Statistics and Mathematics

Statistics:

- ⇨ Statistics is a part of mathematics which deals with Collecting and analyzing of data.
- ⇨ Statistics is a mathematical science including methods of collecting, organizing and analyzing data in such a way that meaningful conclusions can be drawn from them.
  data -> data is a piece of information, that can be stored and retrieved.

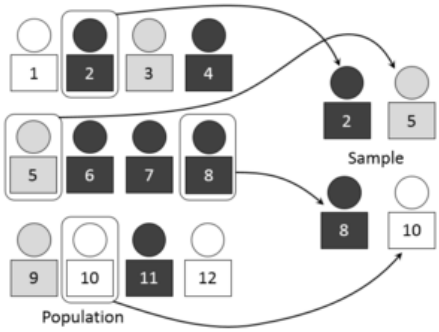
Motivation of Statistics:

- ⇨ Weather forecast
- ⇨ Sports analytics
- ⇨ Election campaign
- ⇨ FMCG / E-Commerce
- ⇨ Medical / Genetics
- ⇨ Stock market

Types of Statistics:

- ⇨ Descriptive Statistics
  - ⇨ Measure of central tendency (mean, median, mode)
  - ⇨ Measure of spread (Standard deviation, variance and many more……)
  - ⇨ Measure of symmetricity (skewness, Kurtosis)
- ⇨ Inferential Statistics -> Sampling
  - ⇨ Simple random sampling technique
  - ⇨ Stratified sampling
  - ⇨ Cluster sampling
  - ⇨ Systematic sampling

1. Simple Random Sampling:



➔ Each member of the population (N) has an equal chance of being selected for the sample.

2. Stratified Sampling:

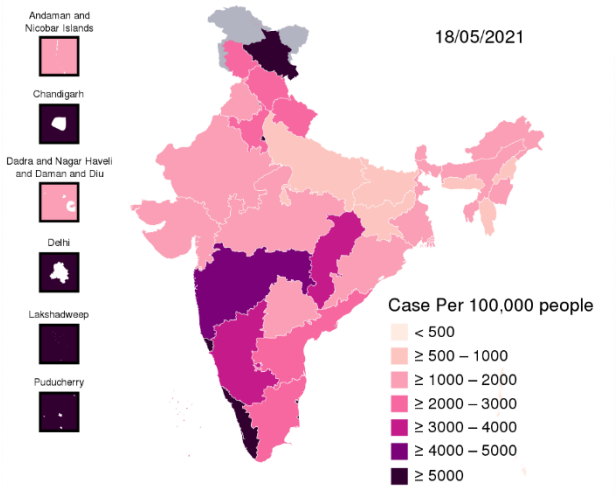
Strata => groups/ layers

➔ Different distinct groups/ layers

➔ The element would be chosen from each Strata.

3. Clustering Sampling:

➔ Divides the population into groups or clusters. Some of the clusters are randomly selected. All the individuals in the chosen cluster are selected to be in sample.



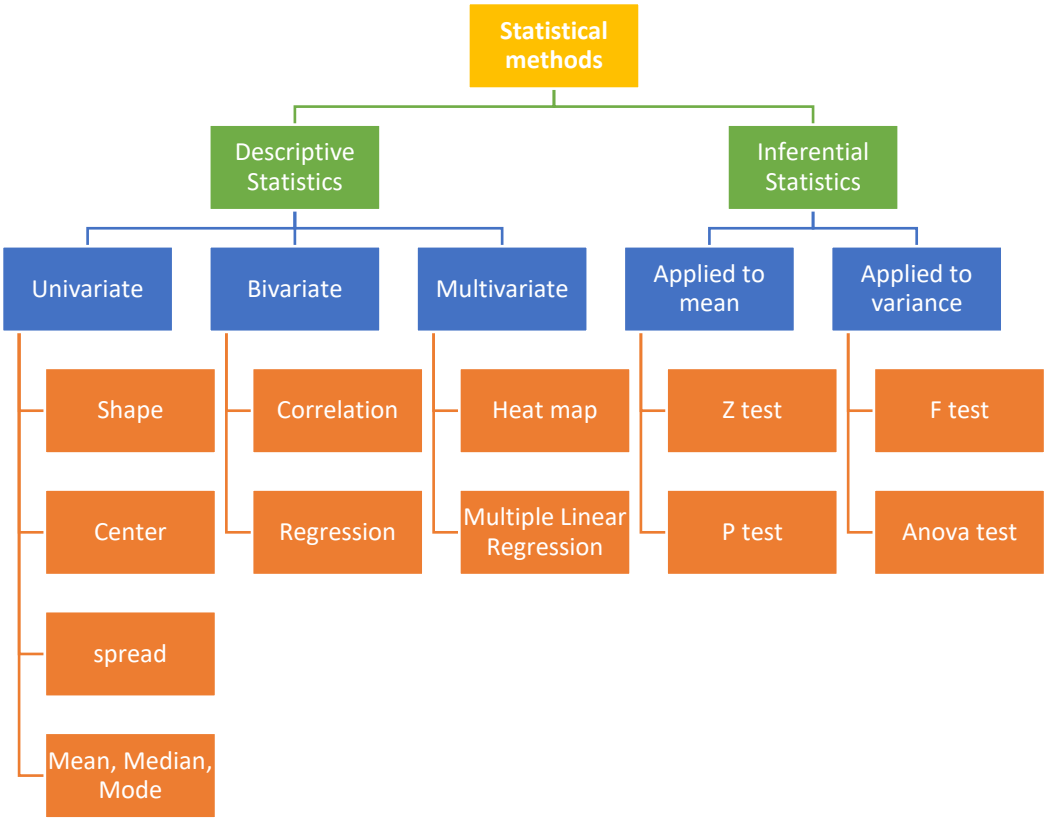
4. Systematic Sampling:

➔ The data points will be selected systematically. e.g. Every n^{th} element will be selected.

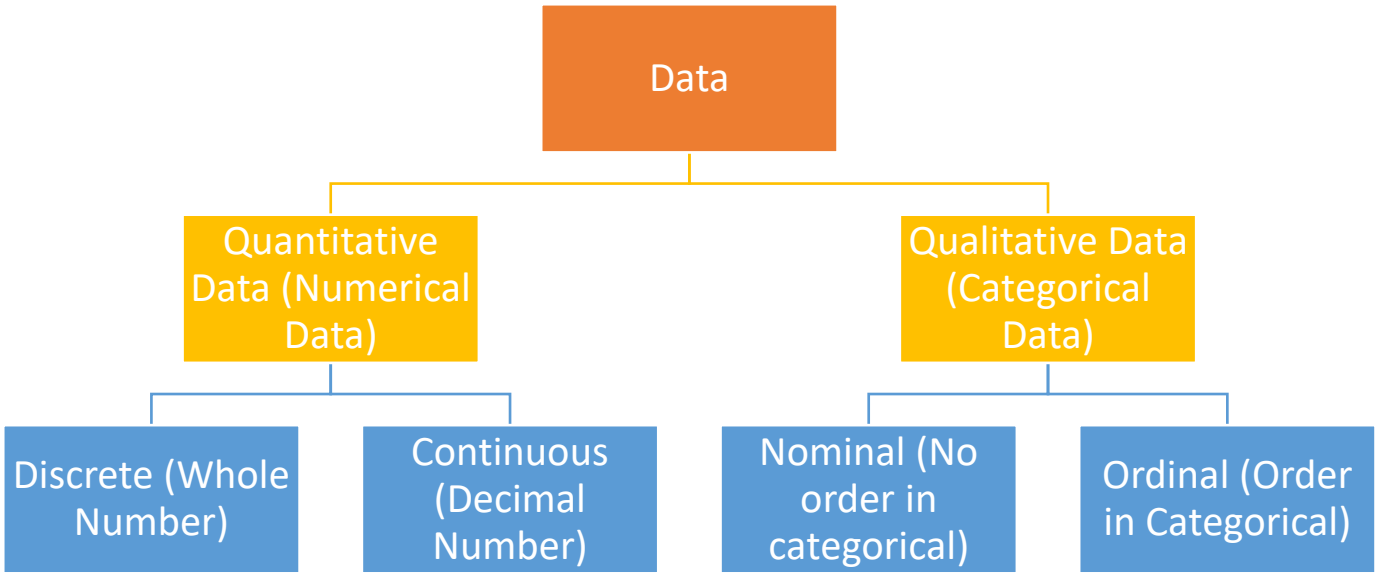
➔ odd roll no

➔ people born on odd years

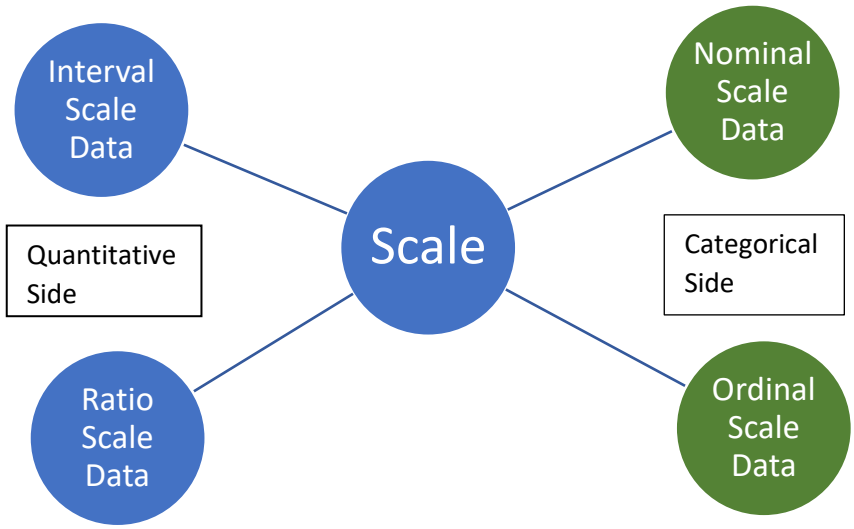
Descriptive	Inferential
What is avg. age/height of student in class	Are the avg. height of sample is also what we expect
Avg. height of population	If sample Avg. height is 165 cm then is it true that the avg. height of population is also 165 cm



Types of data



Scale of Measurement



1. Nominal Scale Data:
   - ⇨ Quantitative/ Categorical data
   - ⇨ gender, color, location
   - ⇨ No order in the data
2. Ordinal Scale Data:
   - ⇨ Order and Rank matters.
   - ⇨ Difference cannot be measured.
3. Interval Scale data:
   - ⇨ The rank and order have a meaning
   - ⇨ Rank & values both matters
   - ⇨ Difference can be measured
   - ⇨ It doesn't have 0 starting point
4. Ration Scale Data:
   - ⇨ Order and rank have a meaning
   - ⇨ Difference and ratio are measurable
   - ⇨ It does have a 0 starting point

Data	Nominal	Ordinal	Interval	Ratio
Labelled	✔	✔	✔	✔
Meaningful	✘	✔	✔	✔
Measurable Difference	✘	✘	✔	✔
True Zero Starring point	✘	✘	✘	✔
Example	Gender, Location	Rating, Rank	Height, Temperature	Age, Length

Types of Analysis:

1. Descriptive Analysis (Complete data/ Population)
2. Predictive Analysis (ML)
3. Prescriptive Analysis (USE Both Analysis)

1. **Descriptive Statistics:**
   - ⇨ Describe the data
   - ⇨ That part of statistics which helps you to summaries the data / describe the data without adding or subtracting anything to data.
   - ⇨ **Types:**
     - ➔ Measures of central tendency
     - ➔ Measures of spread / dispersion
     - ➔ Measures of symmetricity