



Chapter 1

Introductory Statistics

Basic Statistics

Statistics

Statistics is the collection of methods for planning experiments, obtaining data and then organizing, summarizing, presenting, analyzing, interpreting and drawing conclusions based on data.

Statistical Methods

Statistical methods are those ways that are used to collect, present, analyze, and interpret quantitative data.

Type of Statistics

There are two major types of Statistics: Descriptive Statistics and Inferential Statistics:

Descriptive Statistics

It consists of methods for organizing and summarizing information in a presentable and effective way.

Inferential Statistics

It consists of methods of drawing conclusions about a population based on information obtained from a sample of the population.

Data

A collection of facts from which conclusions may be drawn is referred as data.

Observation

Any sort of recording of information is called observation.

Types of Data

Generally, data can be classified by their nature and way of collection.

Types of Data (Nature)

Qualitative Data

Qualitative (or Categorical or Attribute) data can be separated into different categories that are distinguished by some non-numerical characteristics. For example, gender of person, blood type, and eye color etc.

Quantitative Data

Quantitative data consist of numbers representing counts or measurements such as number of patients in a hospital, ages of a group of persons, data about height and weight of individuals etc.

Quantitative data can be further classified into discrete and continuous data. All type of count data are referred as discrete data where measured data are referred as continuous data.

Discrete Data

Data obtained by categorizing subjects so that there is a distinct interval between any two possible values e.g., number of patients in a hospital and number of chairs in a room etc.

Continuous Data

Continuous data result from infinitely many possible values that can be associated with points on a continuous scale in such a way that there are no gaps or interruptions. For example, data about height and weight of individuals etc.

Types of Data (Collection)

Primary Data

The data collected directly from people and organizations via questionnaires or surveys before being analyzed to reach conclusions concerning the issues covered in the questionnaire or survey.

Secondary Data

The data that have undergone any sort of treatment by statistical methods. In other words, the data that have already been assembled, having been collected for some other purpose, are referred as secondary data. Sources include census reports, trade publications, and subscription services.

Scales of Measurement

Nominal Scale

In nominal scale is categorized by data that consists of names, labels or categories only. Such data cannot be arranged in an ordering scheme. For example, gender; "male" and "female", response; "yes" or "no", etc.

Ordinal Scale

The ordinal scale involves data that may be arranged in some order but differences between data values either cannot be determined or are meaningless. For example, in a sample of 36 stereo speakers, 12 were rated good, 16 were rated better and 8 were rated best.

Interval Scale

The interval scale is like the ordinal scale with the additional property that meaningful amount of differences between data can be determined. However, there is no inherent (natural) zero starting point. Interval scales take the notion of ranking items in order one step further, since the distance between adjacent points on the scale are equal. For instance, the Fahrenheit scale is an interval scale, since each degree is equal but there is no absolute zero point. This means that although we can add and subtract degrees (100° is 10° warmer than 90°), we cannot multiply values or create ratios (100° is not twice as warm as 50°). What is important in determining whether a scale is considered interval or not is the underlying intent regarding the equal intervals: although in an IQ scale, the intervals are not necessarily equal (e.g. the difference between 105 and 110 is not really the same as between 80 and 85), behavioral scientists are willing to assume that most of their measures are interval scales as this allows the calculation of averages – mode, median and mean –, the range and standard deviation.

Ratio Scale

The ratio scale is the interval scale modified to include the inherent zero starting point. For values at this level, differences and ratios are meaningful. Ratio scales are the most sophisticated of scales, since it incorporates all the characteristics of nominal, ordinal and interval scales. As a result, a large number of descriptive calculations are applicable such as when respondents are asked for their age, height, income etc.

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