



# DESCRIPTIVE STATISTICS

## INTRODUCTION

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# TOPIC OUTLINE

Descriptive Statistics

Types of Data

Levels of Measurement

Software Tools



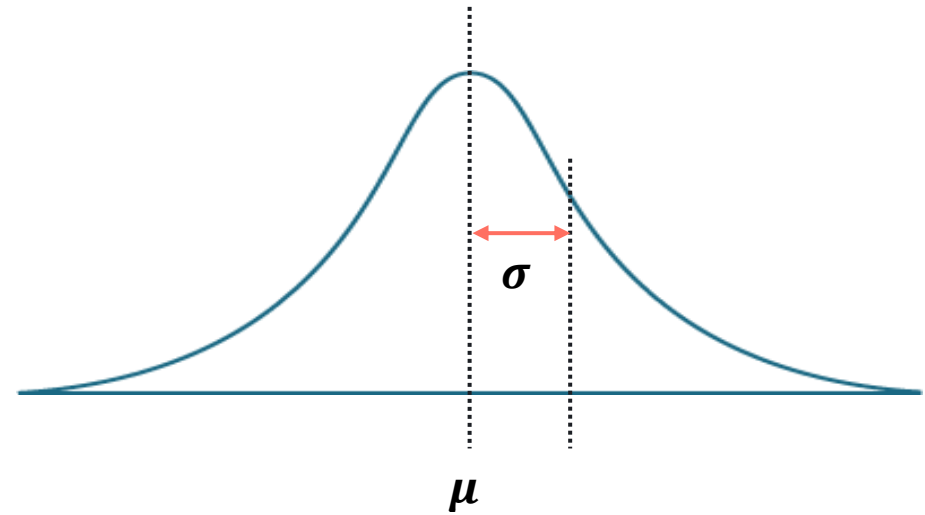
# DESCRIPTIVE STATISTICS



# DESCRIPTIVE STATISTICS

Descriptive statistics is a branch of statistics that summarizes and organizes data to provide meaningful insights. It focuses on presenting raw data in a more understandable form using measures of central tendency, measures of variability, and graphical representations.

## Normal Distribution



# POPULATION VS SAMPLE

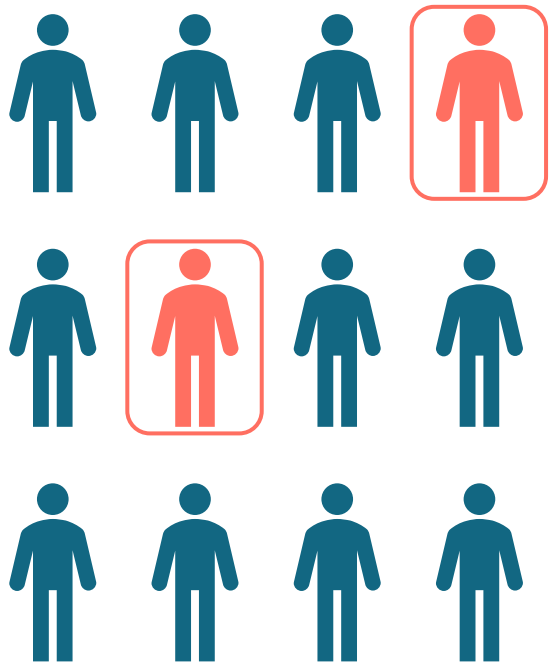
Population ( $N$ ) refers to the entire group of individuals or observations being studied.

Sample ( $n$ ) refers to subset of the population selected for analysis.

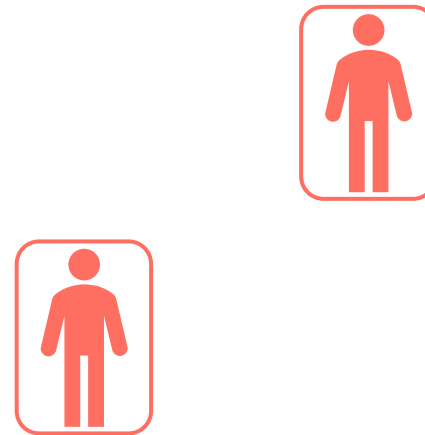


# POPULATION VS SAMPLE

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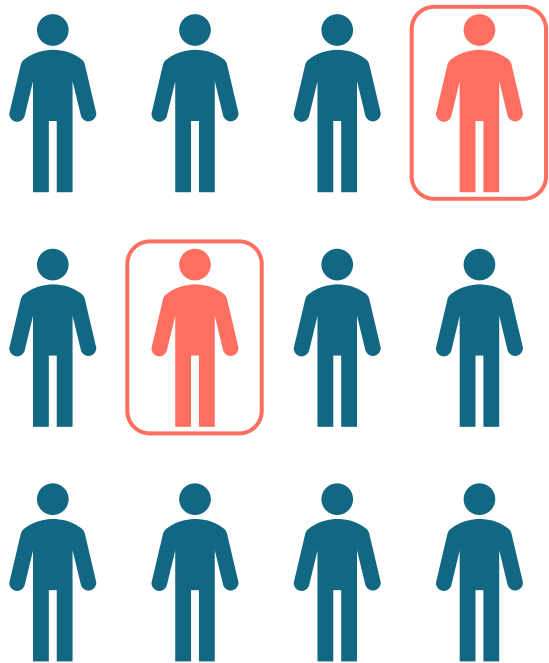
Sample ( $n$ ) refers to subset of the population selected for analysis.



# PARAMETERS VS STATISTICS

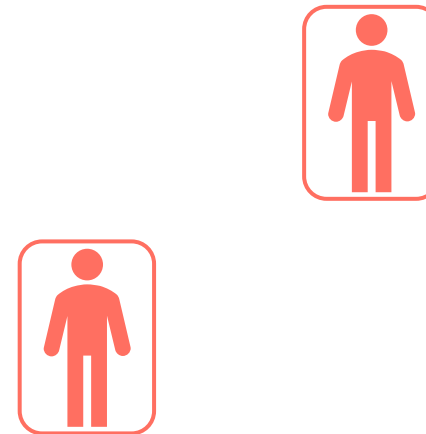
Characteristics of a population are called parameters.

e.g., mean –  $\mu$ , standard deviation –  $\sigma$



Characteristics of a sample are called statistics.

e.g., mean –  $\bar{x}$ , standard deviation –  $s$



# TYPES OF DATA





# DATA

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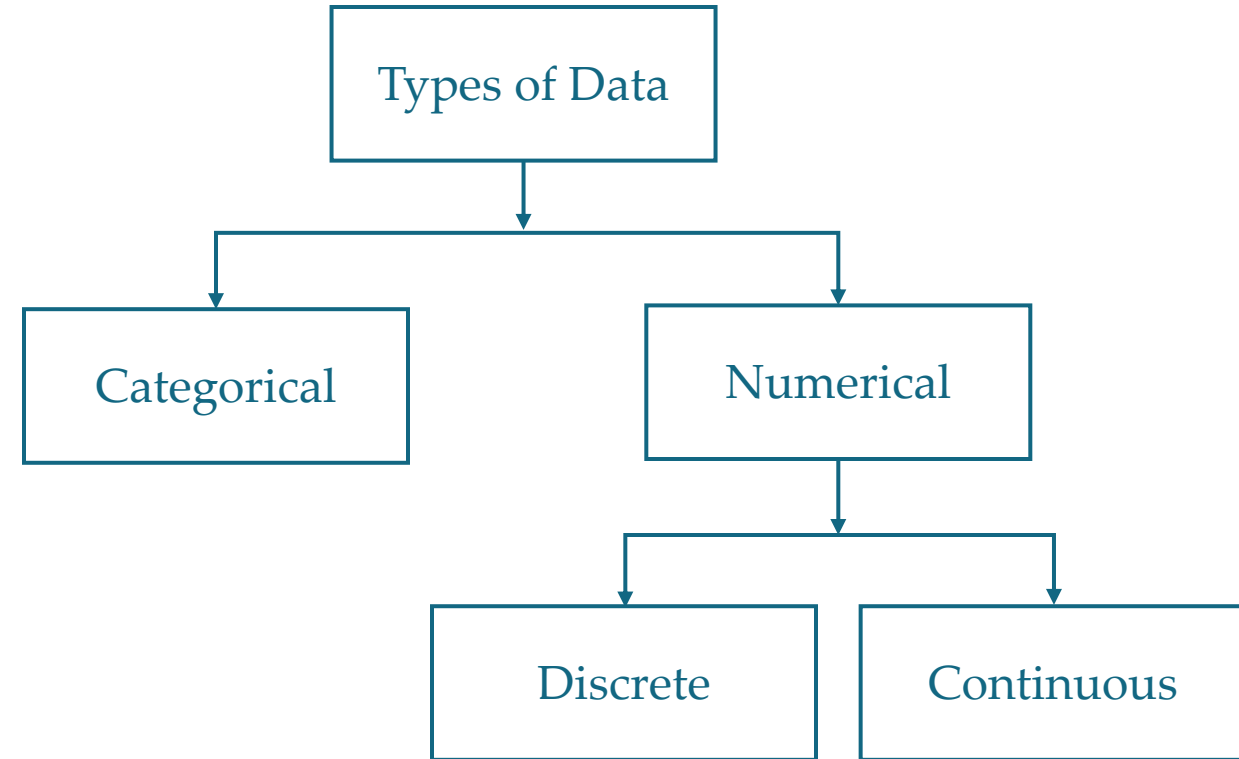
Data refers to the raw facts, figures, and information collected from various sources that can be analyzed to extract insights, identify patterns, and support decision-making.

Voltage Response		
Measurement No.	Instrument A	Instrument B
1	12	2.8
2	5	4.5
3	9.1	6
4	3.3	9
5	24	11.7
6	18.5	14.8
7	15.2	17.3
8		20



# TYPES OF DATA

This classification focuses on the nature of the data and how it can be categorized or measured.



# CATEGORICAL

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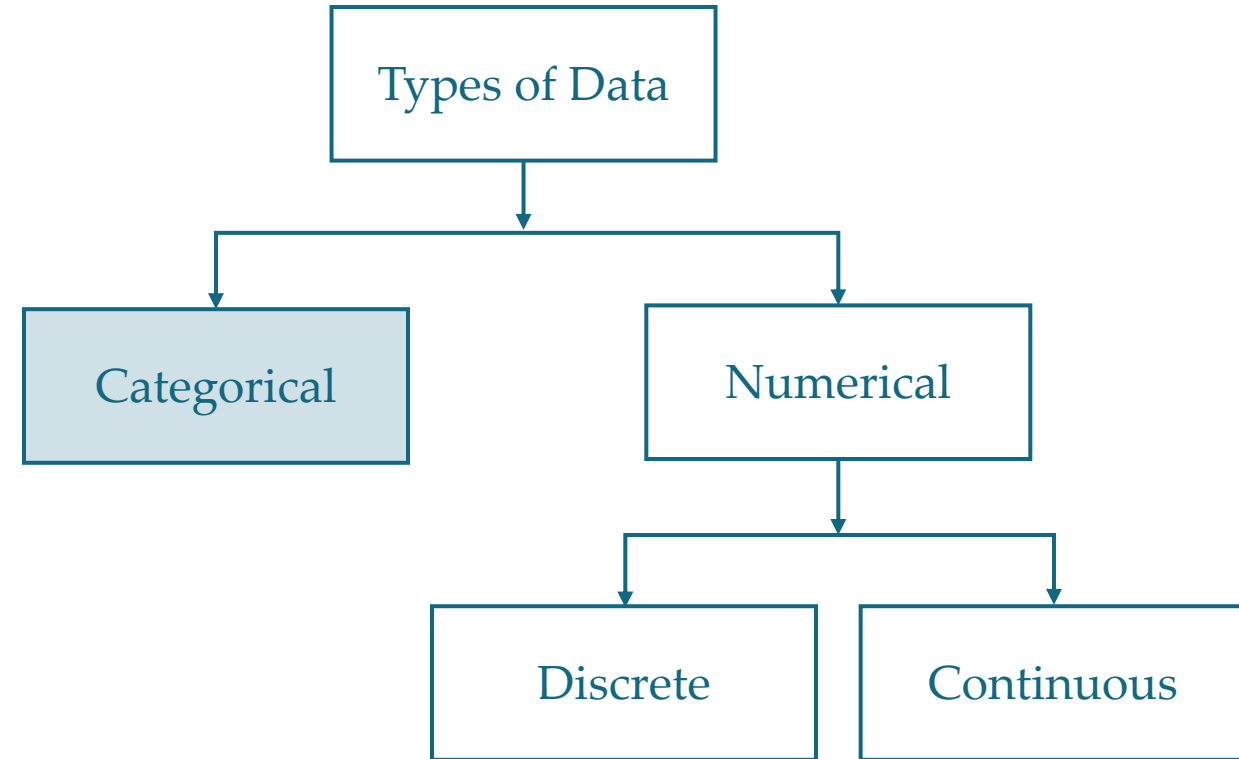
Categorical data represents groups or categories.

## Example

Gender (Male, Female)

Colors (Red, Blue, Green)

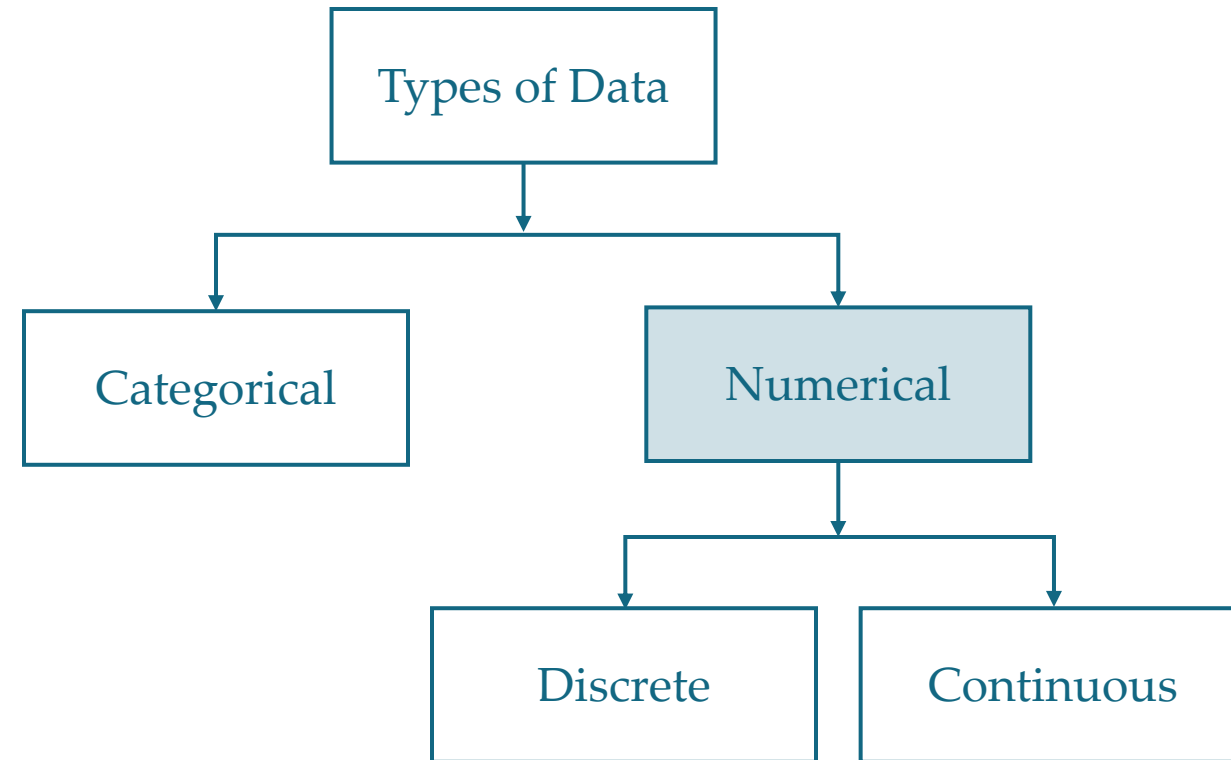
Types of Cars (Sedan, SUV, Truck)



# NUMERICAL

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Numerical data represents quantities or numbers.



# DISCRETE

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Discrete data are data that can be counted in finite manner.

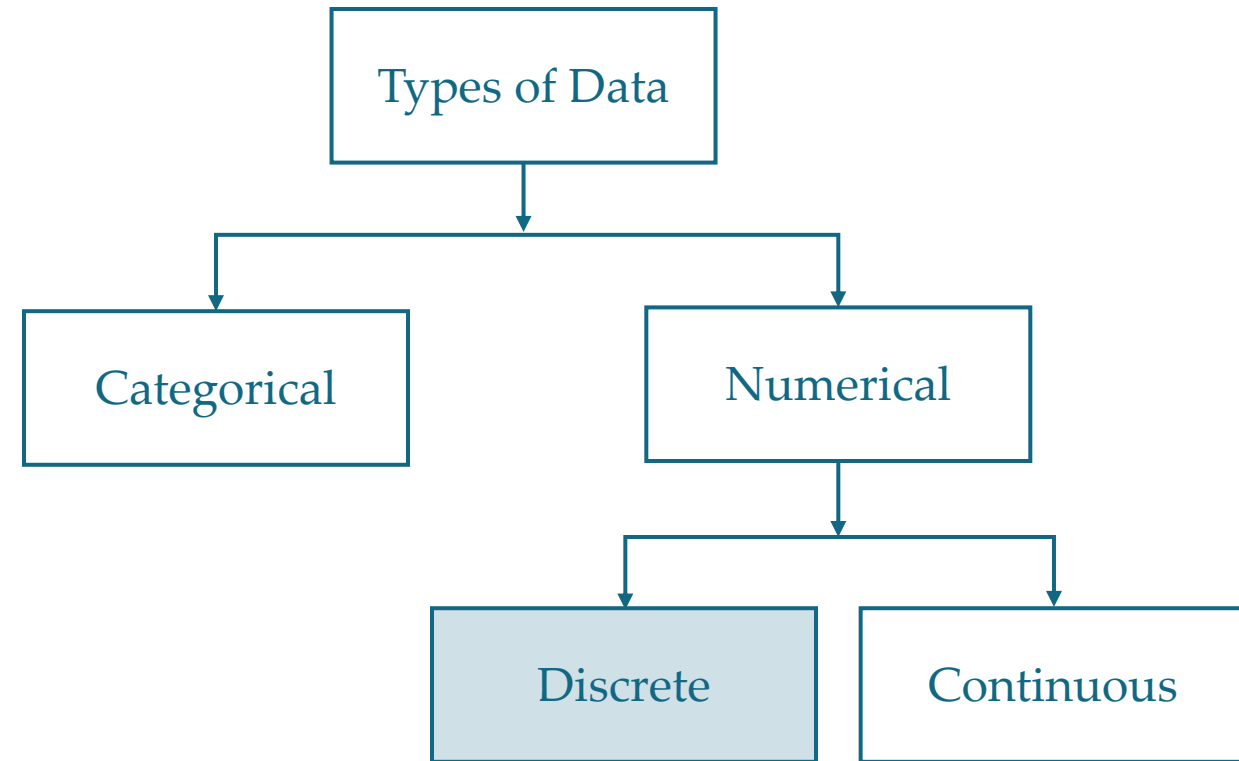
*"You can imagine each member of the dataset."*

## Example

Number of students in a class

Number of correct answers

Count of defective products



# CONTINUOUS

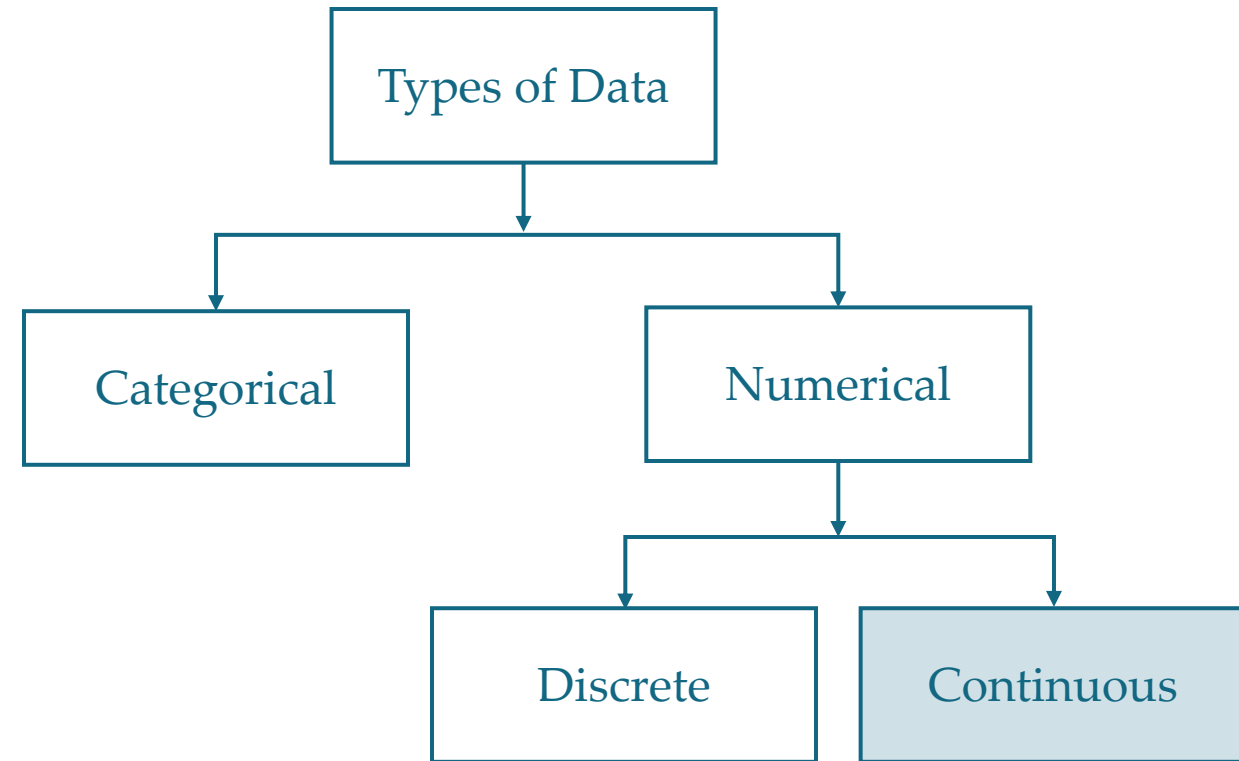
Continuous data can vary by infinitely small amounts, making them impossible to count directly. Measuring continuous data requires an instrument (e.g., ruler, thermometer) to obtain precise values.

## Example

Weight

Temperature

Voltage



# EXERCISE

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Determine if the given example is discrete or continuous data.

Grades

Area

Number of objects

Time

Time on the clock

Money

Physical Money

Height

Distance



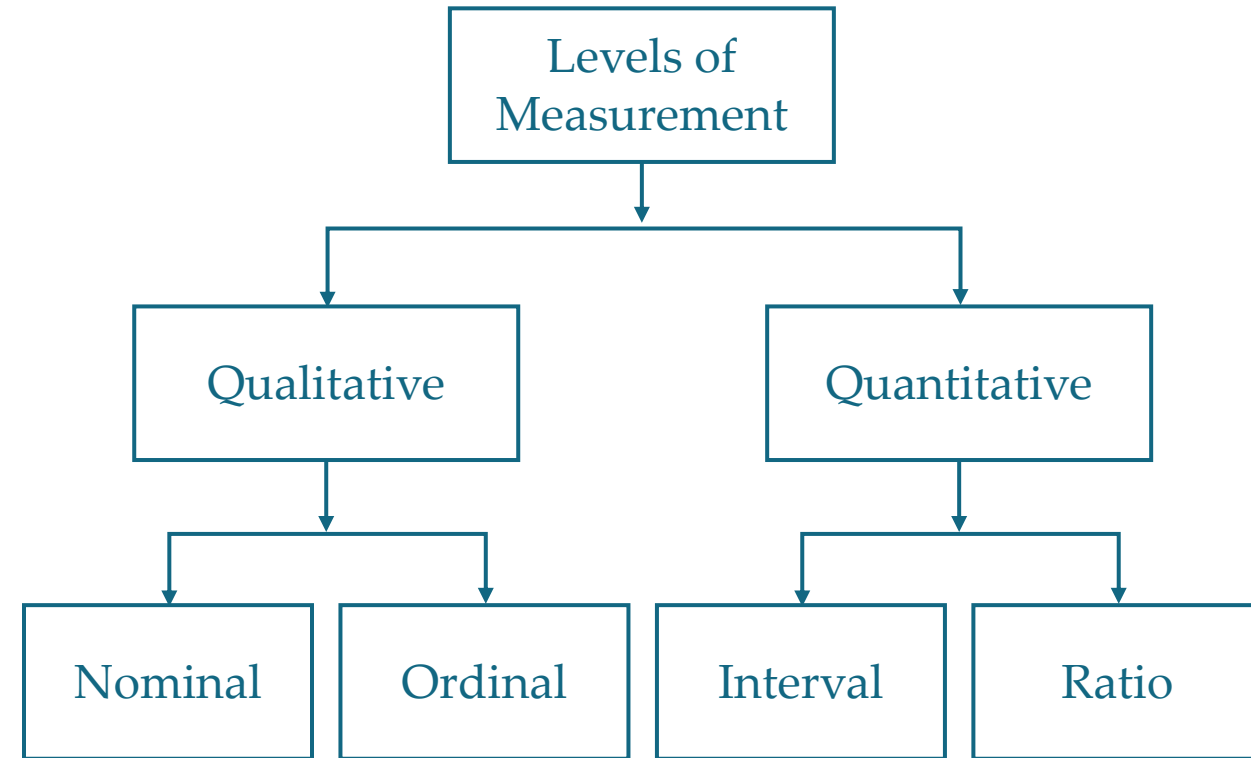
# LEVELS OF MEASUREMENT





# LEVELS OF MEASUREMENT

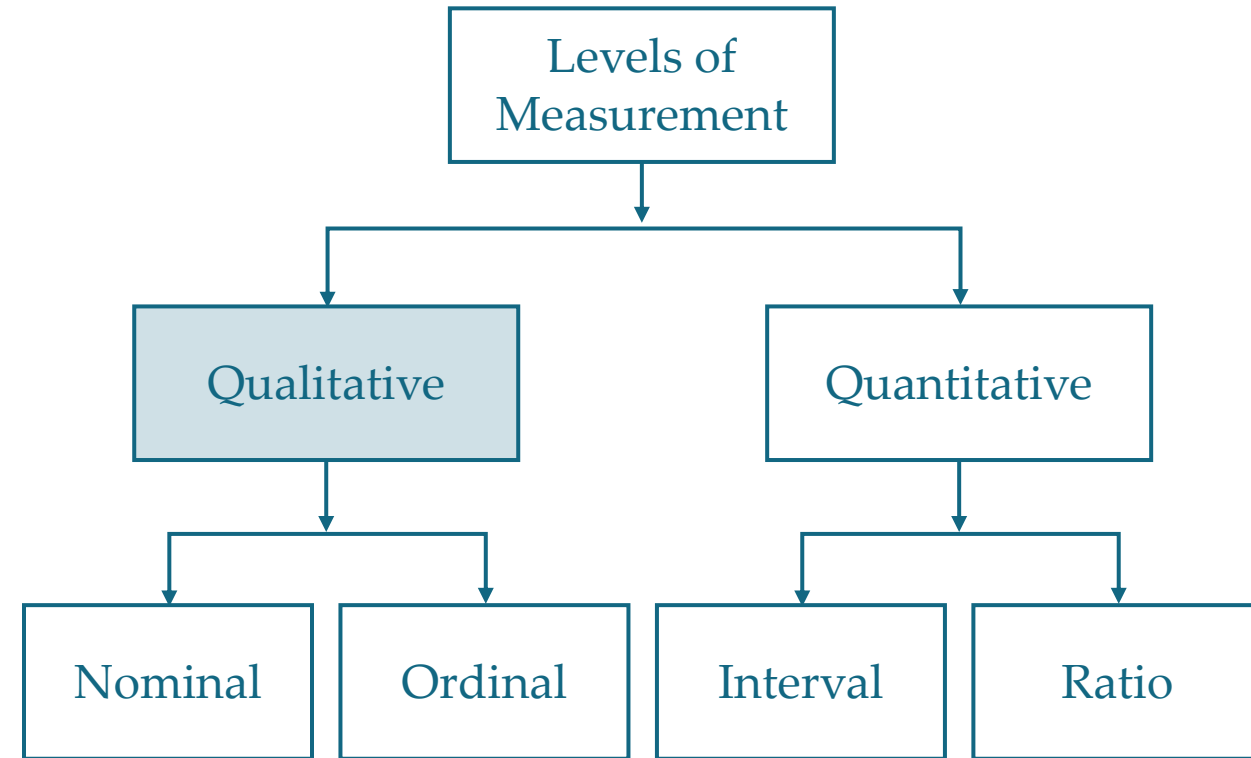
This classification focuses on the properties of the data and how it can be analyzed mathematically.



# QUALITATIVE

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Qualitative data refers to non-numerical information that describes characteristics or attributes (e.g., customer feedback). It is subjective in nature, as it is derived from personal perceptions, opinions, and interpretations.



# NOMINAL

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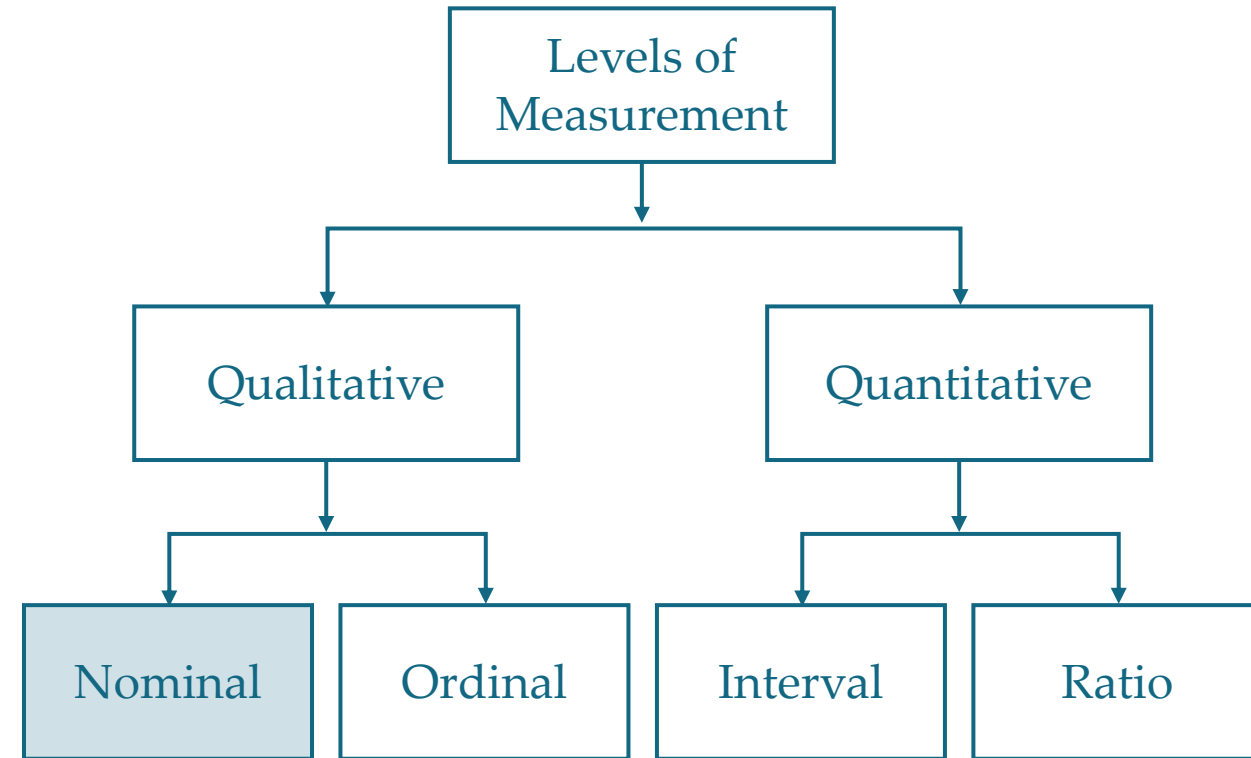
Nominal data can be categorized without any order or ranking.

## Example

Gender (Male, Female)

Fours seasons (winter, spring, summer, autumn)

Types of Cars (Sedan, SUV, Truck)



# ORDINAL

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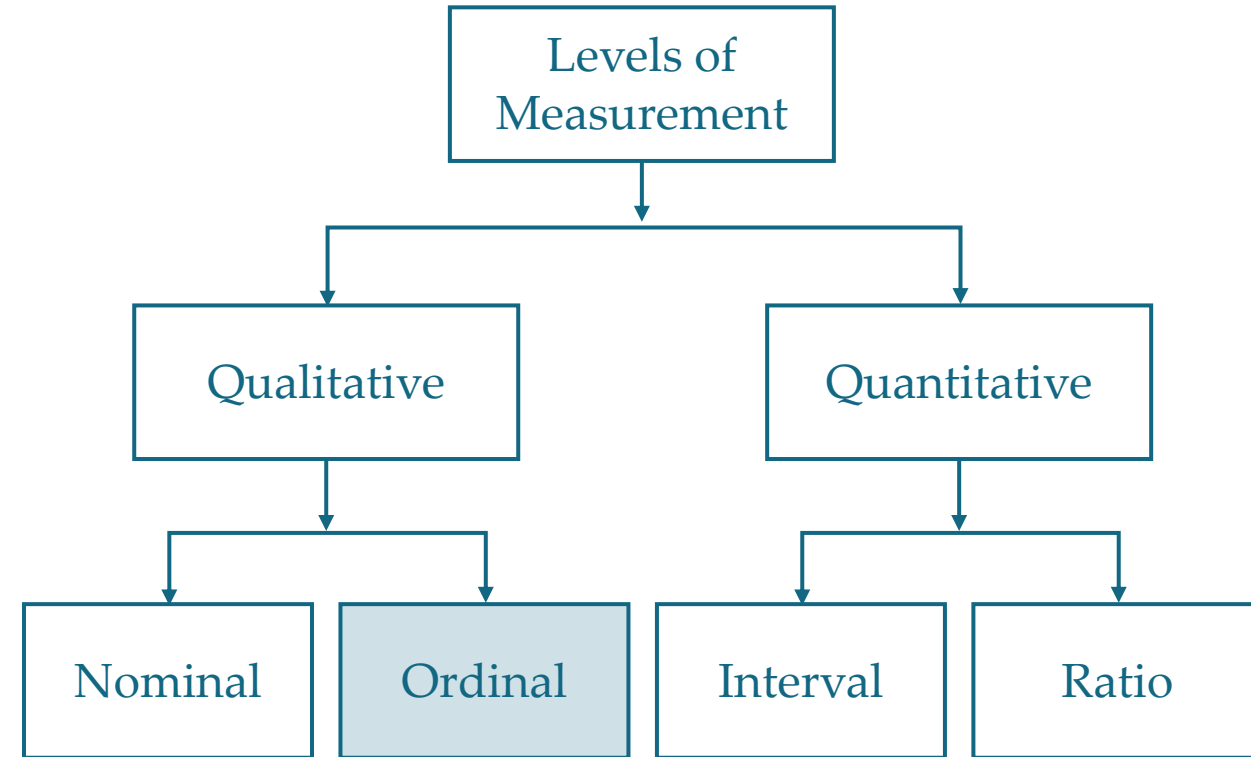
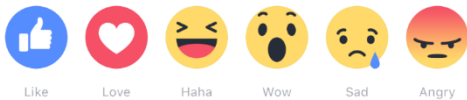
Ordinal data can be categorized with a meaningful order or ranking.

## Example

Customer feedback:



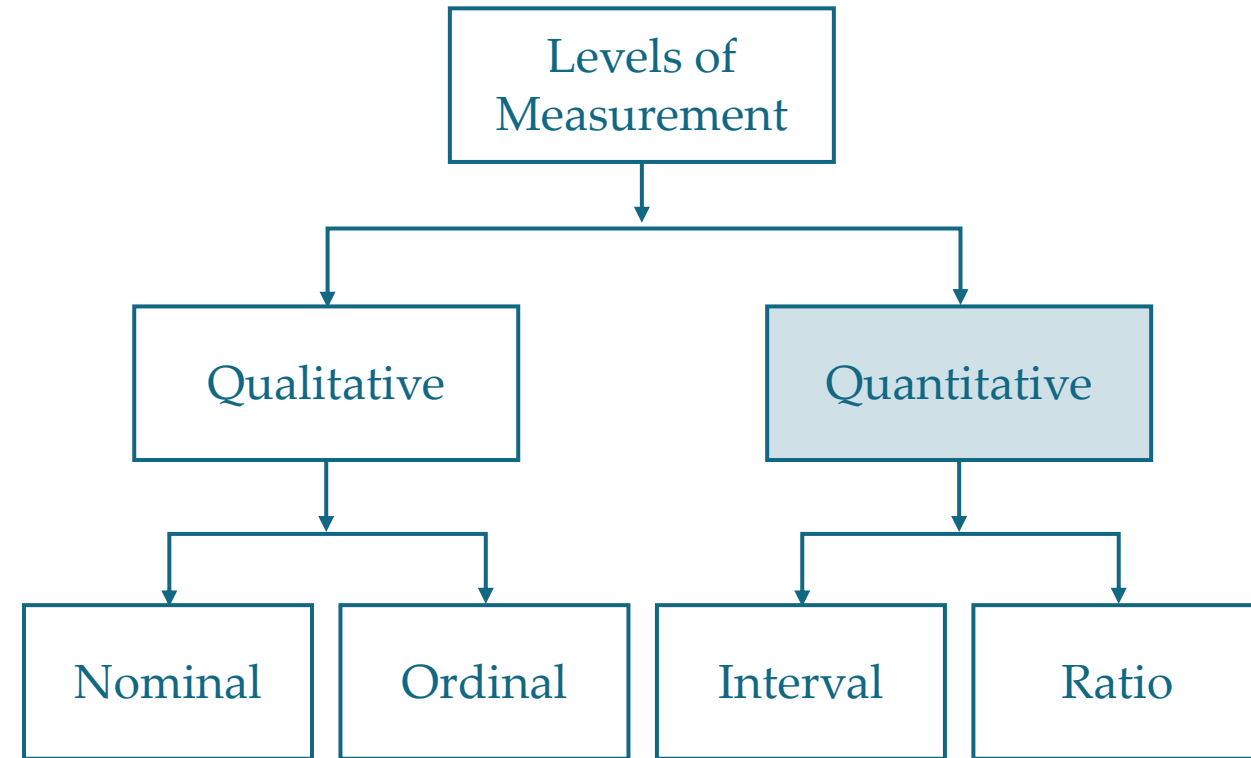
Facebook reactions:



# QUANTITATIVE

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Quantitative data refers to numerical data that can be measured and analyzed statistically (e.g., age, income, temperature).



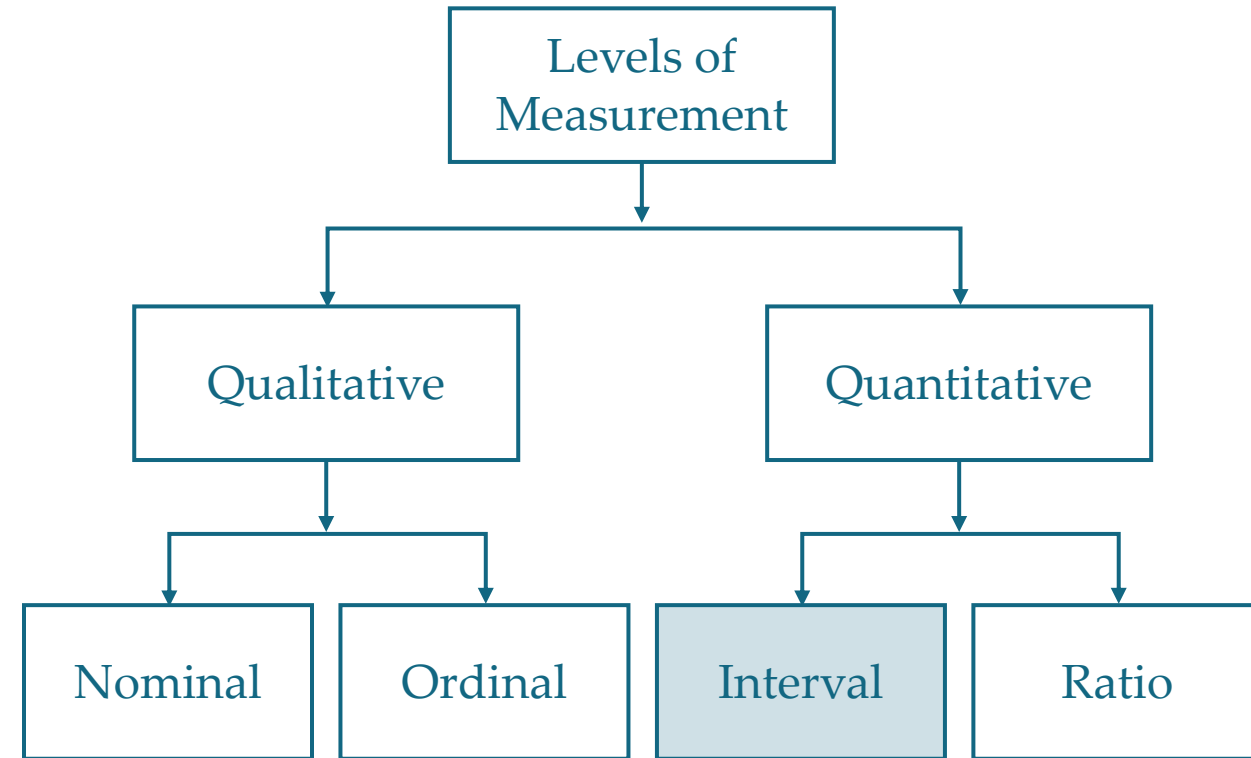
# INTERVAL

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Interval data has no true zero, meaning that the value of zero does not indicate the absence of the measured quantity.

## Example

Temperature in Celsius or Fahrenheit –  $0^{\circ}\text{C}$  or  $0^{\circ}\text{F}$  does not mean there is no temperature; it is just a reference point.



# RATIO

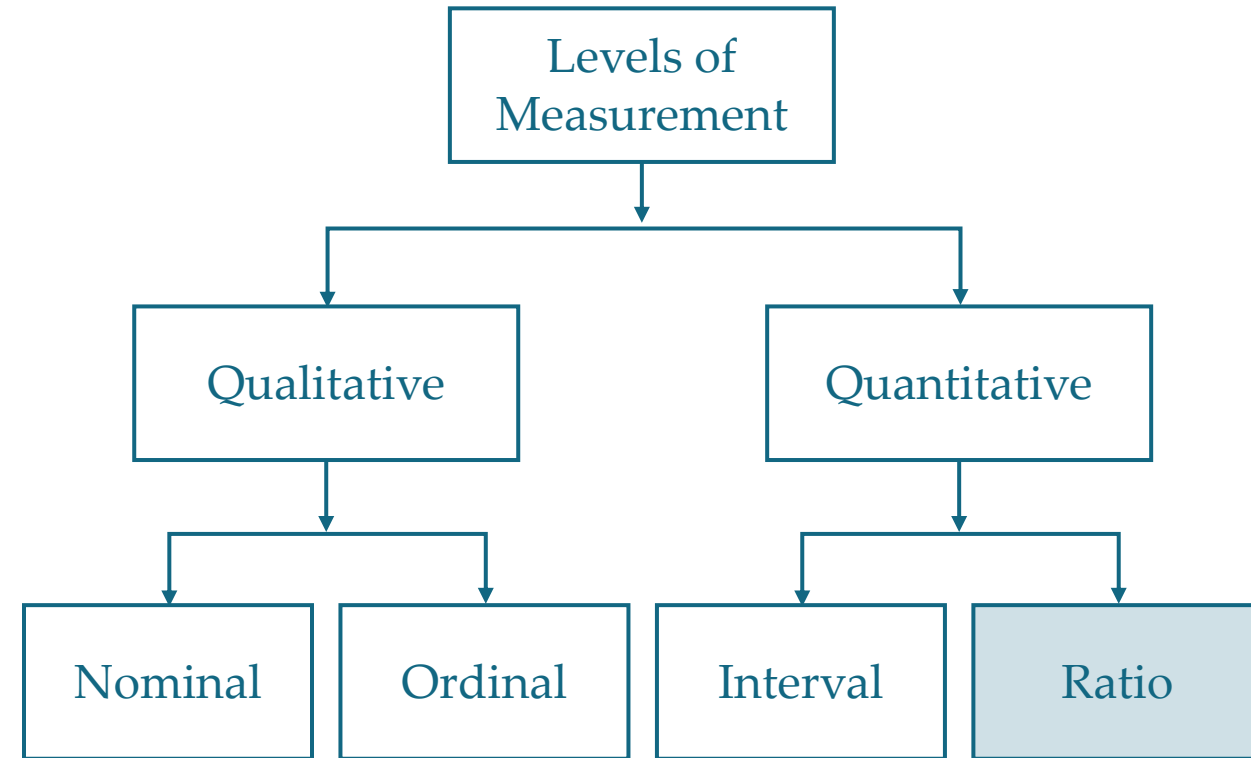
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Ratio data has a true zero, meaning that the value of zero represents the complete absence of the measured quantity.

## Example

Weight, if an object has a weight of  $0\text{ kg}$ , it means it has no weight.

Temperature in Kelvin –  $0^\circ\text{K}$  represents absolute zero, where molecular motion stops.



# EXERCISE

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Determine if the given example is interval or ratio data.

Height of a building (m)

Time to complete a race (seconds)

Exam scores (out of 100)

Year of historical event (1776, 1945, 2001)

Altitude above sea level (m)





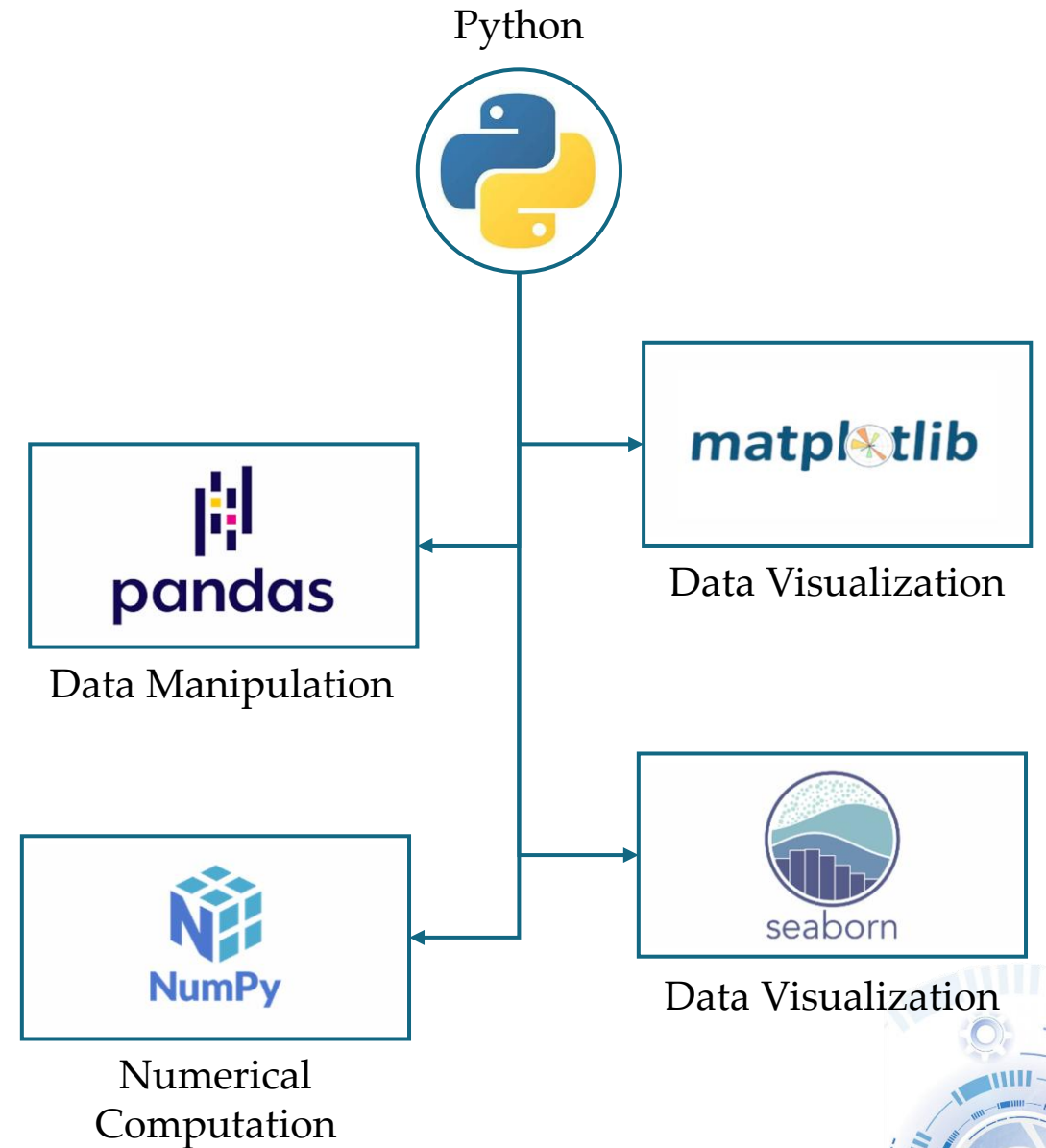
# SOFTWARE TOOLS



# PYTHON

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**Python** is a powerful and versatile programming language widely used in data analytics due to its simplicity, readability, and extensive library support. It enables data analysts to perform various tasks, from data cleaning and manipulation to statistical analysis and visualization.



<https://www.python.org/>

# SOFTWARE TOOLS

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## 1. Visual Studio Code

<https://code.visualstudio.com/Download>



Visual Studio Code

## 2. Python

<https://www.python.org/downloads/>



## 3. Jupyter Notebook Extension on VS Code



## 4. numpy, pandas, scipy, matplotlib libraries

## 5. Github Account

<https://github.com/>



## 6. Git Bash

<https://git-scm.com/downloads/win>



# LABORATORY

