



Deep Learning
Assignment- Week 1

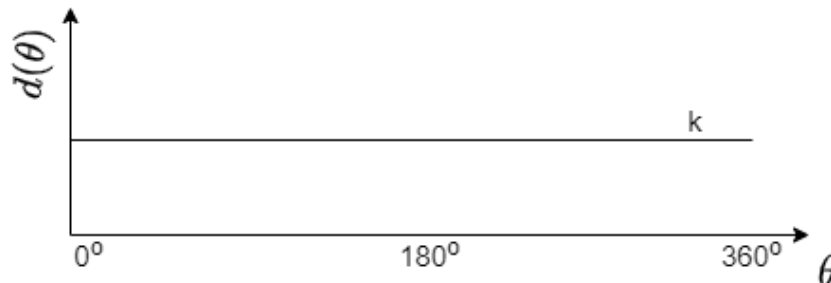
TYPE OF QUESTION: MCQ/MSQ

Number of questions: 10

Total mark: 10 X 2= 20

QUESTION 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

Correct Answer: a

Detailed Solution:

Distance from centroid to boundary is same for every value of θ . This is true for Circle with a radius k .

QUESTION 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.



Correct Answer: c

Detailed Solution:

One of the important approach to region description is texture content. This helps to provide the measure of some of the important properties of an image like smoothness, coarseness and regularity of the region. We use Gabor filter and Wavelet transformation to extract texture feature.

QUESTION 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?

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

Correct Answer: a

Detailed Solution:

Low frequency component of Fourier descriptor captures the general shape properties of the object and high frequency component captures the finer detail. So, if we remove the last few component, then the finer details will be lost, and as a result the reconstructed shape will be smoothed version of original shape. The boundary of the reconstructed shape will be a low frequency approximation of the original shape boundary.

QUESTION 4:

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

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



Correct Answer: b

Detailed Solution:

Options are self-explanatory.

QUESTION 5:

Consider two class Bayes' Minimum Risk Classifier. Probability of classes W1 and W2 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 W1, 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. $\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} > 1.09$

Correct Answer: b

Detailed Solution:

$$\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} > \frac{P(\omega_2/x)}{P(\omega_1/x)}$$

Now, $P(\omega_1/x) = P(\omega_1) * P(x|\omega_1) / P(x) = 0.3 * 0.65 / 0.545 = 0.358$

$P(\omega_2/x) = P(\omega_2) * P(x|\omega_2) / P(x) = 0.7 * 0.50 / 0.545 = 0.642$

$$\frac{\lambda_{21} - \lambda_{11}}{\lambda_{12} - \lambda_{22}} > 1.79$$

QUESTION 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. $a(u) = \sum_{k=-N/2}^{N/2} s(k)e^{-j2\pi uk/N}$

Correct Answer: c

Detailed Solution:

Options are self-explanatory.

QUESTION 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. $5/16$



Correct Answer: a

Detailed Solution:

Maximum probability = $\max (c_{ij})$. c_{ij} is normalized co-occurrence matrix. Total values in C is 17.

QUESTION 8:

Which of the following is not a boundary descriptor.

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

Correct Answer: d

Detailed Solution:

Histogram is a region descriptor.

QUESTION 9:

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

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

Correct Answer: b

Detailed Explanation: We use different feature from the gray co-occurrence matrix to determine the textural content of an image region.



QUESTION 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?

- e. The value of element difference moment will be low.
- f. The value of inverse element difference moment will be low.
- g. The value of entropy will be very low.
- h. None of the above.

Correct Answer: a

Detailed Solution:

Options are self-explanatory. We can't comment anything on the entropy based on the values of diagonal elements. Because it depends on the randomness of the value. Whereas element difference moment will be low and inverse element difference moment will be high.

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