

# Introduction to Data Types

Data types are statistical measurements which can be divided into two different types: (1) Categorical Data, and (2) Numerical Data.

## Categorical Data

Categorical data is a data type represents characteristics such as gender, language, educational background, etc. It is qualitative data which divided into two measurement scales of data: (1) Nominal Data, and (2) Ordinal Data.

## Numerical Data

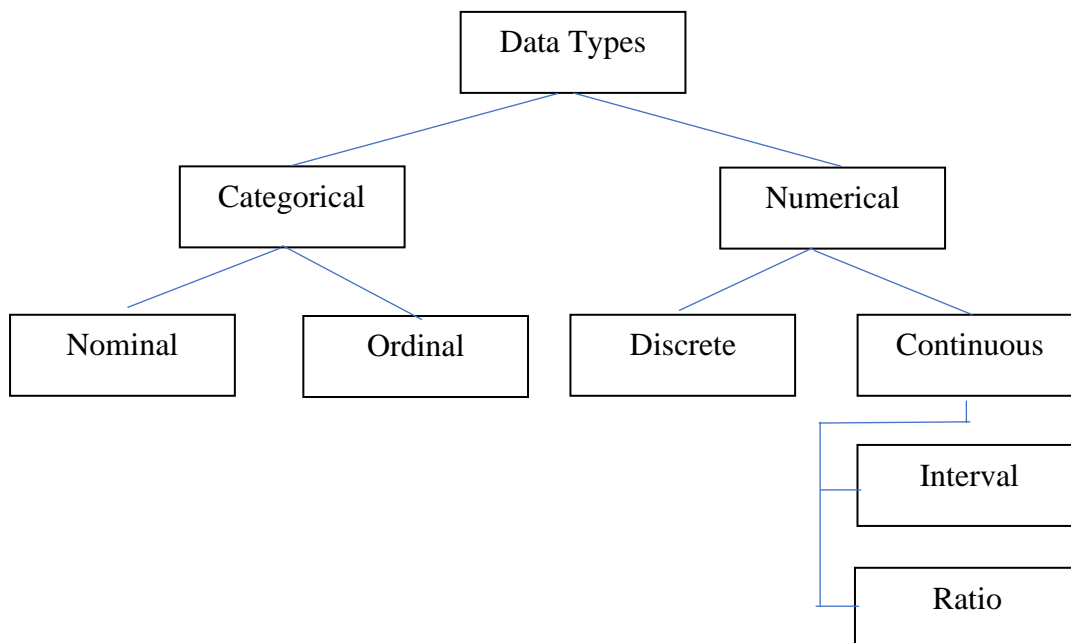
Numerical data is a data type expressed in numbers, sometimes called quantitative data. The examples of numerical data are usually expressed in numbers includes: census, temperature, age, mark grading, annual income, time, height, weight, etc. There are two types of numerical data: (1) Discrete Data, and (2) Continuous Data.

### Discrete Data

Discrete data is a type of numerical data which represents countable items.

### Continuous Data

Continuous data is a type of numerical data which represents the values on a real number line. It may be subdivided into two types: (1) Interval Data, and (2) Ratio Data.



## Level of Measurement

A data or variable has one of four different levels of measurement: Nominal, Ordinal, Interval, or Ratio. There is a hierarchy in the complexity and precision of level of measurement as we move from low (nominal scale) to high (ratio scale). These levels of measurement dictate what statistical analysis is appropriate.

**Nominal:** The data can only be categorized.

**Ordinal:** The data can be categorized and ranked.

**Interval:** The data can be categorized, ranked, and evenly spaced.

**Ratio:** the data can be categorized, ranked, evenly spaced and has a natural zero.

Each of these scales will be explained in detail with the examples as the followings.

### Nominal scales

A nominal scale is the first level of measurement used to assign subjects to certain categories or groups. Examples of nominal scale include: gender, marital status, blood types, eye color, hair color, city of birth, nationality, religion. In this scale, it is easy to generate responses using *close ended questions*. The information that can be generated from nominal scales is to calculate the percentage or frequency.

Examples of close ended questions:

1. What is your gender?
  - M-Male
  - F-Female
2. What is your religious preference?
  - Buddhist
  - Christian
  - Muslim
  - Jewish
  - Others .....

### Ordinal scales

An ordinal scale is the second level of measurement that rank-orders the categories of subjects in some meaning way according to some preference beyond just naming them (e.g.,

from best to worst, first to last, low to high). The information that can be determined from ordinal scales is the percentage or frequency, the mode or median.

Examples of questions might take the following form:

1. How do you feel today?

1 – Very Unhappy

2 – Unhappy

3 – OK

4 – Happy

5 – Very Happy

2. Please rank the following in order of importance from 1 to 4. You should rank the most important item of our restaurant as 1, the next in importance as 2, and so on, until you have ranked each of them 1, 2, 3, or 4.

Speed of Service

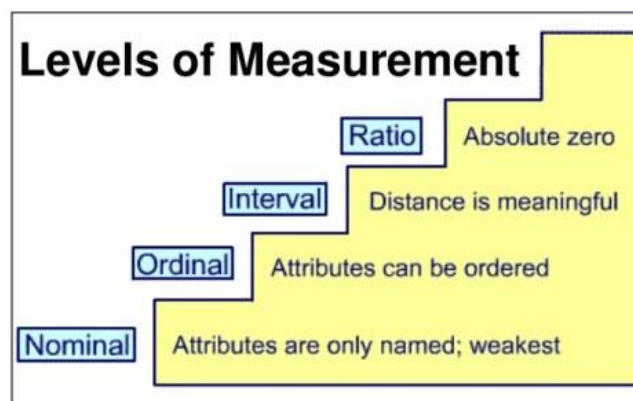
Ease of Parking

Cleanliness

Friendliness of Staff

## Interval Scales

An interval scale is the third level of measurement that allows the researcher to compute the means and standard deviations of the collected data. It involves groups individuals according to certain categories, taps the order of these groups, and computes the means and the standard deviations by performing certain arithmetical operations.



Source: kdnuggets.com

<http://www.fao.org/3/w3241e/w3241e04.htm#TopOfPage>

### Examples of Data Type

Examples	Data Type			
	Nominal	Order	Interval	Ratio
Are you married? <input type="radio"/> Yes <input type="radio"/> No	✓	-	-	-
What language do you speak? <input type="radio"/> Thai <input type="radio"/> English <input type="radio"/> Chinese <input type="radio"/> Japanese	✓	-	-	-
What is your educational background? <input type="radio"/> 1 – Elementary <input type="radio"/> 2 – High School <input type="radio"/> 3 – Undergraduate <input type="radio"/> 4 – Graduate	-	✓	-	-
What is the temperature (°C)? <input type="radio"/> 2 <input type="radio"/> 1 <input type="radio"/> 0 <input type="radio"/> -1 <input type="radio"/> -2	-	-	✓	-
What is your height (cm)? <input type="radio"/> 100 <input type="radio"/> 110 <input type="radio"/> 120 <input type="radio"/> 130 <input type="radio"/> Other .....	-	-	-	✓