Tutorial No. 2

STAT 51033

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1. Let $X_1, X_2, \ldots, X_n$ is a random sample of size n, from the distribution with Probability density function (p.d.f) with $f(x;\theta) = \theta^x (1-\theta)^{1-x}$; $x = 0,1$.
   Show that $\bar{X} = \frac{X_1 + X_2 + \cdots + X_n}{n}$ is a sufficient estimator for the parameter θ.
2. Let $X_1, X_2, \ldots, X_n$ is a random sample of size n from the distribution with Probability density function (p.d.f) with $f(x;\theta) = \lambda e^{-\lambda x}$; $x \geq 0$
   Find a sufficient statistic for the parameter using Factorization theorem.

3. Define the exponential family of densities.

   Let $X_1, X_2, \ldots, X_n$ is a random sample of size n from the geometric distribution with parameter p. Use exponential criteria to find a sufficient statistic for the parameter p.

4. Let $X_1, \cdots, X_n$ be a random sample from a Bernoulli distribution with parameters p. Is $\bar{X}$ the best unbiased estimator for p? Does it attain Cramer Rao Lower Bound?