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Institute Of Information Technology

Business Mathematics and Statistics

Reading Materials

Core Texts:

Business Statistics
By J.K. Sharma
[2nd Edition]
Pearson Education (Dorling Kindersley India Pvt. Ltd)

Applied Mathematics for Business, Economics, and the Social Sciences
By Frank S.Budnick
[4th Edition]McGraw-Hill

Additional reading:

Statistics for Management
By Richard I. Levin and David S. Rubin
[7th Edition] Prentice Hall of India Pvt. Ltd.

Statistical Theory
By M. C. Sher, and K. Shahid
[6th Edition] Ilmi Kitab Khana

Business Mathematics and Statistics

1.1 Statistics:

The term *Statistics* refers to, listing of facts to a systematic methods of arranging and describing the data and finally the science of inferring generalities from specific observations.

1.1.1 Statistical Methods:

Methods adopted in the collection and analysis of numerical information or statistical data for the purpose of drawing conclusions and making decisions are called *Statistical Methods*.

1.1.2 Types of Statistical Methods:

Statistical methods fall into two categories:

Descriptive Statistics

Inferential Statistics

Descriptive Statistics includes statistical methods involving the collection, presentation, and characterization of a set of data in order to describe the various features of that set of data.

In general, methods of descriptive statistics include graphic methods such as Histogram, Frequency Polygon/Curve, Cumulative frequency polygon/Curve, Bar charts, line graphs, pie charts etc, whereas numeric measures includes measures of central tendency, dispersion, Skewness and kurtosis.

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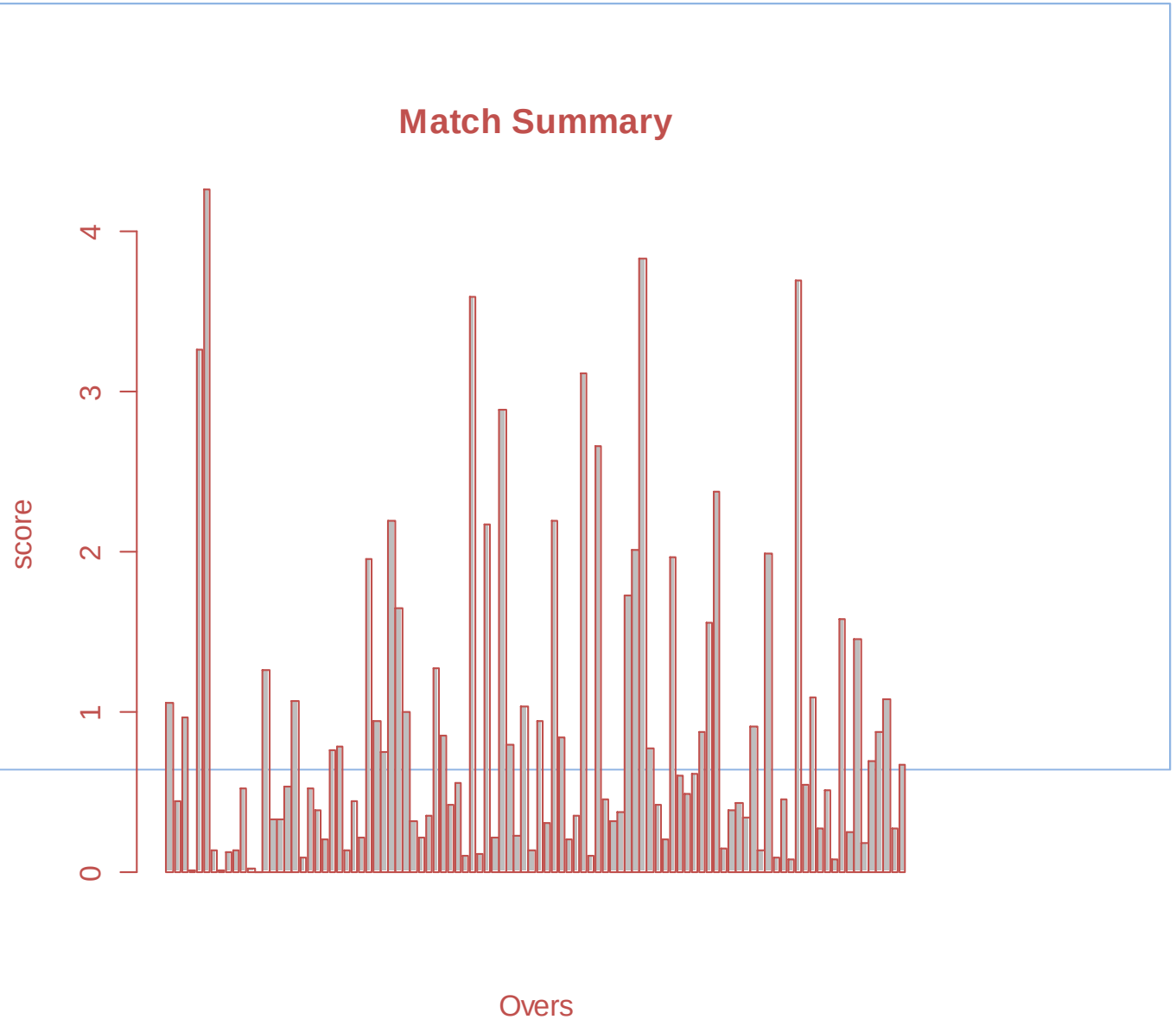
Role of Statistics



Populations and Samples

Inferential Statistics deals with procedures for making inferences about the characteristics that describes the larger group of data, called *population*, from the knowledge derived from only a part of the data, known as *Sample*.

1.1.3 Populations and Samples

A ***population*** or a ***statistical population*** is a collection or set of all possible observations whether finite or infinite, relevant to some characteristics of interest. A statistical population may be real such as the heights of all university students or hypothetical such as all possible outcomes from the toss of a fair coin. The number of observations in a finite population is called the *size* of the population (N). Numerical quantities describing a population are called ***parameters*** (are represented by Greek letters).

A ***sample*** is a part or a subset of population. The number of observations included in a sample is called the size of the sample (n). A numerical quantity computed from a sample, is called a ***statistic***, which is usually represented by the ordinary Latin letter. The information derived from sample is used to draw conclusions about the population.

Observations, Data and Variables

1.2 Observations, Data

In statistics, an observation often means any sort of numerically recording of information, whether it is a physical measurement such as height, or weight; or a classification such as eye color, answer to a question such as yes or no.

A collection of such observations may be termed as *data* or *Statistical data.* Data may be classified into two types, viz. *Qualitative data and Quantitative data.*

Qualitative data. When the population is divided into several categories, it is possible to count the number of individuals in each category. These counts are the Qualitative data. For example, eye color, blood type, gender etc.

Quantitative data. Observations, which are measured quantitatively (numerical measurement) give rise to Quantitative data. such as height, or weight, temperature, time, cholesterol level, blood pressure, etc.

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Types of Variables

1.3 Variables

A characteristic that varies with an individual or an object, is called a *variable.* For example, age is a variable as it varies from person to person. Variables may be classified into Quantitative and Qualitative.

A variable is called *qualitative variable* if the characteristic is non-numerical such as education, honesty, intelligence, poverty, satisfaction, etc.

A variable is called *quantitative variable* when a characteristic can be expressed numerically such as age, weight, height, income or number of children.

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Types of Quantitative Variable

1.3.1 Discrete and Continuous Variables

A *quantitative* variable may be classified as discrete or continuous variable.

A *discrete variable* is one that can take only a discrete set of integers or whole numbers i.e there are jumps between the numerical values. A discrete variable represents count data such as the number of children in a family, number of rooms in a house, the number of road accidents, births, deaths etc.

A variable is called a *continuous variable* if it can take on any value fractional or integral within a given interval (say) a, b such that b>a. A continuous variable represents measurement data such as the age of a person, height of a plant, weight of a commodity, the temperature at a place, etc.

Role of Statistics in Business Management

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Certain activities of a typical organization where Statistics plays an important role in their execution are discussed below;

Marketing

Before a product is launched, the market research team of an organization, through a pilot survey, makes use of various techniques of statistics to analyze data on population, purchasing power, habits of the customers, competitors, pricing etc. such studies reveal the possible market potential for the product to be launched.

Analysis of sales volume in relation to the purchasing power and concentration of population is helpful in establishing sales territories, routing of salesman and advertising strategies to improve sales.

Production

Statistical methods are used to carry out R&D programs for the improvement in the quality of the existing products and setting quality control standards for new ones. Decisions about the quantity and time of either self-manufacturing or buying from out-side are based on statistically analyzed data.

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Role of Statistics in Business Management

Finance

A statistical study through correlation analysis of profits and dividends helps to predict and decide probable dividends for future years. Statistics, applied to analysis of data, on assets and liabilities and income and expenditure helps to ascertain the financial results of various operations.
Financial forecasts, break-even analysis, investment decisions under uncertainty all involve the application of relevant statistical methods for analysis.

Personnel

In the process of manpower planning, a personnel department makes statistical studies of wage rates, incentive plans, cost of living, labor turnover rates, employment trends, accidents rates, performance appraisal and training and development programs. Employer-employee relationships are studied by statistically analyzing various factors such as wages, grievances handling, welfare, delegation of authority, education and housing facilities, and training and development.

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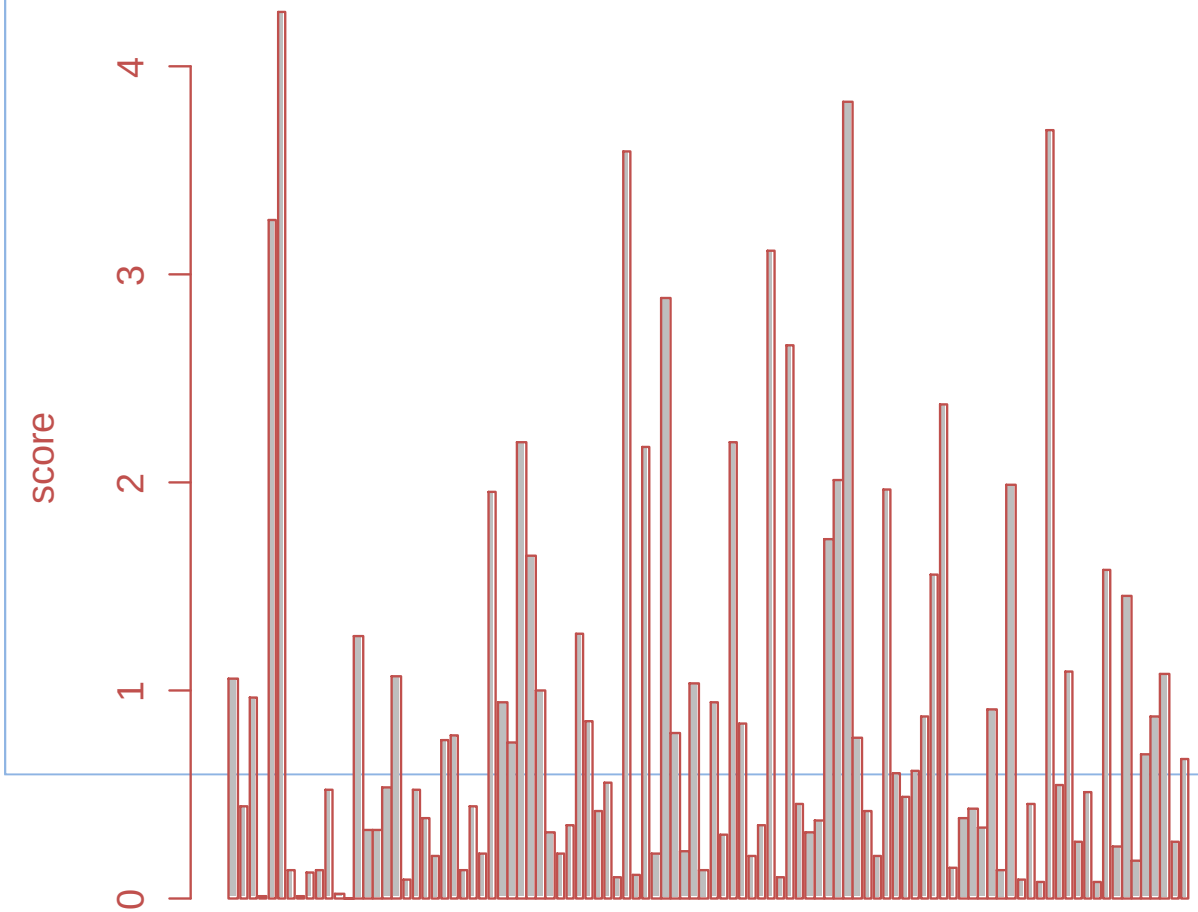
Role of Statistics



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Role of Statistics

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56 – 65 10

66 – 75 12

Role of Statistics

45 – 55

45 – 56

57 – 60

61 –

Mean

$$\text{Mean} = \frac{\Sigma fx}{\Sigma f}$$

$$\text{Mode} = l + \frac{(f_m - f_1)}{(f_m - f_1) + (f_m - f_1)}$$

Where

l = Lower class limit

f_m = Frequency of Modal class.

f_1 = " " class Preceding the Modal class.