1. Estimation

Statistic

Let:

- $(\Omega, \mathcal{A}, \mathcal{P})$ m-D statistical model parametrized by Θ
- (M, Σ) measurable space
- $X : \Omega \to M$ random variable
- $f : M \to \mathbb{R}^m$

Then, f is a statistic if:

- f measurable

We denote:

- $f : T$

Sufficiency

Let:

- $(\Omega, \mathcal{A}, \mathcal{P})$ m-D statistical model parametrized by Θ
- (M, Σ) measurable space
- $X : \Omega \to M$ random variable
- $T : M \to \mathbb{R}^m$ statistic

Then, T is sufficient if:

- $\forall\ \theta_1, \theta_2 \in \Theta$:

  $\forall\ x \in M$:

  $\forall\ t \in \mathbb{R}^m$:

  $$P_{\theta_1}(X = x \mid T \circ X = t) = P_{\theta_2}(X = x \mid T \circ X = t)$$

Estimator

Let:

- $(\Omega, \mathcal{A}, \mathcal{P})$ statistical model parametrized by Θ
- (M, Σ) measurable space
- $X : \Omega \to M$ random variable
- $T : M \to \mathbb{R}^k$ statistic
- $\theta \in \Theta$

Then, T is an estimator of θif:

- T approaches θ

Loss function

Let:

- $(\Omega, \mathcal{A}, \mathcal{P})$ statistical model parametrized by Θ
- (M, Σ) measurable space
- $X : \Omega \to M$ random variable
- $T : M \to \mathbb{R}^k$ estimator
- $W : \mathbb{R}^k \times \Theta \to \mathbb{R}^+$

Then, W is a loss function if:

- $W(\theta, \theta) = 0$

Risk function

Let:

· $(\Omega, \mathcal{A}, \mathcal{P})$ statistical model parametrized by Θ

· (M, Σ) measurable space

· $X : \Omega \to M$ random variable

· $T : M \to \mathbb{R}^k$ estimator

· $W : \mathbb{R}^k \times \Theta \to \mathbb{R}^+$ loss function

We name risk function to:

$$\cdot \quad \begin{array}{rccc} R_T : & \Theta & \longrightarrow & \mathbb{R}^+ \\ & \theta & \longmapsto & E_\theta(W(T,\theta)) \end{array}$$

UMV

Let:

- $\cdot$ *statements*
- $\cdot$

Then, *item* is a/an entity if:

- $\cdot$ *conditions*
- $\cdot$

We denote:

- $\cdot$ *property* : *notation*
- $\cdot$

Same conditions

Let:

· $(\Omega, \mathcal{A}, \mathcal{P})$ parametric statistical model

· $X : \Omega \to \mathbb{R}$ random variable

· $\Theta \subset \mathbb{R}$ interval

· χ_F real estimator with integrable quadratic

·

Then, *item* is a/an entity if:

· $\forall\ \theta \in \Theta$:

$\exists\ h : \mathbb{R} \to \mathbb{R}$:

$h \geq 0$

h integrable

$\exists\ \mathcal{U} \subset \mathbb{R}$:

$\theta \in \mathcal{U}$

$|T(x)\partial_\theta L(x,\theta)| \leq h$

Efficient

Let:

· mismas condiciones

Then, T is efficient if:

· $Var_\theta T = \frac{g'(\theta)^2}{I(\theta)}$