method ?

Options :

6406532867308. ✔ SGDClassifier

6406532867309. ✖ LinearRegression

6406532867310. ✔ Perceptron

6406532867311. ✖ SVC

Sub-Section Number :	7
Sub-Section Id :	640653126871
Question Shuffling Allowed :	Yes

Question Number : 144 Question Id : 640653852474 Question Type : MSQ

Correct Marks : 3 Max. Selectable Options : 0

Question Label : Multiple Select Question

Which of the following options are true for regularization parameter C in sklearn.svm.SVC ?

Options :

6406532867297. ✔ Large value of the regularization parameter C will overfit the training set and complex decision boundaries will form.

6406532867298. ✖ Large value of the regularization parameter C will underfit the training set and smooth decision boundaries will form.

6406532867299. ✖ Small value of the regularization parameter C will overfit the training set and complex decision boundaries will form.

6406532867300. ✔ Small value of the regularization parameter C will underfit the training set and smooth decision boundaries will form.

6406532867301. ✖ None of these

MLT

Section Id :	64065360931
Section Number :	9
Section type :	Online
Mandatory or Optional :	Mandatory
Number of Questions :	11
Number of Questions to be attempted :	11
Section Marks :	40
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 : 640653126872
Question Shuffling Allowed : No

Question Number : 145 Question Id : 640653852479 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 :
6406532867312. ✔ YES
6406532867313. ✖ NO

Sub-Section Number : 2
Sub-Section Id : 640653126873
Question Shuffling Allowed : Yes

Question Number : 146 Question Id : 640653852480 Question Type : MSQ
Correct Marks : 3 Max. Selectable Options : 0
Question Label : Multiple Select Question
Which of the following classifiers are certainly capable of achieving zero training error for any binary classification problem with features in $\mathbb{R}^2$? Note: while computing the training error for KNN, each data-point is its own neighbor.
Options :
6406532867314. ✔ Decision tree
6406532867315. ✔ KNN with $k = 1$
6406532867316. ✖ KNN with $k = 5$
6406532867317. ✖ Naive Bayes

Sub-Section Number : 3
Sub-Section Id : 640653126874

Question Shuffling Allowed : Yes

Question Number : 147 Question Id : 640653852481 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Consider the following training dataset for a linear regression problem with one feature:

x_i	y_i
1	1.2
−1	0.1
2	2.1
−2	−1

Find the value of w^*, the optimal weight. _____

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0.73

Question Number : 148 Question Id : 640653852482 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Consider the following dataset for a kernel regression problem with a polynomial kernel of degree two along with the coefficient vector $\boldsymbol{\alpha}$:

$$\mathbf{X} = \begin{bmatrix} 1 & 0 & -1 & 0 \\ 0 & 1 & 0 & -1 \end{bmatrix}, \mathbf{y} = \begin{bmatrix} 1 \\ -1 \\ 2 \\ -2 \end{bmatrix}, \boldsymbol{\alpha} = \begin{bmatrix} \alpha_1 \\ -0.625 \\ \alpha_3 \\ \alpha_4 \end{bmatrix}$$

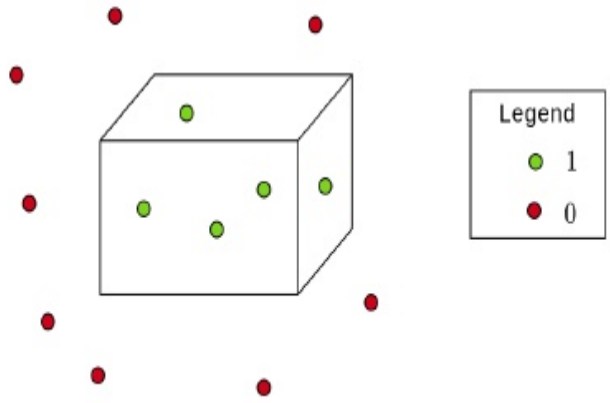
If the prediction for the data-point $\begin{bmatrix} 1 \\ 1 \end{bmatrix}$ is 0, find the value of α_1. _____

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

0.625

Question Number : 149 Question Id : 640653852483 Question Type : SA
Correct Marks : 3
Question Label : Short Answer Question

Consider the following decision boundary obtained for a decision tree trained on a dataset in $\mathbb{R}^3$ for a binary classification problem. All green points (label 1) lie inside the box and the red points (label 0) are outside it. What it is the minimum depth of this tree? Recall that the depth is the number of edges on the longest path from the root to a leaf. _____

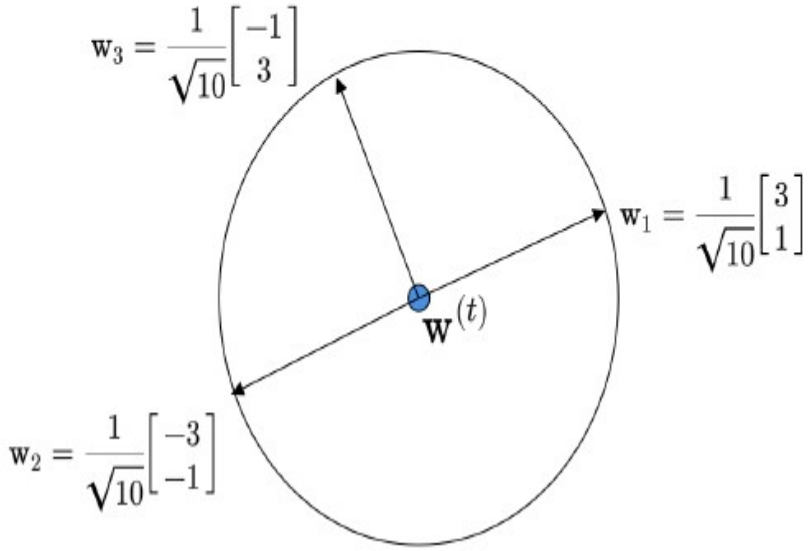


Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
6

Sub-Section Number :	4
Sub-Section Id :	640653126875
Question Shuffling Allowed :	No

Question Id : 640653852484 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (150 to 151)
Question Label : Comprehension

Consider a linear regression problem that has two features with a training dataset of 10,000 points. The blue point in the image below is the weight vector, $\mathbf{w}^{(t)}$, at some iteration of gradient descent. $\mathbf{w}_1, \mathbf{w}_2, \mathbf{w}_3$ are unit vectors. Specifically, $\mathbf{w}_1$ is a unit vector in the direction of the gradient at this point.



Based on the above data, answer the given subquestions.

Sub questions

Question Number : 150 Question Id : 640653852485 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question

If the next iteration of gradient descent is expressed as $\mathbf{w}^{(t+1)} = \mathbf{w}^{(t)} + \eta \mathbf{w}_k$ with $\eta > 0$, what would be the value of k? _____

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

Question Number : 151 Question Id : 640653852486 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question

If $\mathbf{w}^{(t)} = \begin{bmatrix} 0.4 \\ 0.1 \end{bmatrix}$ and $\eta = \frac{1}{\sqrt{10}}$, find $||\mathbf{w}^{(t+1)}||$,

where we use the usual L_2 norm. _____

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0.1

Sub-Section Number :	5
Sub-Section Id :	640653126876
Question Shuffling Allowed :	No

Question Id : 640653852487 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (152 to 153)
Question Label : Comprehension

A dataset for ridge regression has 1000 data-points. k-fold cross validation is performed to estimate the value of λ in ridge regression with $k = 4$. For a given value of λ:

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

Question Number : 152 Question Id : 640653852488 Question Type : SA
Correct Marks : 1.5
Question Label : Short Answer Question
How many models have to be trained?
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
4

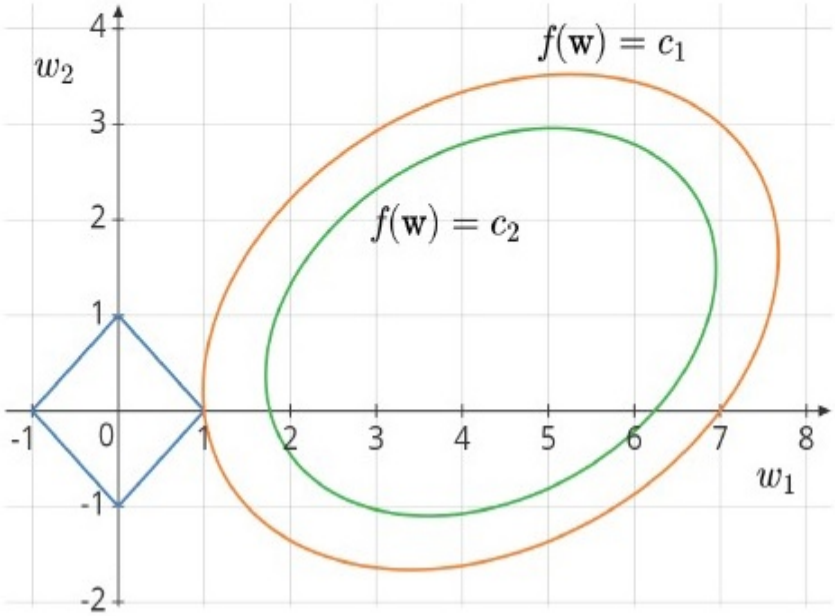
Question Number : 153 Question Id : 640653852489 Question Type : SA
Correct Marks : 1.5
Question Label : Short Answer Question
While training each of these models, how many data-points does the training set have?

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
750

Sub-Section Number :	6
Sub-Section Id :	640653126877
Question Shuffling Allowed :	No

Question Id : 640653852490 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (154 to 158)
Question Label : Comprehension

Consider the following image of the parameter space in a regression problem with regularization. f is the sum of squared errors (SSE) and λ is the regularization parameter. The weight vector is $\mathbf{w} = \begin{bmatrix} w_1 & w_2 \end{bmatrix}^T$.
The contours of f and the regularization term in the loss are displayed below:



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

Question Number : 154 Question Id : 640653852491 Question Type : MCQ
Correct Marks : 1
Question Label : Multiple Choice Question
What kind of a regression problem is this?
Options :

6406532867325. ✖ Ridge regression

6406532867326. ✔ LASSO regression

Question Number : 155 Question Id : 640653852492 Question Type : SA
Correct Marks : 0.5
Question Label : Short Answer Question
What is the optimal value of w_1?
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 156 Question Id : 640653852493 Question Type : SA
Correct Marks : 0.5
Question Label : Short Answer Question
What is the optimal value of w_2?
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0

Question Number : 157 Question Id : 640653852494 Question Type : MCQ
Correct Marks : 1
Question Label : Multiple Choice Question
Which of the following statements is true?
Options :
6406532867329. ✖ Feature-1 can be discarded.

6406532867330. ✔ Feature-2 can be discarded.

6406532867331. ✖ Any one of the two features can be discarded.

6406532867332. ✖ Both features are equally important and neither of them can be discarded.

Question Number : 158 Question Id : 640653852495 Question Type : MSQ
Correct Marks : 2 Max. Selectable Options : 0
Question Label : Multiple Select Question
Which of the following statements are true? Exactly two options are correct.

Options :

6406532867333. ✔ $c_1 > c_2$

6406532867334. ✖ $c_1 < c_2$

6406532867335. ✔ Total loss at optimal point is $c_1 + \lambda$

6406532867336. ✖ Total loss at optimal point is $c_2 + \lambda$

Sub-Section Number :	7
Sub-Section Id :	640653126878
Question Shuffling Allowed :	No

Question Id : 640653852496 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

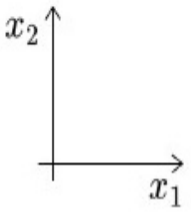
Question Numbers : (159 to 163)

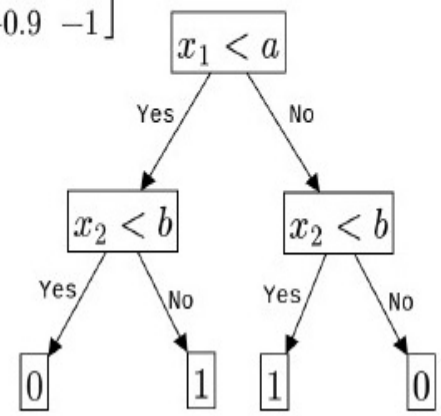
Question Label : Comprehension

Consider the following training dataset for a binary classification problem with the data-points in $\mathbb{R}^2$, the labels in the set $\{0, 1\}$ and a decision tree grown from it that achieves zero training error:

$$\mathrm{X} = \begin{bmatrix} -2 & -0.9 & 0.9 & 2 & -2 & -0.9 & 0.9 & 2 \\ 1 & 0.9 & 0.9 & 1 & -1 & -0.9 & -0.9 & -1 \end{bmatrix}$$

$$\mathrm{y} = [1\ 1\ 0\ 0\ 0\ 0\ 1\ 1]^T$$





If a and b are integers, answer the given subquestions that follow. Hint: Plotting the dataset helps.

Sub questions

Question Number : 159 Question Id : 640653852497 Question Type : SA

Correct Marks : 1

Question Label : Short Answer Question

What is the value of a?

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText
Possible Answers :
0

Question Number : 160 Question Id : 640653852498 Question Type : SA
Correct Marks : 1
Question Label : Short Answer Question
What is the value of *b*?
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
0

Question Number : 161 Question Id : 640653852499 Question Type : SA
Correct Marks : 1
Question Label : Short Answer Question
Find the entropy of the root node. Use $\log_2$_____.
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Number : 162 Question Id : 640653852500 Question Type : SA
Correct Marks : 2
Question Label : Short Answer Question
If E_R is the entropy of the root and E_L is the weighted entropy of all the leaves, what is $E_R - E_L$? Use $\log_2$. _____
Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :

1

Question Number : 163 Question Id : 640653852501 Question Type : SA
Correct Marks : 1
Question Label : Short Answer Question

What is the predicted label of the test data-point $\begin{bmatrix} 3 \\ -4 \end{bmatrix}$? _____

Response Type : Numeric
Evaluation Required For SA : Yes
Show Word Count : Yes
Answers Type : Equal
Text Areas : PlainText
Possible Answers :
1

Question Id : 640653852502 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix
Question Numbers : (164 to 166)
Question Label : Comprehension

Consider the following dataset for a binary classification problem in which the features are from $\{0,1\}^3$ and the labels are from $\{0,1\}$.

$$\mathbf{X} = \begin{bmatrix} 1 & 0 & 1 & 1 & 0 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 & 1 & 0 & 1 & 1 \\ 1 & 1 & 0 & 1 & 1 & 0 & 0 & 1 \end{bmatrix}$$

$$\mathbf{y} = \begin{bmatrix} 1 & 1 & 1 & 1 & 0 & 0 & 0 & 0 \end{bmatrix}^T$$

A Naive Bayes classifier is trained on this dataset. The parameters to be estimated are represented as $\hat{p}_i^y$, which are presented in the form of the table given below. Recall that $\hat{p}_i^y$ is the probability of feature i taking a value 1 in class y:

i	$y=0$	$y=1$
1	a	b
2	c	d
3	e	f

Assume that there is no smoothing. Answer the given subquestions.
Sub questions

Question Number : 164 Question Id : 640653852503 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the value of $c + d$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1.25

Question Number : 165 Question Id : 640653852504 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the value of $a + c + e$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

1.5

Question Number : 166 Question Id : 640653852505 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the predicted label for the test point $\begin{bmatrix} 0 \\ 1 \\ 0 \end{bmatrix}$.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

0

Sub-Section Number :	8
Sub-Section Id :	640653126879
Question Shuffling Allowed :	No

Question Id : 640653852506 Question Type : COMPREHENSION Sub Question Shuffling Allowed : No Group Comprehension Questions : No Question Pattern Type : NonMatrix

Question Numbers : (167 to 168)

Question Label : Comprehension

Consider a multi-class classification problem with 3 classes and 4 features, all of which are binary. A generative model is used to model the joint distribution of the features and labels.

Based on the above data, answer the given subquestions.

Sub questions

Question Number : 167 Question Id : 640653852507 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the total number of independent (free) parameters in the model if the class conditional independence assumption is *not* enforced.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

47

Question Number : 168 Question Id : 640653852508 Question Type : SA

Correct Marks : 2

Question Label : Short Answer Question

Find the total number of independent (free) parameters in the model if the class conditional independence assumption is enforced.

Response Type : Numeric

Evaluation Required For SA : Yes

Show Word Count : Yes

Answers Type : Equal

Text Areas : PlainText

Possible Answers :

14

CT

Section Id :	64065360932
Section Number :	10
Section type :	Online