Consider the below Vue component.

```
<template>
  <div>
    <button @click="setDarkMode">Dark Mode</button>
    <button @click="setLightMode">Light Mode</button>
  </div>
</template>

<script>
export default {
  data() {
    return {
      theme: localStorage.getItem('theme') || 'light'
    };
  },
  methods: {
    setDarkMode() {
      this.theme = 'dark';
      localStorage.setItem('theme', 'dark');
    },
    setLightMode() {
      this.theme = 'light';
      localStorage.setItem('theme', 'light');
    }
  }
};
</script>
```

Which of the following statement(s) is/are correct about the behavior of the above component?

Options :

6406533459196. ✔ The theme will persist across page reloads because it is stored in localStorage.

6406533459197. ✖ If the user opens a new tab, the theme will reset to 'light' in that new tab.

6406533459198. ✖ The theme will reset to 'light' every time the page is refreshed.

6406533459199. ✔ The theme will be shared across all open tabs, as localStorage is accessible across tabs of the same origin.

MLT

Section Id :	64065373892
Section Number :	8
Section type :	Online
Mandatory or Optional :	Mandatory

Number of Questions :	11
Number of Questions to be attempted :	11
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653155082
Question Shuffling Allowed :	No

Question Number : 113 Question Id : 6406531021340 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING TECHNIQUES (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406533459224. ✔ YES

6406533459225. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653155083
Question Shuffling Allowed :	No

Question Id : 6406531021341 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (114 to 115)

Question Label : Comprehension

Kernel regression with a polynomial kernel is applied on the following dataset with two features:

$$X = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix}, \qquad y = [2, 1, 2]^T$$

Weight vector can be written as $w = \phi(X)\alpha$, where ϕ is the transformation mapping corresponding to the kernel $k(x_i, x_j) = (1 + x_i^T x_j)^2$. The vector α is given by $(K)^{-1}y$, where K is the kernel matrix.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 114 Question Id : 6406531021342 Question Type : MCQ
Correct Marks : 3

Question Label : Multiple Choice Question

Compute K.

Options :

6406533459226. ✖ $\begin{pmatrix} 1 & 1 & 1 \\ 1 & 4 & 1 \\ 4 & 1 & 1 \end{pmatrix}$

6406533459227. ✖ $\begin{pmatrix} 1 & 4 & 1 \\ 1 & 1 & 1 \\ 4 & 1 & 1 \end{pmatrix}$

6406533459228. ✖ $\begin{pmatrix} 4 & 4 & 1 \\ 1 & 1 & 1 \\ 4 & 1 & 1 \end{pmatrix}$

6406533459229. ✔ $\begin{pmatrix} 4 & 1 & 1 \\ 1 & 4 & 1 \\ 1 & 1 & 1 \end{pmatrix}$

Question Number : 115 Question Id : 6406531021343 Question Type : SA
Correct Marks : 4

Question Label : Short Answer Question

What will be the prediction for the data point $[1, -1]^T$? Enter the answer correct to two decimal places.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
2.31 to 2.35

Question Id : 6406531021358 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Question Numbers : (116 to 117)

Question Label : Comprehension

A binary classification dataset has 2000 data points belonging to $\{0, 1\}^2$. A Naive Bayes algorithm was run on the same dataset, resulting in the following estimates:

$$\hat{p}, \text{ estimate for } P(y = 1) = 0.4$$
$$\hat{p}_1^0, \text{ estimate for } P(f_1 = 1 \mid y = 0) = 0.25$$
$$\hat{p}_2^0, \text{ estimate for } P(f_2 = 1 \mid y = 0) = 0.35$$
$$\hat{p}_1^1, \text{ estimate for } P(f_1 = 1 \mid y = 1) = 0.15$$
$$\hat{p}_2^1, \text{ estimate for } P(f_2 = 1 \mid y = 1) = 0.05$$

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 116 Question Id : 6406531021359 Question Type : SA Correct Marks : 4

Question Label : Short Answer Question

What is the estimated value of $P(f_2 = 0 \mid y = 1)$? Write your answer correct to two decimal places.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range

Text Areas : PlainText
Possible Answers :
0.94 to 0.96

Question Number : 117 Question Id : 6406531021360 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

What will be the predicted label for the data point $[1, 0]$?

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0

Sub-Section Number :	3
Sub-Section Id :	640653155084
Question Shuffling Allowed :	Yes

Question Number : 118 Question Id : 6406531021348 Question Type : SA
Correct Marks : 4
Question Label : Short Answer Question

Consider the following dataset:

$$D = \{(1, 2), (2, 2), (0, 1)\}.$$

Assume that Leave one out cross validation is applied on this dataset and the model used is $y = w_0 + w_1 x$. Suppose $w = [w_0, w_1]^T$ be the weight obtained when $(2, 2)$ is used in the validation set. Then calculate $\|w\|_2^2$.

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
2

Question Number : 119 Question Id : 6406531021349 Question Type : SA
Correct Marks : 4

Question Label : Short Answer Question

Consider the following feature vectors in $\mathbb{R}^3$:

$$x_1 = \begin{bmatrix} 1 \\ 2 \\ 3 \end{bmatrix}, \quad x_2 = \begin{bmatrix} -1 \\ -2 \\ 0 \end{bmatrix}, \quad x_3 = \begin{bmatrix} 3 \\ 0 \\ 1 \end{bmatrix}, \quad x_4 = \begin{bmatrix} 0 \\ 1 \\ 4 \end{bmatrix}, \quad x_5 = \begin{bmatrix} 2 \\ -1 \\ -3 \end{bmatrix}$$

The labels of these points are:

$$y_1 = 0, \quad y_2 = 1, \quad y_3 = 1, \quad y_4 = 0, \quad y_5 = 1$$

If we use a k-NN algorithm with $k = 3$, what would be the predicted label for the following test point:

$$x_{test} = \begin{bmatrix} 1 \\ 1 \\ 2 \end{bmatrix}$$

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0

Question Number : 120 Question Id : 6406531021357 Question Type : SA
Correct Marks : 4
Question Label : Short Answer Question
Suppose you want to use a Naive Bayes classifier to predict whether a student will pass or fail an exam based on two features: the number of hours they studied and whether they attended review sessions. Assume that the features are conditionally independent given the exam outcome and that the variances of the study hours distributions are equal for both pass and fail categories.

How many parameters are required to classify a new student using this Naive Bayes classifier?
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
6

Sub-Section Number : 4
Sub-Section Id : 640653155085

Question Shuffling Allowed : Yes

Question Number : 121 Question Id : 6406531021350 Question Type : MSQ
Correct Marks : 4 Max. Selectable Options : 0
Question Label : Multiple Select Question
Select all true statements.
Options :

6406533459243. ✔ In Decision tree, if a question Q_1 is "better" than question Q_2, then information gains for Q_1 is greater than information gains Q_2 always.

6406533459244. ✖ The training dataset is not required while predicting the label of a test-point in the k-NN algorithm.

6406533459245. ✖ A question of the form $f_k \leq \theta$ always partitions the dataset into two non-empty sets.

6406533459246. ✔ The depth of the tree is a hyperparameter and has to be chosen using cross validation.

6406533459247. ✔ Decision trees are prone to underfit if the maximum depth is set too low.

Sub-Section Number : 5
Sub-Section Id : 640653155086
Question Shuffling Allowed : No

Question Id : 6406531021351 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (122 to 123)
Question Label : Comprehension
Consider a binary classification problem with a training dataset of 100 points, evenly distributed between two classes (50 points in each class). You decide to train a k-NN algorithm with k = 3. Each point is considered its own neighbor during classification.

Based on the above data, answer the given subquestions.
Sub questions

Question Number : 122 Question Id : 6406531021352 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question
What is the minimum number of misclassifications that can occur in the training dataset when using this k-NN algorithm?

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0

Question Number : 123 Question Id : 6406531021353 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
Assuming there are outliers, the decision boundary becomes smoother with decreasing value of *k* in a k-NN algorithm.
Options :
6406533459249. ✖ TRUE
6406533459250. ✔ FALSE

Sub-Section Number :	6
Sub-Section Id :	640653155087
Question Shuffling Allowed :	No

Question Id : 6406531021345 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (124 to 125)
Question Label : Comprehension
Consider the following linear regression model

$$y_i \mid x_i = w^T x_i + \epsilon_i,$$

where the noise $\epsilon \sim \text{Normal}(0, 1)$.

Based on the above data, answer the given subquestions.
Sub questions

Question Number : 124 Question Id : 6406531021346 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
For some $\lambda > 0$, where $\lambda \in \mathbb{R}$,
MSE of $\hat{w}_{ML}$ is greater than MSE of
$\hat{w}_{Ridge}$.
Options :
6406533459235. ✔ TRUE

6406533459236. ✖ FALSE

Question Number : 125 Question Id : 6406531021347 Question Type : MCQ
Correct Marks : 4
Question Label : Multiple Choice Question

Consider the Bayesian formulation of the linear regression problem, where the prior for w is assumed to be

$$w \sim \text{Laplace}(0, 2/\lambda).$$

Then, which among the following is true?

Hint: If $X \sim \text{Laplace}(\mu, b)$, then

$$f_X(x) = \frac{1}{2b} e^{-|x-\mu|}/b.$$

Options :

6406533459237. ✖ $\hat{w}_{MAP} = \arg\min_w \sum_{i=1}^{n} (w^T x_i - y_i)^2 + \lambda \|w\|_2^2$, where $\|w\|_2^2 = \sum_{i=1}^{d} w_i^2$

6406533459238. ✖ $\hat{w}_{MAP} = \arg\max_w \sum_{i=1}^{n} (w^T x_i - y_i)^2 + \lambda \|w\|_2^2$, where $\|w\|_2^2 = \sum_{i=1}^{d} w_i^2$

6406533459239. ✔ $\hat{w}_{MAP} = \arg\min_w \sum_{i=1}^{n} (w^T x_i - y_i)^2 + \lambda \|w\|_1$, where $\|w\|_1 = \sum_{i=1}^{d} | w_i |$

6406533459240. ✖ $\hat{w}_{MAP} = \arg\max_w \sum_{i=1}^{n} (w^T x_i - y_i)^2 + \lambda \|w\|_1$, where $\|w\|_1 = \sum_{i=1}^{d} | w_i |$

Question Id : 6406531021354 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (126 to 127)
Question Label : Comprehension

Consider a binary classification problem in which a decision tree is classifying data points into two classes, A and B. In a particular node of the tree, 60% of the data points belong to class A, while the remaining 40% belong to class B.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 126 Question Id : 6406531021355 Question Type : MCQ
Correct Marks : 2
Question Label : Multiple Choice Question
Do you have enough information to find the entropy of this node?
Options :
6406533459251. ✔ Yes
6406533459252. ✖ No

Question Number : 127 Question Id : 6406531021356 Question Type : SA
Correct Marks : 4
Question Label : Short Answer Question
If the answer to the previous question is ”Yes,” calculate the entropy of this node to three decimal places. If the answer to the previous question is ”No,” enter -1 as your answer.
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Range
Text Areas : PlainText
Possible Answers :
0.94 to 1.01

Sub-Section Number :	7
Sub-Section Id :	640653155088
Question Shuffling Allowed :	Yes

Question Number : 128 Question Id : 6406531021344 Question Type : MSQ
Correct Marks : 3 Max. Selectable Options : 0
Question Label : Multiple Select Question
Consider a linear regression model with loss $L(w) = \sum_{i=1}^{n}(w^T x_i - y_i)^2$, where x_i's are the d-dimensional training data points and y_i's are their corresponding labels. For the optimal weight vector w^*, which among the following is correct?
Options :
6406533459231. ✔ If we double all the values of y_i, w^* will also get doubled.
6406533459232. ✖ If we double all the values of y_i, w^* will get halved.
6406533459233. ✔ If we double all the values of x_i, w^* will get halved.
6406533459234. ✖

If we double all the values of x_i, w^* will also get doubled.

MLP

Section Id :	64065373893
Section Number :	9
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	22
Number of Questions to be attempted :	22
Section Marks :	50
Display Number Panel :	Yes
Section Negative Marks :	0
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	No
Section Maximum Duration :	0
Section Minimum Duration :	0
Section Time In :	Minutes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	640653155089
Question Shuffling Allowed :	No

Question Number : 129 Question Id : 6406531021361 Question Type : MCQ

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING PRACTICE (COMPUTER BASED EXAM)"

ARE YOU SURE YOU HAVE TO WRITE EXAM FOR THIS SUBJECT?
CROSS CHECK YOUR HALL TICKET TO CONFIRM THE SUBJECTS TO BE WRITTEN.

(IF IT IS NOT THE CORRECT SUBJECT, PLS CHECK THE SECTION AT THE TOP FOR THE SUBJECTS REGISTERED BY YOU)

Options :

6406533459257. ✔ YES

6406533459258. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	640653155090