



Deep learning

Assignment 1

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Problem 7

x_1, x_2, x_3 are the linearly independent vectors. If $x_1 = \begin{bmatrix} 1 \\ 3 \\ 0 \end{bmatrix}$, $x_2 = \begin{bmatrix} -2 \\ 4 \\ -5 \end{bmatrix}$, what is the possible value of x_3 ?

- a. $\begin{bmatrix} -1 \\ 7 \\ -5 \end{bmatrix}$
- b. $\begin{bmatrix} 0 \\ 10 \\ -5 \end{bmatrix}$
- c. $\begin{bmatrix} 3 \\ 4 \\ 5 \end{bmatrix}$
- d. $\begin{bmatrix} 5 \\ -5 \\ 10 \end{bmatrix}$



Problem 8

$$x + 2y - z = 1 \quad \dots\dots\dots (1)$$

$$-2x - 4y + 2z = -2 \quad \dots\dots\dots (2)$$

$$z = 2 \quad \dots\dots\dots (3)$$

What are the values of x, y, z ?

- a. $x = 0, y = 0, z = 2$
- b. $z = 2$ and infinitely possible x, y
- c. $z = 2$ and no possible x, y
- d. None of the above

Problem 9

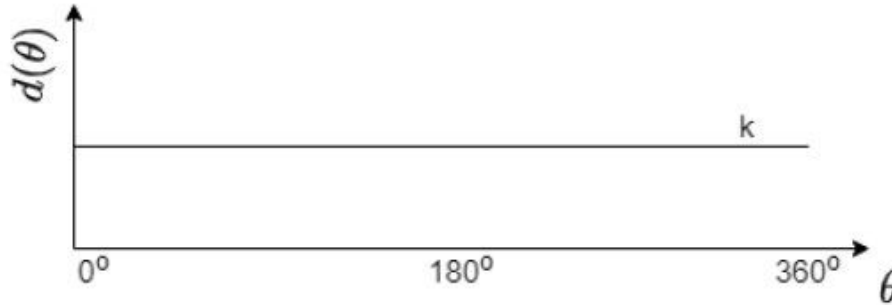
What are the eigen values of the matrix A?

$$A = \begin{bmatrix} 5 & 4 \\ -3 & -2 \end{bmatrix}$$

- a. 4, -3
- b. 5, -2
- c. -2, -1
- d. 2, 1

Problem 1

Signature descriptor of an unknown shape is given in the figure, can you identify the unknown shape?



- a. Circle
- b. Square
- c. Straight line
- d. Cannot be predicted



Problem 2

To measure the Smoothness, coarseness and regularity of a region we use which of the transformation to extract feature?

- a. Gabor Transformation
- b. Wavelet Transformation
- c. Both Gabor, and Wavelet Transformation.
- d. None of the Above.



Problem 3

Suppose Fourier descriptor of a shape has K coefficient, and we remove last few coefficient and use only first m ($m < K$) number of coefficient to reconstruct the shape. What will be effect of using truncated Fourier descriptor on the reconstructed shape?

- We will get a smoothed boundary version of the shape.
- We will get only the fine details of the boundary of the shape.
- Full shape will be reconstructed without any loss of information.
- Low frequency component of the boundary will be removed from contour of the shape.

Problem 4

While computing polygonal descriptor of an arbitrary shape using splitting technique, which of the following we take as the starting guess?

- Vertex joining the two closet point above a threshold on the boundary.
- Vertex joining the two farthest point on the boundary.
- Vertex joining any two arbitrary point on the boundary.
- None of the above.

Problem 5

Consider two class Bayes' Minimum Risk Classifier. Probability of classes W_1 and W_2 are, $P(\omega_1) = 0.3$ and $P(\omega_2) = 0.7$ respectively. $P(x) = 0.545$, $P(x | \omega_1) = 0.65$, $P(x | \omega_2) = 0.5$ and the loss

matrix values are $\begin{bmatrix} \lambda_{11} & \lambda_{12} \\ \lambda_{21} & \lambda_{22} \end{bmatrix}$

If the classifier assign x to class W_1 , then which one of the following is true.

- a. $\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} < 1.79$
- b. $\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} > 1.79$
- c. $\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} < 1.09$
- d. $\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} > 1.09$

$$\begin{aligned} & \lambda_{11} P(\omega_1/x) + \lambda_{12} P(\omega_2/x) < \lambda_{21} P(\omega_1/x) + \lambda_{22} P(\omega_2/x) \\ \Rightarrow & (\lambda_{21} - \lambda_{11}) P(\omega_1/x) > (\lambda_{12} - \lambda_{22}) P(\omega_2/x) \\ \Rightarrow & \frac{P(\omega_1/x)}{P(\omega_2/x)} > \frac{\lambda_{12} - \lambda_{22}}{\lambda_{21} - \lambda_{11}} \end{aligned}$$

Problem 6

The Fourier transformation of a complex sequence of number $s(k)$ for $k = 0, \dots, N - 1$ is given by:

- a. $a(u) = \sum_{k=0}^{N-1} s(k)e^{j2\pi uk/N}$
- b. $a(u) = \sum_{k=0}^N s(k)e^{j2\pi uk/N}$
- c. $a(u) = \sum_{k=0}^{N-1} s(k)e^{-j2\pi uk/N}$
- d. $a(u) = \sum_{k=-N/2}^{N/2} s(k)e^{-j2\pi uk/N}$



Problem 7

The gray co-occurrence matrix C of an unknown image is given in below. What is the value of maximum probability descriptor?

1	2	2
2	1	2
2	3	2

Fig 1: C

- a. $3/17$
- b. $1/12$
- c. $3/16$
- d. $5/16$



Problem 8

Which of the following is not a boundary descriptor.

- a. Polygonal Representation
- b. Fourier descriptor
- c. Signature
- d. Histogram.





Problem 9

We use gray co-occurrence matrix to extract which type of information?

- a. Boundary
- b. Texture
- c. MFCC
- d. Zero Crossing rate.



Problem 10

If the larger values of gray co-occurrence matrix are concentrated around the main diagonal, then which one of the following will be true?

- a. The value of element difference moment will be low.
- b. The value of inverse element difference moment will be low.
- c. The value of entropy will be very low.
- d. None of the above.