Learning Outcome

By the end of this lecture, you will be able to:

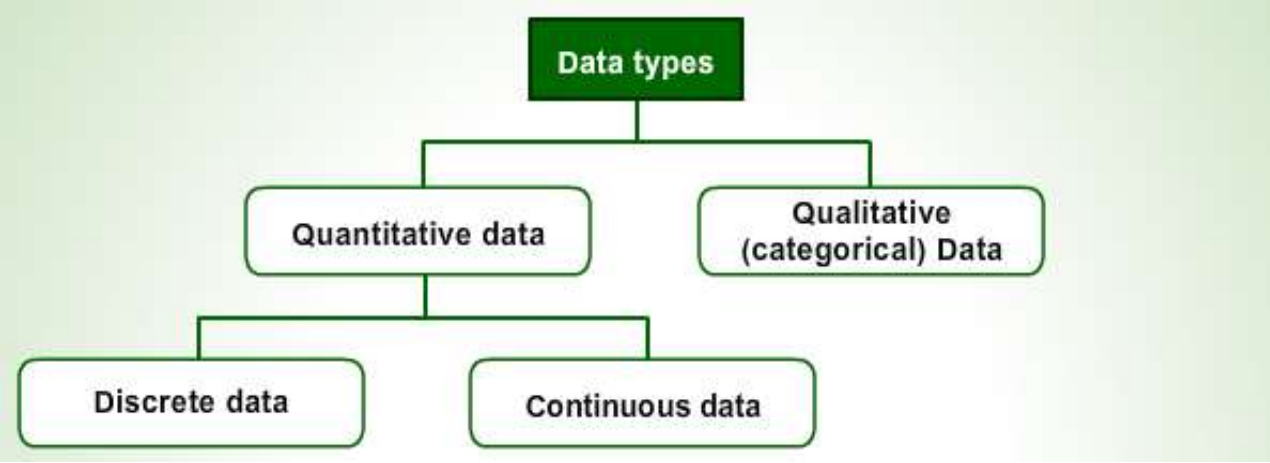
- Classify data types
- Describe levels of measurement

Data Types and Levels of Measurement

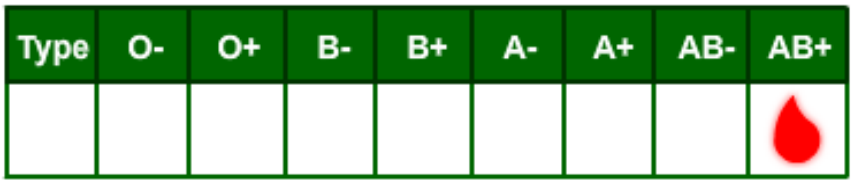
One of the important topics for the study of descriptive statistics is to recognize the type of data and level of measurement they follow. This helps us choose appropriate descriptive statistics and apply suitable statistical analysis.

Data Types

In general, data can be classified into two types.



Data types

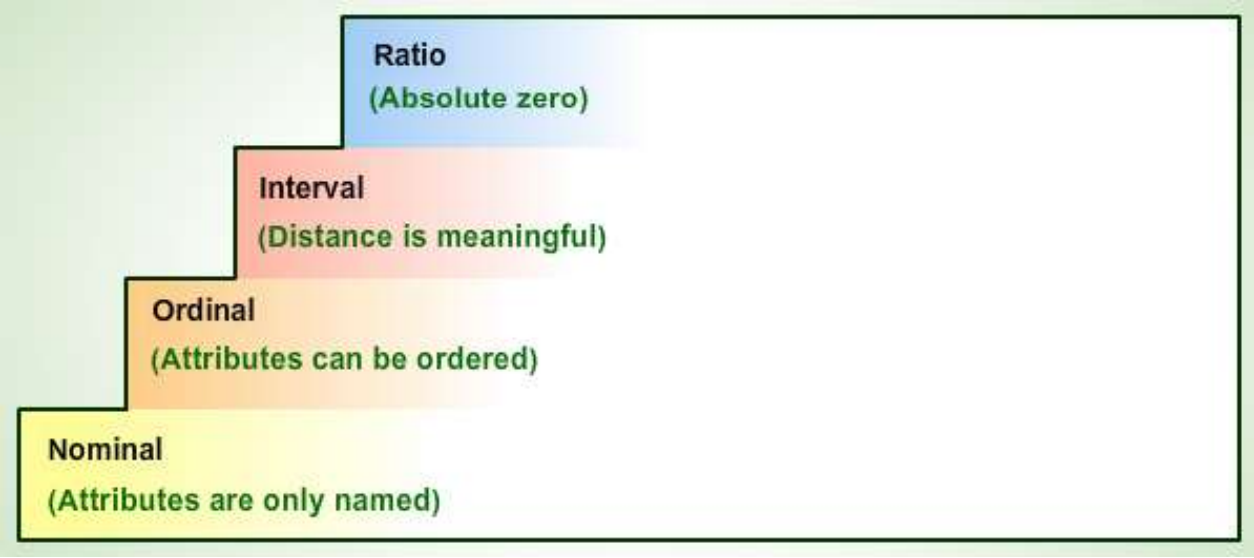
Quantitative Data	It is usually numerical values resulting from a counting or a measurement process. Quantitative data can be also classified into two sub-types namely: Discrete data and Continuous data.
Discrete Data	Data that assume distinct values such as the number of absent students, the number of potential customers and so on. 
Continuous Data	Data that can assume any value within a real-number interval such as the length, the weight, the temperature and so on. 
Qualitative (categorical) Data	Qualitative (categorical) Data are non-numerical values, which result from classifying the data of the variable under consideration into two or more categories (or classes). For instance, type of investment, blood type, the college of the student and so on. 

In terms of the time length of the statistical study, data can be classified into:

Cross-sectional data	Data that are recorded from one or more variables monitored at the same fixed time period. Examples: • The average company income by the end of the year • The number of credit hours registered by a student by the end of the summer session
Time-series data	Data that result from monitoring one or more variables at successive time-periods. Examples: • Annual sales of a company, monthly revenue the oil prices per day

Levels of Measurement

In general, there are four levels of measurement:



Levels of measurement

Nominal level	In the nominal level different values or attributes of the variable are only codes for "names" or classes that can be listed in any order with no possibility to be ranked. Examples: • The student's college • Blood types • Marital status
Ordinal level	In the ordinal level different attributes of the variable are only codes for "names" or classes that can be ranked and ordered accordingly. But, the differences between the attributes have no meaning. Examples: • The student's rank in the class according to his GPA • The students level according to the number of credit hours completed • The professorial rank • The military rank
Interval level	In the interval level different values or attributes of the variable are numerical and the distances between the attributes are meaningful. But the ratios between the different attributes are not real. Examples: • The weather temperature • The sum of the grades of a student
Ratio level	The ration level has all the properties of the previous levels. However, the ratios between the different attributes are meaningful, and the variable has a real zero. Examples: • Distance between cities • The volume of fluids • The number of attendees at an event

Recap

In this lecture, you have learned that:

- Data can be classified into quantitative data and qualitative data
- Qualitative data can be further divided into discrete data and continuous data
- In terms of the time length of the statistical study, data can be classified into cross-sectional data and time-series data
- There are four levels of measurement, nominal level, ordinal level, interval level and ratio level