Massachusetts Institute of Technology
Department of Electrical Engineering and Computer Science

6.432 Stochastic Processes, Detection and Estimation

Recitation 6 Outline

March 10, 2004

Nonrandom Parameter Estimation

1. Review of important concepts

   - Estimator performance: bias versus error covariance
   - Cramer–Rao bound and the Fisher information matrix
   - Maximum Likelihood (ML) estimation
   - Efficiency and minimum variance unbiased estimators

2. Proof of equivalence of Fisher information forms (scalar case)

$$I_{\mathsf{y}}(x) = E\left[\left(\frac{d}{dx}\ln p_{\mathsf{y}}(y;x)\right)^2\right] = -E\left[\frac{d^2}{dx^2}\ln p_{\mathsf{y}}(y;x)\right]$$

3. Maximum Likelihood estimation examples

   - Nonlinear function of vector in Gaussian noise
   - Linear function of vector in Gaussian noise (projection theorem)