

X

<https://swayam.gov.in>https://swayam.gov.in/nc_details/NPTEL

shweta_s@cs.iitr.ac.in ▾

NPTEL (<https://swayam.gov.in/explorer?ncCode=NPTEL>) » Deep Learning - IIT Ropar (course)

Click to register
for Certification
exam ([https://
examform.nptel.ac.in/2025_10/
exam_form/
dashboard](https://examform.nptel.ac.in/2025_10/exam_form/dashboard))

If already
registered, click
to check your
payment status

Course outline

About
NPTEL ()

How does an
NPTEL
online
course
work? ()

Week 0 ()

Week 1 ()

Week 2 ()

Week 3 ()

week 4 ()

Week 5 : Assignment 5

The due date for submitting this assignment has passed.

Due on 2025-02-26, 23:59 IST.

Assignment submitted on 2025-02-18, 14:27 IST

1) Which of the following is the most appropriate description of the method used in PCA to achieve dimensionality reduction? **1 point**

- ☐ PCA achieves this by discarding a random subset of features in the dataset
- ☐ PCA achieves this by selecting those features in the dataset along which the variance of the dataset is maximised
- ☐ PCA achieves this by retaining the those features in the dataset along which the variance of the dataset is minimised
- ☒ PCA achieves this by looking for those directions in the feature space along which the variance of the dataset is maximised

Yes, the answer is correct.

Score: 1

Accepted Answers:

PCA achieves this by looking for those directions in the feature space along which the variance of the dataset is maximised

2) What is/are the limitations of PCA? **1 point**

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

No, the answer is incorrect.

Score: 0

Accepted Answers:

It can only identify linear relationships in the data.

Week 5 ()

- Eigenvalues and Eigenvectors (unit? unit=71&lesson=72)
- Linear Algebra : Basic Definitions (unit? unit=71&lesson=73)
- Eigenvalue Decomposition (unit? unit=71&lesson=74)
- Principal Component Analysis and its Interpretations (unit? unit=71&lesson=75)
- PCA : Interpretation 2 (unit? unit=71&lesson=76)
- PCA : Interpretation 3 (unit? unit=71&lesson=77)
- PCA : Interpretation 3 (Contd.) (unit? unit=71&lesson=78)
- PCA : Practical Example (unit? unit=71&lesson=79)
- Singular Value Decomposition (unit? unit=71&lesson=80)

It can be sensitive to outliers in the data.

3) The following are possible numbers of linearly independent eigenvectors for a 7×7 **1 point** matrix. Choose the incorrect option.

- ☐ 1
☐ 3
☒ 9
☐ 5
☒ 8

Yes, the answer is correct.

Score: 1

Accepted Answers:

9
8

4) Find the singular values of the following matrix: $\begin{bmatrix} -4 & -6 \\ 3 & -8 \end{bmatrix}$

1 point

- ☒ $\sigma_1 = 10, \sigma_2 = 5$
☐ $\sigma_1 = 1, \sigma_2 = 0$
☐ $\sigma_1 = 100, \sigma_2 = 25$
☐ $\sigma_1 = \sigma_2 = 0$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$\sigma_1 = 10, \sigma_2 = 5$

5) PCA is performed on a mean-centred dataset in \mathbb{R}^3 . If the first principal component is $\frac{1}{\sqrt{6}}(1, -1, 2)$, which of the following could be the second principal component? **1 point**

- ☐ $(1, -1, 2)$
☐ $(0, 0, 0)$
☐ $\frac{1}{\sqrt{5}}(0, 1, 2)$
☒ $\frac{1}{\sqrt{2}}(-1, -1, 0)$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$\frac{1}{\sqrt{2}}(-1, -1, 0)$

Questions 6-9 are based on common data

Consider the following data points x_1, x_2, x_3 to answer following questions:

Lecture
Material for
Week 5 (unit?
unit=71&lesso
n=81)

Week 5:
Solution (unit?
unit=71&lesso
n=249)

Week 5
Feedback
Form:Deep
Learning - IIT
Ropar!! (unit?
unit=71&lesso
n=234)

Quiz: Week 5
: Assignment
5
(assessment?
name=313)

Week 6 ()

Week 7 ()

Week 8 ()

Week 9 ()

week 10 ()

Week 11 ()

Week 12 ()

Download
Videos ()

Books ()

Text
Transcripts ()

Problem
Solving
Session -
Jan 2025 ()

$$x_1 = \begin{bmatrix} -2 \\ 2 \end{bmatrix}, x_2 = \begin{bmatrix} 2 \\ -2 \end{bmatrix}, x_3 = \begin{bmatrix} 1 \\ 1 \end{bmatrix}$$

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

1 point

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

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

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

☒ $\begin{bmatrix} 0.33 \\ 0.33 \end{bmatrix}$

Yes, the answer is correct.

Score: 1

Accepted Answers:

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

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**

☐ $\begin{bmatrix} 8.66 & -7.33 \\ -7.33 & 8.66 \end{bmatrix}$

☒ $\begin{bmatrix} 2.88 & -2.44 \\ -2.44 & 2.88 \end{bmatrix}$

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

☐ $\begin{bmatrix} 5.33 & -0.33 \\ -5.33 & 0.33 \end{bmatrix}$

Yes, the answer is correct.

Score: 1

Accepted Answers:

$$\begin{bmatrix} 2.88 & -2.44 \\ -2.44 & 2.88 \end{bmatrix}$$

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

1 point

☐ 1

☒ 5.33

☐ 0.44

☐ 0.5

Yes, the answer is correct.

Score: 1

Accepted Answers:

5.33

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

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

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

☐ $\begin{bmatrix} 0.67 \\ 0 \end{bmatrix}$

☐ $\begin{bmatrix} -1.48 \\ 1 \end{bmatrix}$

Yes, the answer is correct.

Score: 1

Accepted Answers:

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

10) Given that A is a 2×2 matrix, what is the determinant of A , if its eigenvalues are 6 and 7?

42

Yes, the answer is correct.

Score: 1

Accepted Answers:

(Type: Numeric) 42

1 point