6406531484826. ✖ The “actions” in a Vuex store should not be used for any asynchronous operations.

6406531484827. ✖ The “mutations” in a Vuex store should be used to perform asynchronous operations, if required.

6406531484828. ✔ All the components should use “this.$store” to access the properties of a Vuex store, instead of directly using the Vuex store object name.

Question Number : 185 Question Id : 640653445621 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2 Selectable Option : 0

Question Label : Multiple Select Question

Which of the following statements is/are true regarding Vuex?

Options :

6406531484829. ✖ A component which uses store state cannot have local state.

6406531484830. ✔ A component can have local state, even if it uses store state.

6406531484831. ✔ Getters in vuex is used to create derived state.

6406531484832. ✖ All of these

MLT

Section Id :	64065328985
Section Number :	11
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	17
Number of Questions to be attempted :	17
Section Marks :	100
Display Number Panel :	Yes
Group All Questions :	No

Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065363342
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 186 Question Id : 640653445629 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0

Question Label : Multiple Choice Question

THIS IS QUESTION PAPER FOR THE SUBJECT "DIPLOMA LEVEL : MACHINE LEARNING TECHNIQUES"

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 :

6406531484861. ✔ YES

6406531484862. ✖ NO

Sub-Section Number :	2
Sub-Section Id :	64065363343
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 187 Question Id : 640653445630 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 7

Question Label : Multiple Choice Question

Let X be the data matrix of shape (d, n) and y be the corresponding label vector. A linear regression model of the form $\hat{y}_i = w^T x_i$ is fit using the squared error on the same dataset. If the solution w^* to the optimization problem is orthogonal to the subspace spanned by the data points (columns of matrix X), what will be the squared error?

Options :

6406531484863. ✖ 0

6406531484864. ✖ 1

6406531484865. ✔ $||y||^2$

6406531484866. ✖ Insufficient information to answer

Sub-Section Number :	3
Sub-Section Id :	64065363344
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 188 Question Id : 640653445631 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Which of the following regression model will certainly achieve zero training error on a given training dataset where the error is defined as the sum of squared error? Assume that $x_i \in \mathbb{R}^d$ is the i^{th} data point and $y_i \in \mathbb{R}$ is the corresponding label.

Options :

6406531484867. ✖ $h(x_i) = \overline{y}\ \ \forall i$, where $\overline{y}$ is the average of all the labels.

6406531484868. ✖ $h(x_i) = w^T x_i\ \ \forall i$, where $w \in \mathbb{R}^d$

6406531484869. ✖ $h(x_i) = c$ where c is a constant.

6406531484870. ✔ $h(x_i) = y_i \ \forall i$

Question Number : 189 Question Id : 640653445632 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Let w^*, w^g, and w^{sg} be the weight vectors obtained using analytical, gradient descent, and stochastic gradient descent approaches, respectively, on the same linear regression model. The following expression holds true for these weight vectors:

$$||w^g - w^*|| < ||w^{sg} - w^*||$$

The model obtained by the analytical solution gives a training error of 0.5. Which of the following approaches is more likely to give less training error? Assume that the loss function is a convex function.

Options :

6406531484871. ✔ Gradient descent

6406531484872. ✖ Stochastic gradient descent

Question Number : 190 Question Id : 640653445633 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the following data set:

$X = [-3, 5, 4]$

$y = [-10, 20, 20]$

Assuming a ridge penalty $\lambda = 50$, what will be the value of $\frac{\hat{w}_{ridge}}{\hat{w}_{MLE}}$?

Here $\hat{w}_{ridge}$ and $\hat{w}_{MLE}$ are the Ridge and MLE estimates of the weight vectors, respectively.

Options :

6406531484873. ✖ 2

6406531484874. ✖ 1

6406531484875. ✖ 0.666

6406531484876. ✔ 0.5

6406531484877. ✖ 0.25

Question Number : 191 Question Id : 640653445634 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

Consider the following data $\{(x_1, y_1), (x_2, y_2), (x_3, y_3)\}$:

x	y
0	2
2	2
3	1

Assume that Leave one out cross validation is applied on this data.

Note: The model to be used is $y = w_0 + w_1 x$.

What will be the weights obtained when (x_2, y_2) is used in the validation set?

Options :

6406531484878. ✖ $\{w_0 : 4, w_1 : -1\}$

6406531484879. ✖ $\{w_0 : 2/5, w_1 : 0\}$

6406531484880. ✖ $\{w_0 : 4, w_1 : -2/5\}$

6406531484881. ✔ $\{w_0 : 2, w_1 : -1/3\}$

Question Number : 192 Question Id : 640653445636 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Multiple Choice Question

A Gaussian naive Bayes model is trained on a given dataset. For an unseen data point x, the following two values are calculated as

$$P(x|y=0) = 0.4$$
$$P(x|y=1) = 0.6$$

What will be the predicted label for x?

Options :

6406531484886. ✖ 0

6406531484887. ✖ 1

6406531484888. ✔ Insufficient information to make a prediction

Sub-Section Number :	4
Sub-Section Id :	64065363345
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 193 Question Id : 640653445635 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Multiple Choice Question

The training dataset for a binary classification problem has 100 points, 50 of which belong to class $+1$. Consider a k-NN algorithm with $k = 1$ that is used to predict the labels of the training data-points. A point is considered as its own neighbor. Based on this setup, study the following statements:

S1: The number of points that are **misclassified** by the classifier is zero.

S2: Since the training error is zero, we have found a very good classifier for this problem.

Options :

6406531484882. ✔ S1 is true but S2 is false

6406531484883. ✖ S1 is false but S2 is true

6406531484884. ✖ Both S1 and S2 are true

6406531484885. ✖ Both S1 and S2 are false

Sub-Section Number : 5

Sub-Section Id : 64065363346

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 194 Question Id : 640653445637 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

You know the distribution $P(X, y)$ for a given dataset $\{X, y\}$. Can you always find the distribution $P(y|X)$ for the same dataset $\{X, y\}$?

Options :

6406531484889. ✔ Yes

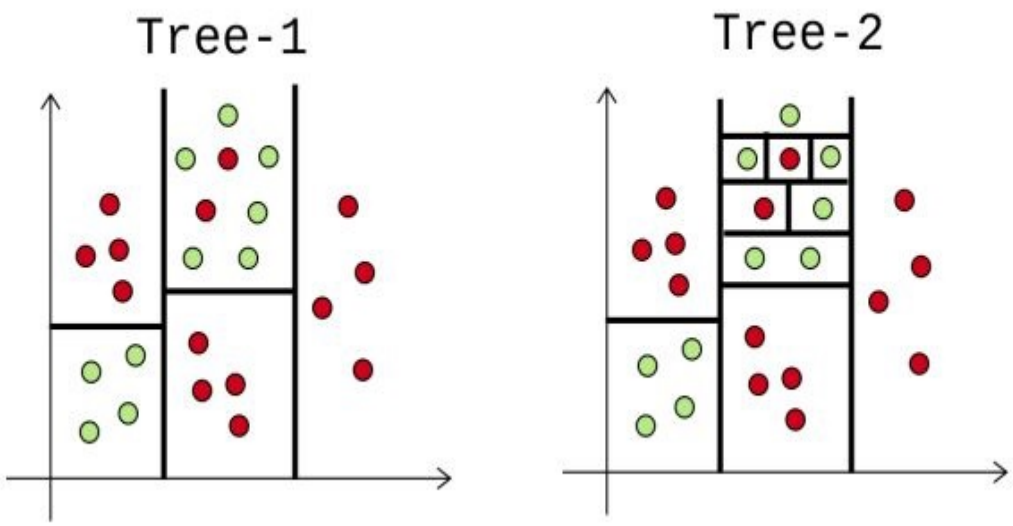
6406531484890. ✖ No

Question Number : 195 Question Id : 640653445643 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Multiple Choice Question

Consider a training dataset for a binary classification problem in $\mathbb{R}^2$. Two decision trees are trained on the same dataset. The decision regions obtained are plotted for both the trees:



Which of these two trees is likely to perform better on test data?

Options :

6406531484900. ✔ Tree-1

6406531484901. ✖ Tree-2

Sub-Section Number :	6
Sub-Section Id :	64065363347
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 196 Question Id : 640653445638 Question Type : MSQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5 Selectable Option : 0

Question Label : Multiple Select Question

Consider the following dataset for a binary classification problem in $\mathbb{R}^2$.

$$\mathbf{x}_1 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}, y_1 = +1 \qquad \mathbf{x}_2 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}, y_2 = +1$$

$$\mathbf{x}_3 = \begin{bmatrix} -1 \\ 0 \end{bmatrix}, y_3 = -1 \qquad \mathbf{x}_4 = \begin{bmatrix} 0 \\ -1 \end{bmatrix}, y_4 = -1$$

Choose all linear classifiers that result in zero misclassifications on this dataset. Here, $\mathbf{w}$ is the weight vector for the linear classifier.

Options :

6406531484891. ✔ $\mathbf{w} = \begin{bmatrix} 1 \\ 2 \end{bmatrix}$

6406531484892. ✔ $\mathbf{w} = \begin{bmatrix} 10 \\ 19 \end{bmatrix}$

6406531484893. ✖ $\mathbf{w} = \begin{bmatrix} -1 \\ -4 \end{bmatrix}$

6406531484894. ✖ $\mathbf{w} = \begin{bmatrix} -5 \\ 3 \end{bmatrix}$

6406531484895. ✖ $\mathbf{w} = \begin{bmatrix} 5 \\ -3 \end{bmatrix}$

Sub-Section Number :	7
Sub-Section Id :	64065363348
Question Shuffling Allowed :	Yes
Is Section Default? :	null

Question Number : 197 Question Id : 640653445639 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 7

Question Label : Short Answer Question

Kernel regression with a polynomial kernel of degree three is applied on a data set $\{X, y\}$. Let the weight vector be given by

$$w = \phi(X)[1.3, 0.6, -0.2, -0.7]^T$$

Here $\phi(X)$ is the transformed data matrix whose i^{th} column is $\phi(x_i)$. What will be the prediction for the data point $[0, 0, 0, 0]^T$?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

Sub-Section Number :	8
Sub-Section Id :	64065363349
Question Shuffling Allowed :	Yes
Is Section Default? :	null

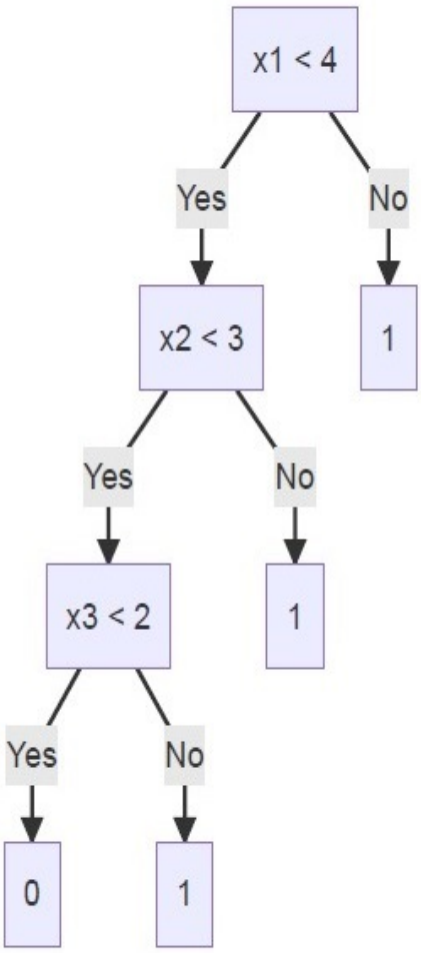
Question Number : 198 Question Id : 640653445640 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Short Answer Question

Consider a dataset in $\mathbb{R}^3$. Each data-point is represented by $\mathbf{x} = [x_1 \quad x_2 \quad x_3]^T$. The features in this problem are all positive. That is, $x_1, x_2, x_3 > 0$ for all data-points. Consider the following decision tree trained on this dataset. The features are represented without the subscript in the nodes: for example, x_1 is represented as $x1$.



Consider only those points for which x_1, x_2, and x_3 are all positive.

Let S be the set of all points in $\mathbb{R}^3$ that are predicted as 0 by this decision tree. What is the volume of the region S?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

24

Sub-Section Number :	9
Sub-Section Id :	64065363350
Question Shuffling Allowed :	Yes

Is Section Default? : null

Question Number : 199 Question Id : 640653445641 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 6

Question Label : Short Answer Question

Suppose you have a three-class classification problem where class label $y \in \{0, 1, 2\}$ and each training example x_i has 3 binary features $f_1, f_2, f_3 \in \{0, 1\}$. How many parameters do you need to know to classify an example using the Naive Bayes classifier?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

11

Sub-Section Number : 10

Sub-Section Id : 64065363351

Question Shuffling Allowed : Yes

Is Section Default? : null

Question Number : 200 Question Id : 640653445642 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 4

Question Label : Short Answer Question

Consider fitting a linear regression model (as stated below) for the following data:

x	y
-1	1
0	-1
2	1

Fit $y_i = \beta_0$. Find β_0.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.3 to 0.4

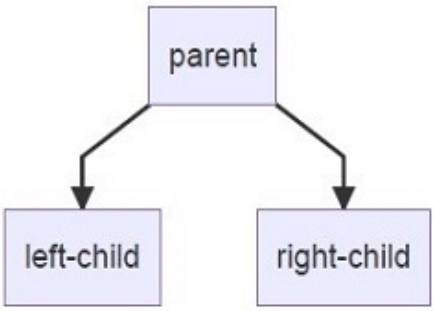
Sub-Section Number :	11
Sub-Section Id :	64065363352
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653445644 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (201 to 205)

Question Label : Comprehension

A decision stump is a decision tree that has exactly one question at the parent node (root) which then splits into two prediction nodes (leaves):



Consider a decision stump for a binary classification problem that has 500 data points at the parent node, out of which 200 data points go into the left child. The number of data points that belong to class 1 in the parent node is 300. The number of data points that belong to class 1 in the left child is 50. The labels are in $\{1, 0\}$.

Note for calculations: Use $\log_2$ for all calculations that involve logarithms. For all questions, enter your answer correct to three decimal places. Use three decimal places even while calculating intermediate quantities.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 201 Question Id : 640653445645 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 2

Question Label : Short Answer Question

What is the label assigned to the left child? Enter 1 or 0 .

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Question Number : 202 Question Id : 640653445646 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

What is the entropy of the parent?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.92 to 1

Question Number : 203 Question Id : 640653445647 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

What is the entropy of the left child?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.80 to 0.83

Question Number : 204 Question Id : 640653445648 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

What is the entropy of the right child?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.62 to 0.68

Question Number : 205 Question Id : 640653445649 Question Type : SA Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

What is the information gain corresponding to the question at the parent node?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Range

Text Areas : PlainText

Possible Answers :

0.21 to 0.29

Sub-Section Number :	12
Sub-Section Id :	64065363353
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Id : 640653445650 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Question Numbers : (206 to 207)

Question Label : Comprehension

Consider a naive Bayes model is trained on the following data matrix X of shape (d, n) and corresponding label vector y:

$$X = \begin{bmatrix} 1 & 0 & 0 & 0 \\ 0 & 1 & 0 & 0 \\ 0 & 1 & 1 & 0 \end{bmatrix} \quad y = [1 \;\; 0 \;\; 1 \;\; 0]^T$$

Assume that $\hat{p}$ and $\hat{p}_j^{y_i}$ are estimates for $P(y = 1)$ and $P(f_j = 1 | y = y_i)$, respectively. Here, $f_i;\ i = 1, 2, 3$ is the i^{th} feature. These parameters are estimated using MLE.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 206 Question Id : 640653445651 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 3

Question Label : Short Answer Question

What is the value of $\hat{p}_3^0$? Assume that no smoothing is done.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0.5

Question Number : 207 Question Id : 640653445652 Question Type : SA Calculator : None

Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 5

Question Label : Short Answer Question

What will be the predicted label for the point $[1 \;\; 0 \;\; 0]^T$? Assume that no smoothing is done.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1

MLP

Section Id :	64065328986
Section Number :	12
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
Group All Questions :	No
Enable Mark as Answered Mark for Review and Clear Response :	Yes
Maximum Instruction Time :	0
Sub-Section Number :	1
Sub-Section Id :	64065363354
Question Shuffling Allowed :	No
Is Section Default? :	null

Question Number : 208 Question Id : 640653445653 Question Type : MCQ Is Question Mandatory : No Calculator : None Response Time : N.A Think Time : N.A Minimum Instruction Time : 0

Correct Marks : 0