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NPTEL (https://swayam.gov.in/explorer?ncCode=NPTEL) » Pattern Recognition And Application (course)

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Course outline

Week 4 : Assignment 4

Assignment not submitted **Due date: 2023-08-23, 23:59 IST.**

1) ***2 points***

Exponential distribution $p(x) = \begin{cases} \lambda e^{-\lambda x}, & \text{if } x \geq 0 \\ 0, & \text{otherwise} \end{cases}$. Variance of this distribution is _____

a) λ
b) λ^{-1}
c) λ^{-2}
d) None of these

- a)
- b)
- c)
- d)

2) Gaussian probability density function is parametrized by? ***2 points***

a) radius and center
b) mean and variance
c) standard deviation
d) centroid and height

- a)
- b)
- c)
- d)

3) ***2 points***

Which of the following is/are related to parametric probability density estimation?

a) Maximum likelihood estimation
b) Window based estimation
c) Kernel based estimation
d) None of these

- a)
- b)
- c)
- d)

4) The Poisson distribution is given as *2 points*

a) $p(k,\lambda)=\dfrac{\lambda^{-k}e^{\lambda}}{k!}$

b) $p(k,\lambda)=\dfrac{\lambda^{k}e^{\lambda}}{k!}$

c) $p(k,\lambda)=\dfrac{\lambda^{k}e^{-\lambda}}{k!}$

d) None of these

- a)
- b)
- c)
- d)

5) *2 points*

Which of the technique is used in non-parametric probability density estimation?

a) Histogram based.
b) Window based.
c) Both a and b.
d) None of the above.

- a)
- b)
- c)
- d)

6) *2 points*

A probability density function, $p(x) = \begin{cases} \alpha e^{-\alpha x}, & \text{if } x \geq 0 \\ 0, & \text{otherwise} \end{cases}$, with α as an unknown parameter. Which of the following expressions is the maximum likelihood estimation of α ? (Assume sample values are greater than 1)

a) $\frac{1}{N}\sum_{i=1}^{N} \log x_i$

b) $\frac{N}{\sum_{i=1}^{N} x_i}$

c) $\frac{1}{N}\sum_{i=1}^{N} x_i$

d) $\frac{N}{\sum_{i=1}^{N} \log x_i}$

- a)
- b)
- c)
- d)

7) **2 points**

Let a density function $p(x_k \mid \theta)$ is given as, $p(x_k \mid \theta) = \frac{1}{\sqrt{2\pi\theta_2}} \exp\left[-\frac{(x_k - \theta_1)^2}{2\theta_2}\right]$. Find the maximum likelihood estimate with respect to the parameter vector θ_1.

a) $\hat{\theta}_1 = \sum_{k=1}^{N} x_k$

b) $\hat{\theta}_1 = \sum_{k=1}^{N} x_k^2$

c) $\hat{\theta}_1 = \frac{1}{N}\sum_{k=1}^{N} x_k^2$

d) $\hat{\theta}_1 = \frac{1}{N}\sum_{k=1}^{N} x_k$

- a)
- b)
- c)
- d)

8) **2 points**

Let a density function $p(x_k \mid \theta)$ is given as, $p(x_k \mid \theta) = \frac{1}{\sqrt{2\pi\theta_2}} \exp\left[-\frac{(x_k - \theta_1)^2}{2\theta_2} \right]$. Find the maximum likelihood estimate with respect to the parameter vector θ_2.

a) $\hat{\theta}_2 = \sum_{k=1}^{N} \left(x_k - \hat{\theta}_1\right)^2$

b) $\hat{\theta}_2 = \frac{1}{N} \sum_{k=1}^{N} \left(x_k - \hat{\theta}_1\right)^2$

c) $\hat{\theta}_2 = \sum_{k=1}^{N} \ln\left(x_k - \hat{\theta}_1\right)$

d) $\hat{\theta}_2 = \sum_{k=1}^{N} \left(x_k - \hat{\theta}_1\right)$

- a)
- b)
- c)
- d)

9) **_2 points_**

Exponential distribution $p(x) = \begin{cases} \lambda e^{-\lambda x}, & \text{if } x \geq 0 \\ 0, & \text{otherwise} \end{cases}$. Let μ is the mean of the samples, then λ is defined as

a) $\lambda = \mu$

b) $\lambda = \mu^{-1}$

c) $\lambda = \mu^2$

d) None of these

- a)
- b)
- c)
- d)

10) **_2 points_**

Let a probability distribution is given as $p(k) = \frac{\lambda^k e^{-\lambda}}{k!}$, find the mean of this distribution.

a) λ

b) λ^2

c) $1/\lambda$

d) None of these

- a)
- b)
- c)
- d)

You may submit any number of times before the due date. The final submission will be considered for grading.

Submit Answers