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NPTEL (<https://swayam.gov.in/explorer?ncCode=NPTEL>) » Deep Learning - IIT Ropar (course)Course
outlineAbout
NPTEL ()How does an
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Week 1 ()

Week 2 ()

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Week 5 ()

☐ Eigenvalues
and
Eigenvectors
(unit?
unit=71&lesso
n=72)☐ Linear Algebra
: Basic
Definitions
(unit?)

Week 5 : Assignment 5

The due date for submitting this assignment has passed.

Due on 2024-08-28, 23:59 IST.

Assignment submitted on 2024-08-26, 23:25 IST

1) Which of the following is a measure of the amount of variance explained by a principal component in PCA?

1 point

- ☐ Covariance
- ☐ Correlation
- ☐ Mean absolute deviation
- ☒ Eigenvalue

Yes, the answer is correct.

Score: 1

Accepted Answers:

Eigenvalue

2) What is/are the limitations of PCA?

1 point

- ☐ It is computationally less efficient than autoencoders
- ☐ It can only reduce the dimensionality of a dataset by a fixed amount.
- ☒ It can only identify linear relationships in the data.
- ☒ It can be sensitive to outliers in the data.

Yes, the answer is correct.

Score: 1

Accepted Answers:

*It can only identify linear relationships in the data.**It can be sensitive to outliers in the data.*

3) Which of the following is a property of eigenvalues of a symmetric matrix?

1 point

unit=71&lesson=73)

☐ Eigenvalue Decomposition (unit=71&lesson=74)

☐ Principal Component Analysis and its Interpretations (unit=71&lesson=75)

☐ PCA : Interpretation 2 (unit=71&lesson=76)

☐ PCA : Interpretation 3 (unit=71&lesson=77)

☐ PCA : Interpretation 3 (Contd.) (unit=71&lesson=78)

☐ PCA : Practical Example (unit=71&lesson=79)

☒ Singular Value Decomposition (unit=71&lesson=80)

☒ Lecture Material for Week 5 (unit=71&lesson=81)

☒ Quiz: Week 5 : Assignment 5 (assessment?name=290)

- ☐ Eigenvalues are always positive
- ☐ Eigenvalues are always negative
- ☒ Eigenvalues are always real
- ☐ Eigenvalues can be complex numbers with imaginary parts non-zero

Yes, the answer is correct.

Score: 1

Accepted Answers:

Eigenvalues are always real

4) The eigenvalues of A are 3,4. Which of the following are the eigenvalues of A^3 ? **1 point**

- ☐ 3, 4
- ☐ 9, 16
- ☒ 27, 64
- ☐ $\sqrt{3}, \sqrt{4}$

Yes, the answer is correct.

Score: 1

Accepted Answers:

27, 64

5) If we have a 12×12 matrix having entries from R , how many linearly independent eigenvectors corresponding to real eigenvalues are possible for this matrix? **1 point**

- ☒ 10
- ☐ 24
- ☒ 12
- ☒ 6

Yes, the answer is correct.

Score: 1

Accepted Answers:

10

12

6

Questions 6-9 are based on common data.

Consider the following data points x_1, x_2, x_3 to answer following questions: $x_1 = \begin{bmatrix} 2 \\ 2 \end{bmatrix}$,

$$x_2 = \begin{bmatrix} 1 \\ 2 \end{bmatrix}, x_3 = \begin{bmatrix} 2 \\ 1 \end{bmatrix}$$

6) What is the mean of the given data points x_1, x_2, x_3 ? **1 point**

- ☐ $\begin{bmatrix} 5 \\ 5 \end{bmatrix}$
- ☒ $\begin{bmatrix} 1.67 \\ 1.67 \end{bmatrix}$
- ☐

Week 5
Feedback
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unit=71&lesso
n=234)

Week 6 ()

Week 7 ()

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July 2024 ()

$$\begin{bmatrix} 2 \\ 2 \end{bmatrix}$$



$$\begin{bmatrix} 1.5 \\ 1.5 \end{bmatrix}$$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$$\begin{bmatrix} 1.67 \\ 1.67 \end{bmatrix}$$

7) The covariance matrix $C = \frac{1}{n} \sum_{i=1}^n (x - \bar{x})(x - \bar{x})^T$ is given by: (\bar{x} is mean of the data points) **1 point**



$$\begin{bmatrix} 0.22 & -0.11 \\ -0.11 & 0.22 \end{bmatrix}$$



$$\begin{bmatrix} 0.33 & -0.17 \\ -0.17 & 0.33 \end{bmatrix}$$



$$\begin{bmatrix} 0.22 & -0.22 \\ -0.22 & 0.22 \end{bmatrix}$$



$$\begin{bmatrix} 0.33 & -0.33 \\ -0.33 & 0.33 \end{bmatrix}$$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$$\begin{bmatrix} 0.22 & -0.11 \\ -0.11 & 0.22 \end{bmatrix}$$

8) The maximum eigenvalue of the covariance matrix C is:

1 point



0.33



0.67



1



0.5

Yes, the answer is correct.

Score: 1

Accepted Answers:

0.33

9) The eigenvector corresponding to the maximum eigenvalue of the given matrix C is: **1 point**



$$\begin{bmatrix} 0.71 \\ 0.71 \end{bmatrix}$$



$$\begin{bmatrix} -0.71 \\ 0.71 \end{bmatrix}$$



$$\begin{bmatrix} -1 \\ 1 \end{bmatrix}$$



$$\begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$$\begin{bmatrix} -0.71 \\ 0.71 \end{bmatrix}$$

OR

$$\begin{bmatrix} -1 \\ 1 \end{bmatrix}$$

10) What is the determinant of a 2×2 matrix that has eigenvalues of 4 and 5?

Yes, the answer is correct.

Score: 1

Accepted Answers:

(Type: Numeric) 20

1 point