ID3

ARX Identification

3.11 CRAMÉR–RAO LOWER BOUND

Let $x = [x_1, x_2 \dots x_N]^T$ be a vector whose entries are observations of a stochastic process with probability density function $p(x;\gamma)$ depending on an unknown vector $\gamma \in \mathcal{R}^d$. Denote then with $\hat{\gamma}(x)$ an arbitrary unbiased estimate of γ obtained from x. Then

$$\mathrm{cov}\,\hat{\gamma} \geq F^{-1} \tag{3.11.1}$$

where F, given by

$$F = \mathrm{E}\left[\frac{\partial \log p(x;\gamma)}{\partial \gamma}\left(\frac{\partial \log p(x;\gamma)}{\partial \gamma}\right)^T\right] = -\mathrm{E}\left[\frac{\partial^2 \log p(x;\gamma)}{\partial \gamma^2}\right], \tag{3.11.2}$$

is called Fischer information matrix. Note that in (3.11.2) $\partial \log p(x;\gamma)/\partial\gamma$ is a $(d \times 1)$ vector and consequently, F is a $(d \times d)$ matrix.

SECTIONS MODULES QUESTIONS HOME PAGE
PREV. MODULE FAQ TUTOR NEXT MODULE