Basic Statistics

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Outline I

Chapter 1: Introduction

Introduction I

What is statistics?

- Statistics is the science of making numerical conjectures about puzzling question.
    - What causes resemblance between parents and children? How strong is the force?
    - Are new medical treatments effective?
    - How much increment is needed in advertisement expenditure to attain a specific sales value?
    - Who is going to win the next election? What will be the margin?
    - Why does the casino make a profit?

Definition

- Statistics is the science of understanding data/information and of making decisions in the face of **variability** and **uncertainty**.

Introduction III

- Uncertainty:
  - There are many situations that we encounter in science (or more generally in life) in which the outcome is uncertain.
  - In some cases the uncertainty is because the outcome in question is not determined yet
    - We may not know whether it will rain tomorrow
  - In some cases the uncertainty is because although the outcome has been determined already, we are not aware of it
    - We may not know whether we passed a particular exam

Introduction IV

- Variability:
    - It can arise for various reasons.
    - If one visits a Teak plantation and measures the diameter of the trees at breast height, the measurements will reflect the natural variation from one tree to another,
    - Variation due to
        - Type of trees
        - Age differences
        - Measurement error
    - The concepts and methods of Statistics enable the investigator to describe/explain variability and to plan research so as to take variability into account.

Introduction V

Another definition

- Statistic: A body of scientific methods (statistical methods) used for collection, compilation, analysis and interpretation of statistical data.
  - Statistical methods are used to analyse data so as to extract the maximum information and also to quantify the message from that information.
  - Experiment->Observation->Inference