

Pattern Recognition Assignment#2

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Question1

Calculate the distance from the test sample to each training sample

Distance	Category	Distance	Category
$L_a = 4.12$	ω_1	$L_e = 5.00$	ω_3
$L_b = 2.24$	ω_3	$L_f = 2.00$	ω_2
$L_c = 3.16$	ω_3	$L_g = 5.66$	ω_1
$L_d = 3.16$	ω_1	$L_h = 5.39$	ω_3

(a) Use the single-nearest neighbor algorithm: the category of \mathbf{x} is ω_2

(b) Use the 3-nearest neighbor algorithm: the category of \mathbf{x} is ω_3

Question2

(a) Estimate μ by maximum-likelihood estimation

$$\hat{\mu} = \frac{1}{n} \sum_{i=1}^n x_i = 0.038$$

The mean squared error between the estimated distribution and the ground-truth distribution

$$error = \frac{1}{n} \sum_{i=1}^n (\hat{p}(x_i) - p(x_i))^2 = 2.97 \times 10^{-5}$$

(b) Estimate the pdf of each training sample through parzen window method

sample	-0.17	0.24	-0.79	0.32	0.44	0.08	0.26	0.06	-0.71	0.65
pdf	0.53	0.81	0.27	0.79	0.70	0.76	0.80	0.74	0.29	0.47

The mean squared error between the estimated distribution and the ground-truth distribution

$$error = \frac{1}{n} \sum_{i=1}^n (\hat{p}(x_i) - p(x_i))^2 = 9.20 \times 10^{-2}$$