AI1110 Assignment-13

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Outline

Question

The random variable x has the truncated exponential $f(x) = ce^{-c(x-x_0)}U(x-x_0)$. Find the ML estimate $\hat{c}$ of c in terms of n samples x_i of x.

Solution

Given

$$f(x) = ce^{-c(x-x_0)}U(x - x_0) \tag{1}$$

$$\Rightarrow f(X, c) = c^n e^{-cn(\bar{x}-x_0)} \tag{2}$$

Where $\bar{x} = \frac{\Sigma x_i}{n}$
To obtain the ML estimate $\hat{c}$ of c

$$\frac{\partial f(X, c)}{\partial c} = 0 \tag{3}$$

$$\Rightarrow nc^{n-1}e^{-c(x-x_0)} = c^n e^{-c(x-x_0)} n(\bar{x} - x_0) \tag{4}$$

$$\Rightarrow \hat{c} = \frac{1}{\bar{x} - x_0} \tag{5}$$