176	69	Normal
173	64	Normal
172	65	Normal
174	56	Underweight
169	58	Normal
173	57	Normal
170	55	Normal
170	57	?