

Sri Lanka Institute of Information Technology

Faculty of Computing

IT2120 - Probability and Statistics

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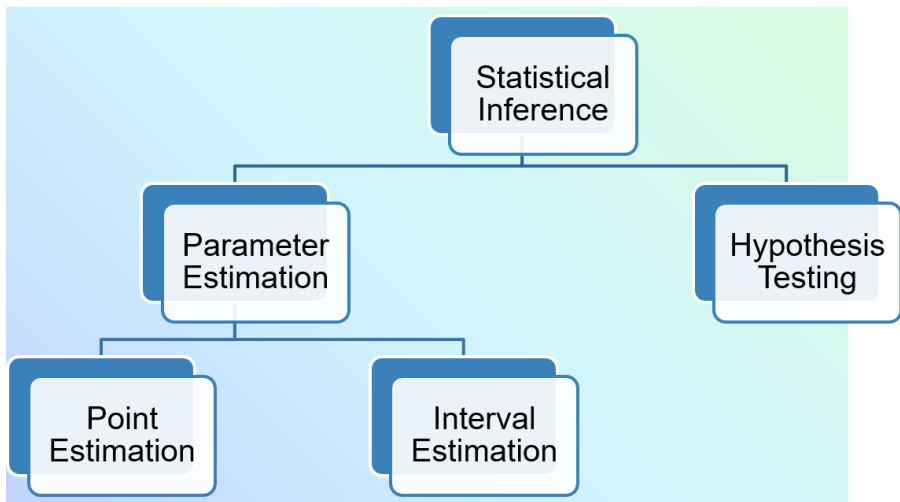
Year 02 and Semester 01

Lecture 9

STATISTICAL INFERENCE

(Part 2)

CONFIDENCE INTERVALS



Introduction

- Estimates will differ from the true parameter values by varying amounts depending on the samples obtained.
- Point estimates do not convey any measure of reliability.

Interval Estimation

- Interval estimation states that a **population parameter** is **within two values** (an interval) with a **certain probability (Confidence Level)**.
- Interval Estimation is also known as **Confidence Interval**.
- For a good interval estimate,
 - The probability that the parameter is within the interval should be high.
 - The length of the interval should be small.

- A confidence level for the interval should be defined first.

$$\text{Confidence Level} = 1 - \alpha$$

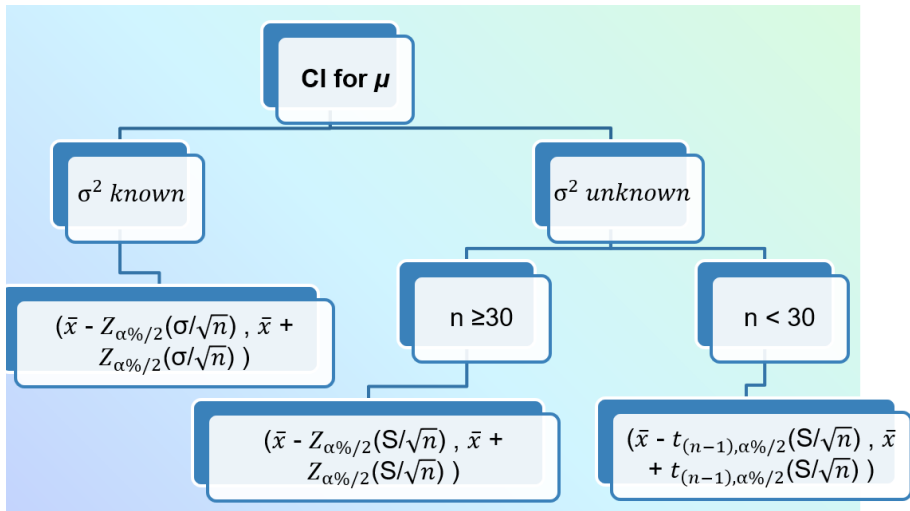
where α is the significance level discussed in hypothesis testing.

- Let L and U be the lower and upper confidence limits for a parameter θ based on a random sample X_1, \dots, X_n .
- Both L and U are functions of the sample. We can write the interval estimate of θ as,

$$Pr (L \leq \theta \leq U) = 1-\alpha$$

- **Interpretation:** We are $(1 - \alpha)\%$ confident that the true parameter θ is located in the interval (L, U) .
- In this session, we will discuss confidence intervals for population mean (μ) only.

Confidence Intervals (CI)



Example:

A company that manufactures cars claims that the gas mileage for its new line of hybrid cars, has a standard deviation of 4 mpg. It was also found out that the mpg was normally distributed. A random sample of 16 cars yielded a mean of 57 miles per gallon. What is the interval estimation for the population mean at a 95% confidence level?

Thanks!

Any questions?

