Behavior of the Fisher information under additive perturbations and properties of the Pitman estimators in small samples

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Abstract

Let $I(X)$ denote the Fisher information on a location parameter θ contained in an obsevation of $X+\theta$. If a random variable Y is independent of X, then plainly $I(X+Y) < I(X)$. A much less trivial inequality is due to Stam:

$$1/I(X+Y) \geq 1/I(X) + 1/I(Y).$$

In the talk, the statistical meaning of the Stam inequality is revealed, a few related inequalities and the behavior of $I(X+\lambda Y)$ as a function of λ are discussed. An interesting characteristic property of the Gaussian distribution surfaces.

Properties of the Pitman estimators in small samples related to the above properties of the Fisher information will be presented.