213L6: Point Estimation of Parameters

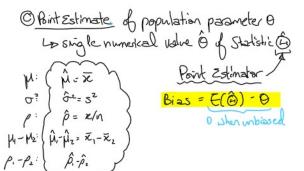
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Statistical inference:

- Parameter estimation
- Hypothesis testing

- 1. Introduction
- 2. General Concepts of Point Estimation
- 3. Methods of Point Estimation
- 4. Sampling Distributions
- 5. Sampling Distributions of Means

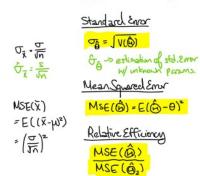


Minimum Vaniance Unbiased Estimator (MVUE)

Lo unbiased estimators of 0 W small set variance

M: MVUE = sample mean X

Unomal dist: u/ µ, 02 & random sample size n.



yethods of PE

 k^{4h} population moment = $E(\chi^{k})$ k^{4h} sample moment = $\frac{1}{h}\sum_{i=1}^{h}\chi_{i}^{k}$

Moment Estimators $\hat{\Theta}_1$, $\hat{\Theta}_2$,..., $\hat{\Theta}_m$ found by

$$\begin{cases} M_s + \Delta_s = \frac{N}{2} \sum_{i=1}^{n} X_i^s \\ N = X \end{cases}$$

$$\hat{\beta} = \frac{\sum_{i=1}^{n} X_{i}^{x} - \left(\frac{1}{N} \sum_{i=1}^{n} X_{i}^{x} \right)^{2}}{\gamma}$$

$$= \frac{\sum_{i=1}^{n} (X_{i} - \overline{X}_{i})^{2}}{\gamma}$$
//not unb

Likelihood Function

L(0) = f(x, 0) · f(x20) · ... · f(xn10)

$$\frac{M_{aximum} \text{ Liklihood Estimator}}{\hat{\mu} = \bar{\chi} \quad \hat{\sigma}^2 = \frac{1}{N} \sum_{i=1}^{n} (X_i - \bar{X})^2}$$

 $\frac{d L(\theta)}{d \theta} = 0$

(1) E(@) ~0

2) V(G) nearly as small as variance obtained up only other estimator

(3) ô has an approx. normal distribution

Invariance Property

if $\hat{\Theta}_1, \hat{\Theta}_2, ..., \hat{\Theta}_k$ are max. likelihood estimators W/ param $\Theta_1, \Theta_2, ..., \Theta_k$, then max likelihood est. of any function $h(\Theta_1, \Theta_2, ..., \Theta_k)$ of these parameters is the same function $h(\hat{\Theta}_1, \hat{\Theta}_2, ..., \hat{\Theta}_k)$ of estimators $\hat{\Theta}_1, \hat{\Theta}_2, ..., \hat{\Theta}_k$.

Statistical Inference

- O Sampling distribution: probability distribution of a statistic
- @ Central Limit Thm:

IF 1) X1, X2,..., Xn of rand. sample size on his pe & 02 2) X = rample mean

 $Z = \frac{\overline{X} - \mu}{\sigma / \sqrt{n}}$ as $n \to \infty$ /approx. std. normal dist.

@ Sampling Distribution of Means:

if 1) 2 independent populations W/ μ, 4 μz, $\sigma_1^2 \xi \sigma_2^2$

2) X, & X, are sample means

 $Z = \frac{\overline{x}_1 - \overline{x}_2 - (\mu_1 - \mu_2)}{\sqrt{\sigma_1^2/n_1 + \sigma_2^2/n_2}}$ //approx. std. named