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



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Course
outline

About NPTEL
()

How does an
NPTEL online
course work?
()

Week 0 ()

Week 1 ()

Week 2 ()

Week 3 ()

☐ Linear
Classification
(unit?
unit=42&lesson
=43)

Thank you for taking the Week 3: Assignment 3.

Week 3: Assignment 3

Your last recorded submission was on 2024-08-14, 23:30 IST Due date: 2024-08-14, 23:59 IST.

1) For a two-class problem using discriminant functions (δ_k - discriminant function for class k), where is the separating hyperplane located? **1 point**

- ☐ Where $\delta_1 > \delta_2$
- ☐ Where $\delta_1 < \delta_2$
- ☒ Where $\delta_1 = \delta_2$
- ☐ Where $\delta_1 + \delta_2 = 1$

2) Given the following dataset consisting of two classes, A and B , calculate the prior probability of each class. **1 point**

Feature 1	Class
2.3	A
1.8	A
3.2	A
2.7	B
3.0	A
2.1	A
1.9	B
2.4	B

What are the prior probabilities of class A and class B ?

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☐ Logistic Regression (unit? unit=42&lesson=44)

☐ Linear Discriminant Analysis - I - Introduction (unit? unit=42&lesson=45)

☐ Linear Discriminant Analysis - II (unit? unit=42&lesson=46)

☐ Linear Discriminant Analysis - III - Another view of LDA (unit? unit=42&lesson=47)

☐ Tutorial (unit? unit=42&lesson=48)

☐ Practice: Week 3: Assignment 3 (Non Graded) (assessment? name=266)

☒ **Quiz: Week 3: Assignment 3 (assessment? name=281)**

☐ Week 3 Feedback Form : Introduction To Machine Learning (unit? unit=42&lesson=284)

Week 4 ()

$$P(A) = 0.5, P(B) = 0.5$$

☒ $P(A) = 0.625, P(B) = 0.375$

☐ $P(A) = 0.375, P(B) = 0.625$

☐ $P(A) = 0.6, P(B) = 0.4$

3) In a 3-class classification problem using linear regression, the output vectors for three data points are [0.8, 0.3, -0.1], [0.2, 0.6, 0.2], and [-0.1, 0.4, 0.7]. To which classes would these points be assigned? **1 point**

☐ 1, 2, 1

☐ 1, 2, 2

☐ 1, 3, 2

☒ 1, 2, 3

4) If you have a 5-class classification problem and want to avoid masking using polynomial regression, what is the minimum degree of the polynomial you should use? **1 point**

☐ 3

☒ 4

☐ 5

☐ 6

5) Consider a logistic regression model where the predicted probability for a given data point is 0.4. If the actual label for this data point is 1, what is the contribution of this data point to the log-likelihood? **1 point**

☐ -1.3219

☒ -0.9163

☐ +1.3219

☐ +0.9163

6) What additional assumption does LDA make about the covariance matrix in comparison to the basic assumption of Gaussian class conditional density? **1 point**

☐ The covariance matrix is diagonal

☐ The covariance matrix is identity

☒ The covariance matrix is the same for all classes

☐ The covariance matrix is different for each class

7) What is the shape of the decision boundary in LDA? **1 point**

☐ Quadratic

☒ Linear

☐ Circular

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☐ Can not be determined

8) For two classes C_1 and C_2 with within-class variances $\sigma_{w1}^2 = 1$ and $\sigma_{w2}^2 = 4$ respectively, if the projected means are $\mu'_1 = 1$ and $\mu'_2 = 3$, what is the Fisher criterion $J(w)$? **1 point**

- ☐ 0.5
☒ 0.8
☐ 1.25
☐ 1.5

9) Given two classes C_1 and C_2 with means $\mu_1 = \begin{bmatrix} 2 \\ 3 \end{bmatrix}$ and $\mu_2 = \begin{bmatrix} 5 \\ 7 \end{bmatrix}$ respectively, **2 points**

what is the direction vector w for LDA when the within-class covariance matrix S_w is the identity matrix I ?

- ☒ $\begin{bmatrix} 4 \\ 3 \end{bmatrix}$
☐ $\begin{bmatrix} 5 \\ 7 \end{bmatrix}$
☐ $\begin{bmatrix} 0.7 \\ 0.7 \end{bmatrix}$
☐ $\begin{bmatrix} 0.6 \\ 0.8 \end{bmatrix}$

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers