

# Basic Statistics

Sudipta Das

Assistant Professor,  
Department of Computer Science,  
Ramakrishna Mission Vivekananda Educational & Research Institute

## 1 Introduction

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# *Chapter 1: Introduction*

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## What is statistics?

- Statistics is the science of making numerical conjectures about puzzling question.
  - What are the effects of new medical treatments?
  - What causes the resemblance between parents and children, and how strong is the force?
  - Why does casino make a profit at roulette?
  - Who is going to win the next election? by how much?
  - How many people are employed? unemployed?
  - How much increment is needed in advertisement expenditure to attain a specific sales value?

## Definition

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

- 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

- 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.

## 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