Introduction to Statistics

1 Introduction to Statistics

1. Definition of Statistics
2. Types of Statistics
   (a) Descriptive Statistics
   (b) Inferential Statistics
3. Population and Sample

2 Data Types and Measurement Levels

1. Classification of Variables
   (a) Categorical Variables
      i. Nominal Data
      ii. Ordinal Data
   (b) Numerical Variables
      i. Interval Data
      ii. Ratio Data
2. Comparison Between Data Types

3 Descriptive Statistics: Summarising and Visualising Data

1. Frequency Tables and Graphs
   (a) Frequency Tables
   (b) Line Graphs
   (c) Bar Graphs
   (d) Frequency Polygons
   (e) Relative Frequency Tables
   (f) Pie Charts

2. Grouped Data, Histograms, and Ogives
    (a) Class Frequency Tables
    (b) Frequency Histograms (Normal, Bimodal, Skewed)
    (c) Cumulative Frequency (Ogives)
3. Stem and Leaf Plots
4. Measures of Spread or Variability
    (a) Sample Variance
    (b) Sample Standard Deviation
5. Measures of Position
    (a) Sample Percentile
    (b) Sample Quartiles (First, Second/Median, Third)
    (c) Sample Mode
    (d) Box Plots

4 Sampling Techniques

1. Importance of Choosing a Representative Sample
2. Methods for Choosing a Representative Sample
    (a) Simple Random Sample
    (b) Stratified Random Sampling
3. Sequential Sampling
    (a) Non-fixed Sample Size
    (b) Stopping Rules
    (c) Time and Cost Savings

5 Correlation

1. Paired Data Sets
2. Sample Correlation Coefficient (r)
    (a) Positive Correlation
    (b) Negative Correlation
    (c) Properties of r

6 Inequalities

1. Chebyshev's Inequality
2. One-Sided Chebyshev Inequality
3. Empirical Rule of Normal Datasets
4. Fitting Different Types of Distributions (Future Topic)

7 Probability

1. Sample Space (S) and Events (E, F)
2. Venn Diagrams
3. Algebra of Events
   (a) Commutative Law
   (b) Associative Law
   (c) Distributive Law
   (d) De Morgan's Laws
4. Axioms of Probability
5. Propositions Derived from Axioms
6. Sample Spaces with Equally Likely Outcomes
7. Generalized Basic Principle of Counting
8. Conditional Probability
9. Bayes' Formula