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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Introduction To Machine Learning (course)



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Course outline

How does an NPTEL online course work? ()

Week 0 ()

Week 1 ()

Week 2 ()

Week 3 ()

Week 4 ()

Separating Hyperplane Approaches -Perceptron Learning

Week 4: Assignment 4

The due date for submitting this assignment has passed.

Due on 2023-08-23, 23:59 IST.

Assignment submitted on 2023-08-23, 08:32 IST

1) Consider the data set given below.

1 point

x_1	x_2	y
0	0	0
0	1	1
1	0	1
1	1	0

Claim: PLA (perceptron learning algorithm) can learn a classifier that achieves zero misclassification error on the training data. This claim is:

- True
- False
- Depends on the initial weights
- True, only if we normalize the feature vectors before applying PLA.

No, the answer is incorrect.

Score: 0

Accepted Answers:

False

- 2) Which of the following loss functions are convex? (Multiple options may be correct) 1 point
 - 0-1 loss (sometimes referred as mis-classification loss)
 - ✓ Hinge loss
 - Logistic loss
 - Squared error loss

(unit? unit=51&lesso n=52)

- Support
 Vector
 Machines I Formulation
 (unit?
 unit=51&lesso
 n=53)
- Support
 Vector
 Machines II Interpretation
 and Analysis
 (unit?
 unit=51&lesso
 n=54)
- SVMs for Linearly Non Separable Data (unit? unit=51&lesso n=55)
- SVM Kernels (unit? unit=51&lesso n=56)
- O Hingle Loss formulation of SVM Objective (unit? unit=51&lesso n=57)
- Practice:
 Week 4:
 Assignment 4
 (Non Graded)

(Non Graded) (assessment? name=179)

Assignment 4 (assessment? name=212)

Week 4FeedbackForm:IntroductionTo MachineLearning

Yes, the answer is correct.

Score: 1

Accepted Answers:

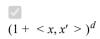
Hinge loss

Logistic loss

Squared error loss

3) Which of the following are valid kernel functions?

1 point



 $tanh(K_1 < x, x' > + K_2)$

/

$$exp(-\gamma | |x-x'||^2)$$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$$(1 + \langle x, x' \rangle)^d$$

 $tanh(K_1 \langle x, x' \rangle + K_2)$
 $exp(-\gamma | |x - x' | |^2)$

4) Consider the 1 dimensional dataset:

1 point

\boldsymbol{x}	y	
-1	1	
0	-1	
2	1	

(Note: *x* is the feature, and *y* is the output)

State true or false: The dataset becomes linearly separable after using basis expansion with the

following basis function $\phi(x) = \begin{bmatrix} 1 \\ x^3 \end{bmatrix}$

- True
- False

No, the answer is incorrect.

Score: 0

Accepted Answers:

False

5) State True or False:

1 point

SVM cannot classify data that is not linearly separable even if we transform it to a higherdimensional space.

- True
- False

Yes, the answer is correct.

Score: 1

Accepted Answers:

False

(unit? unit=51&lesso n=192)

O Week 4: Solution (unit? unit=51&lesso n=214)

Week 5 ()

Week 6 ()

Week 7 ()

Week 8 ()

Week 9 ()

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1 point

The decision boundary obtained using the perceptron algorithm does not depend on the initial values of the weights.

- True
- False

Yes, the answer is correct.

Score: 1

Accepted Answers:

False

7) Consider a linear SVM trained with n labeled points in R^2 without slack penalties and **1** point resulting in k = 2 support vectors, where n > 100. By removing one labeled training point and retraining the SVM classifier, what is the maximum possible number of support vectors in the resulting solution?

- 0 1
- **2**
- 3
- 0 n 1
- \bigcirc n

No, the answer is incorrect.

Score: 0

Accepted Answers:

n – 1

8) Consider an SVM with a second order polynomial kernel. Kernel 1 maps each input 1 point

data point x to $K_1(x) = \begin{bmatrix} x \\ x^2 \end{bmatrix}$. Kernel 2 maps each input data point x to $K_2(x) = \begin{bmatrix} 3x \\ 3x^2 \end{bmatrix}$. Assume the

hyper-parameters are fixed. Which of the following option is true?

The margin obtained using $K_2(x)$ will be larger than the margin obtained using $K_1(x)$.

The margin obtained using $K_2(x)$ will be smaller than the margin obtained using $K_1(x)$.

The margin obtained using $K_2(x)$ will be the same as the margin obtained using $K_1(x)$.

Yes, the answer is correct.

Score: 1

Accepted Answers:

The margin obtained using $K_2(x)$ will be larger than the margin obtained using $K_1(x)$.