Deep learning

Assignment 1 (Cont.)

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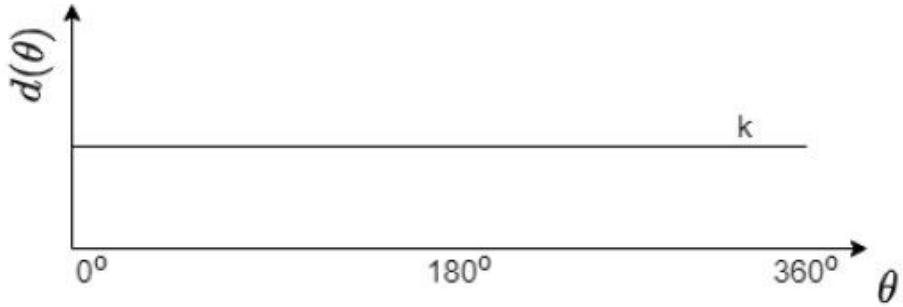
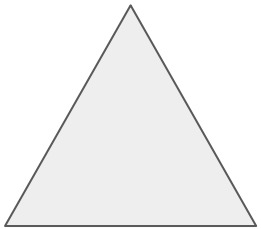
Problem 1

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?

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.

Problem 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.

Problem 5

Consider two class Bayes' Minimum Risk Classifier. Probability of classes W1 and W2 are, P (ω_1) =0.3 and P (ω_2) =0.7 respectively. P(x) = 0.545, P (x| ω_1) = 0.65, P (x| ω_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. $\frac{\lambda_{21}-\lambda_{11}}{\lambda_{12}-\lambda_{22}} > 1.09$

$\lambda_{11} P(\omega_1|x) + \lambda_{12} P(\omega_2|x) < \lambda_{21} P(\omega_1|x) + \lambda_{22} P(\omega_2|x)$

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

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

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.

Element Difference Moment $\sum_i \sum_j (i-j)^k C_{i,j}$

Inverse Element Difference Moment $\sum_i \sum_j C_{i,j} / (i-j)^k \quad i \neq j$