

Probability and Statistics

Assignment -5 [29th Oct 2018]

1. Let X_1, X_2, \dots be independent random variables with Bernouli(p) distribution. Find the maximum likelihood estimator of p based on X_1, X_2, \dots, X_n . Is it unbiased? Is it consistent ?
2. Let X_1, X_2, \dots be independent random variables with normal distribution, mean 0 and variance θ , $0 < \theta < \infty$. Find the maximum likelihood estimator of θ based on X_1, X_2, \dots, X_n . Is it unbiased? Is it consistent ?
3. Let X_1, X_2, \dots be independent random variables with common density, for $\theta > 0$

$$f(x, \theta) = \frac{1}{\theta} \exp\left\{-\frac{x}{\theta}\right\}, \quad 0 < x < \infty.$$

Find the maximum likelihood estimator of θ based on X_1, X_2, \dots, X_n . Is it unbiased? Is it consistent ?

4. Let X_1, X_2, \dots be independent random variables with common density, for $\theta > 0$

$$f(x, \theta) = \frac{1}{\theta} \quad 0 < x < \theta.$$

Find the maximum likelihood estimator of θ based on X_1, X_2, \dots, X_n . Is it unbiased? Is it consistent ?

5. Let X_1, X_2, \dots be independent random variables with Poisson distribution, mean θ , $\theta > 0$. Find the maximum likelihood estimator of θ based on X_1, X_2, \dots, X_n . Is it unbiased? Is it consistent ?
6. Let X_1, X_2, \dots be independent random variables with common density, for $\theta > 0$

$$f(x, \theta) = \frac{1}{2} \exp\{-|x - \theta|\}, \quad -\infty < x < \infty.$$

Find the maximum likelihood estimator of θ based on X_1, X_2, \dots, X_n . Is it unbiased? Is it consistent ?

7. Let X_1, X_2, \dots be independent random variables with normal distribution, mean μ and variance θ , $-\infty < \mu < \infty$, $0 < \theta < \infty$. Find the maximum likelihood estimates of μ and θ based on X_1, X_2, \dots, X_n . Are they unbiased?