Introduction to statistics

Md. Ismail Hossain Riday

What is Statistics

- Statistics is a science that deals with data

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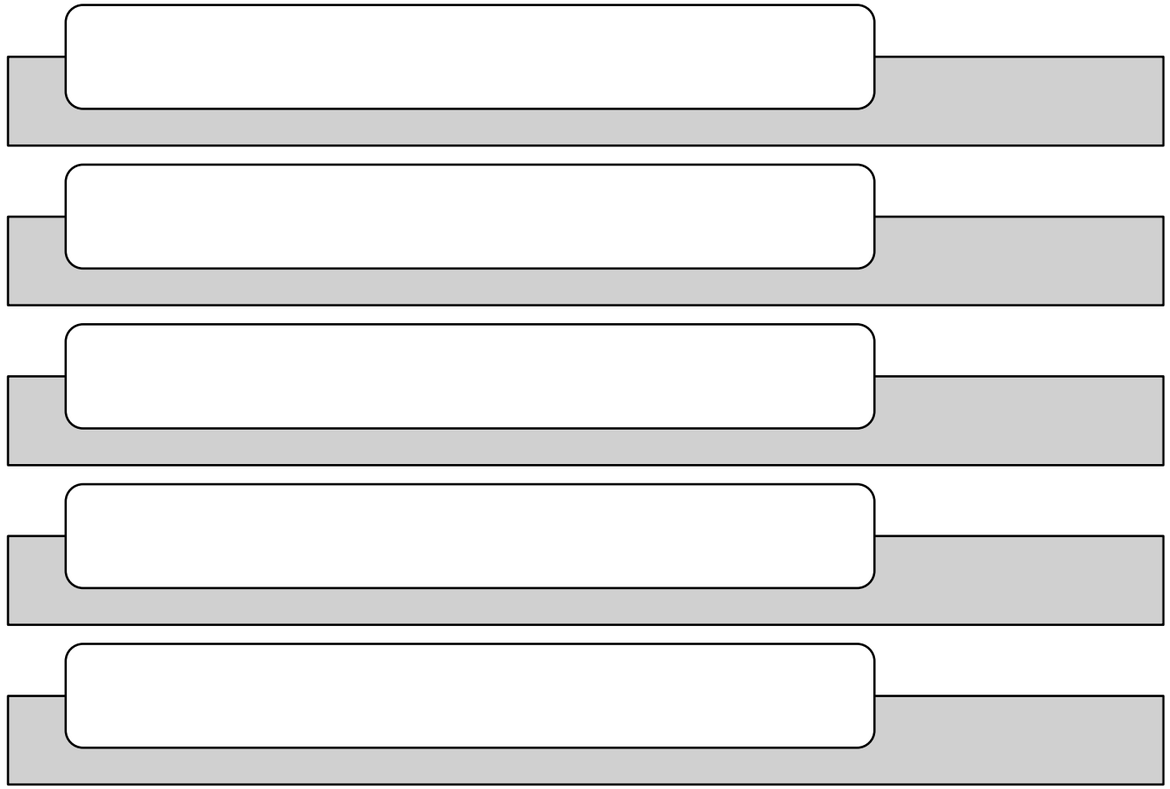
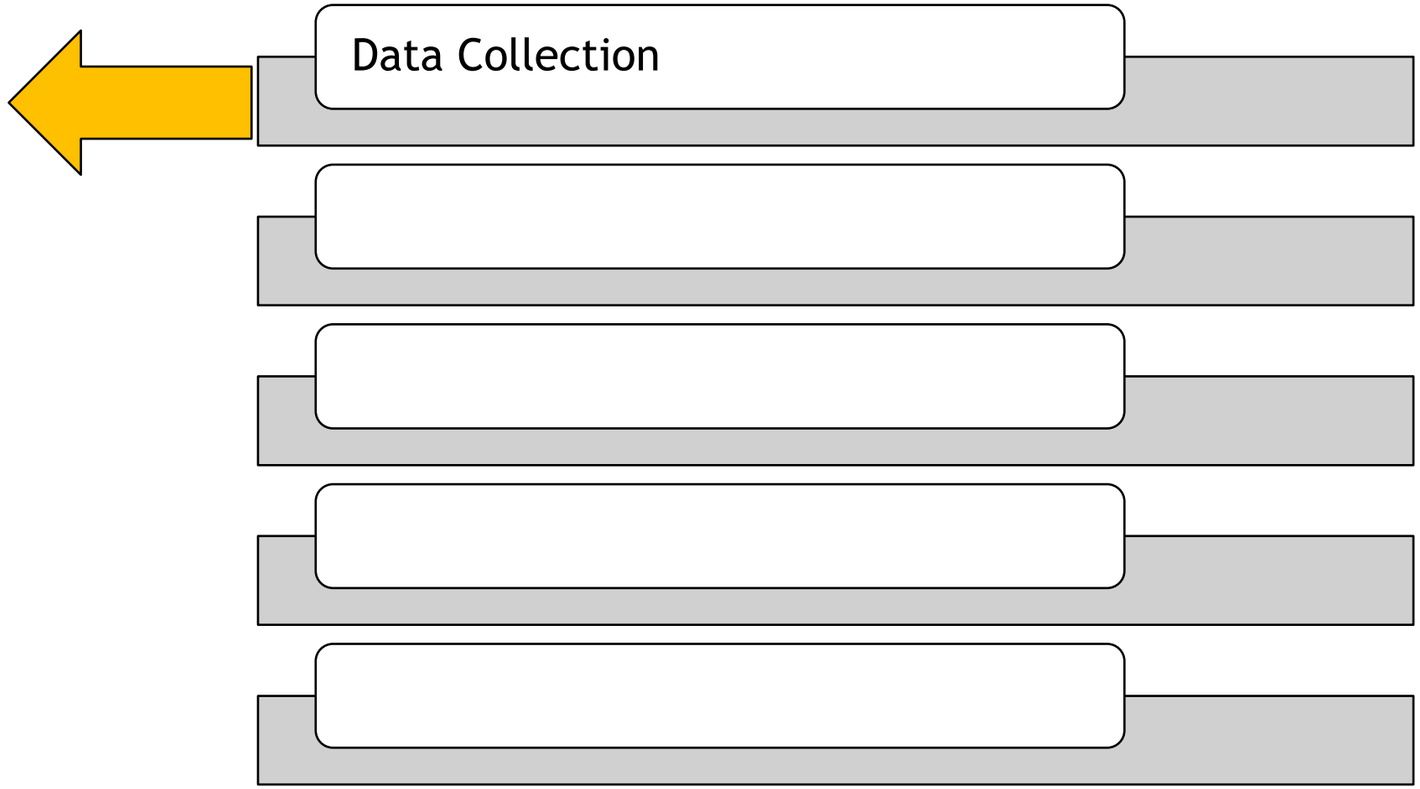


What is Statistics

- Statistics is a science that deals with data

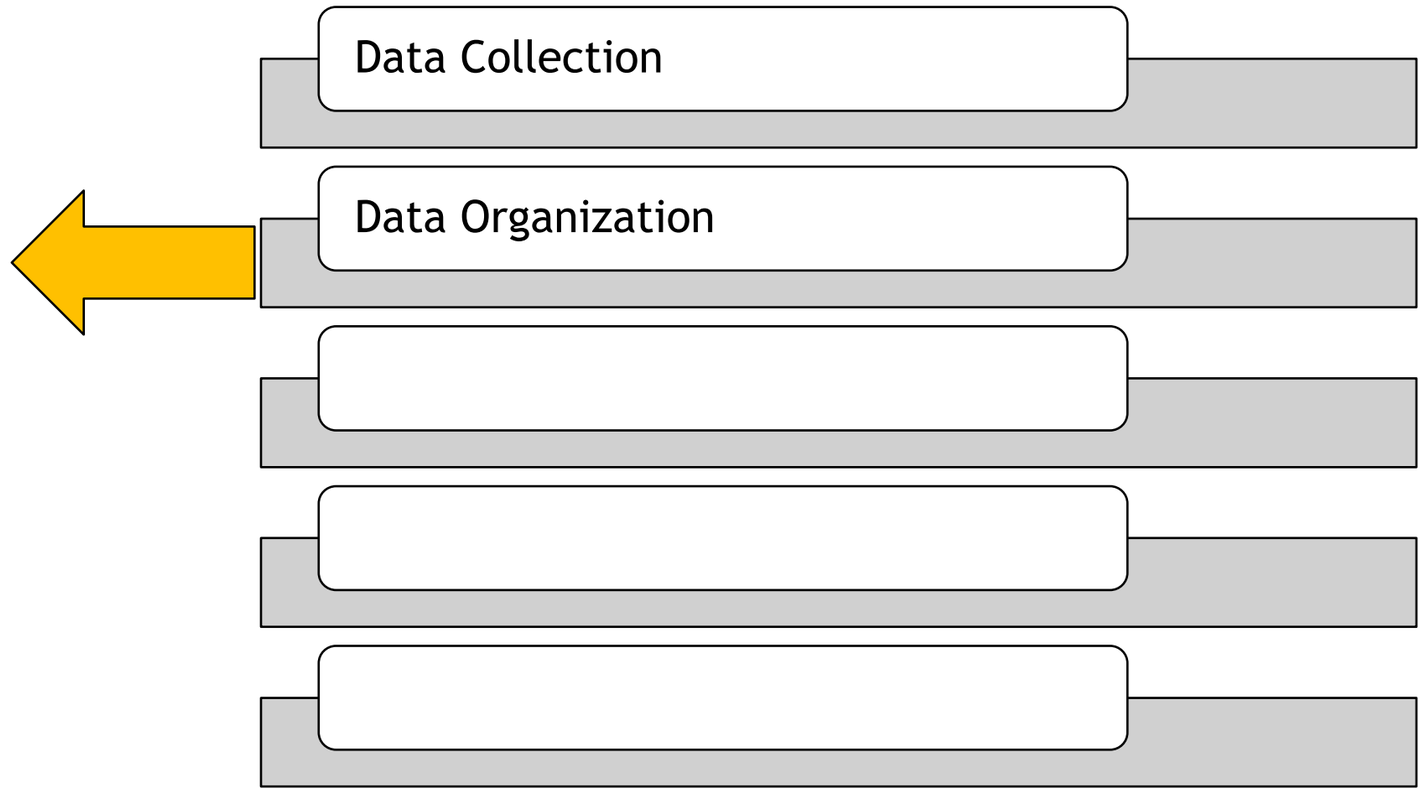
Statistics involves the process of gathering data from various sources.



What is Statistics

- Statistics is a science that deals with data

Once the data is collected, it needs to be organized in a systematic manner.



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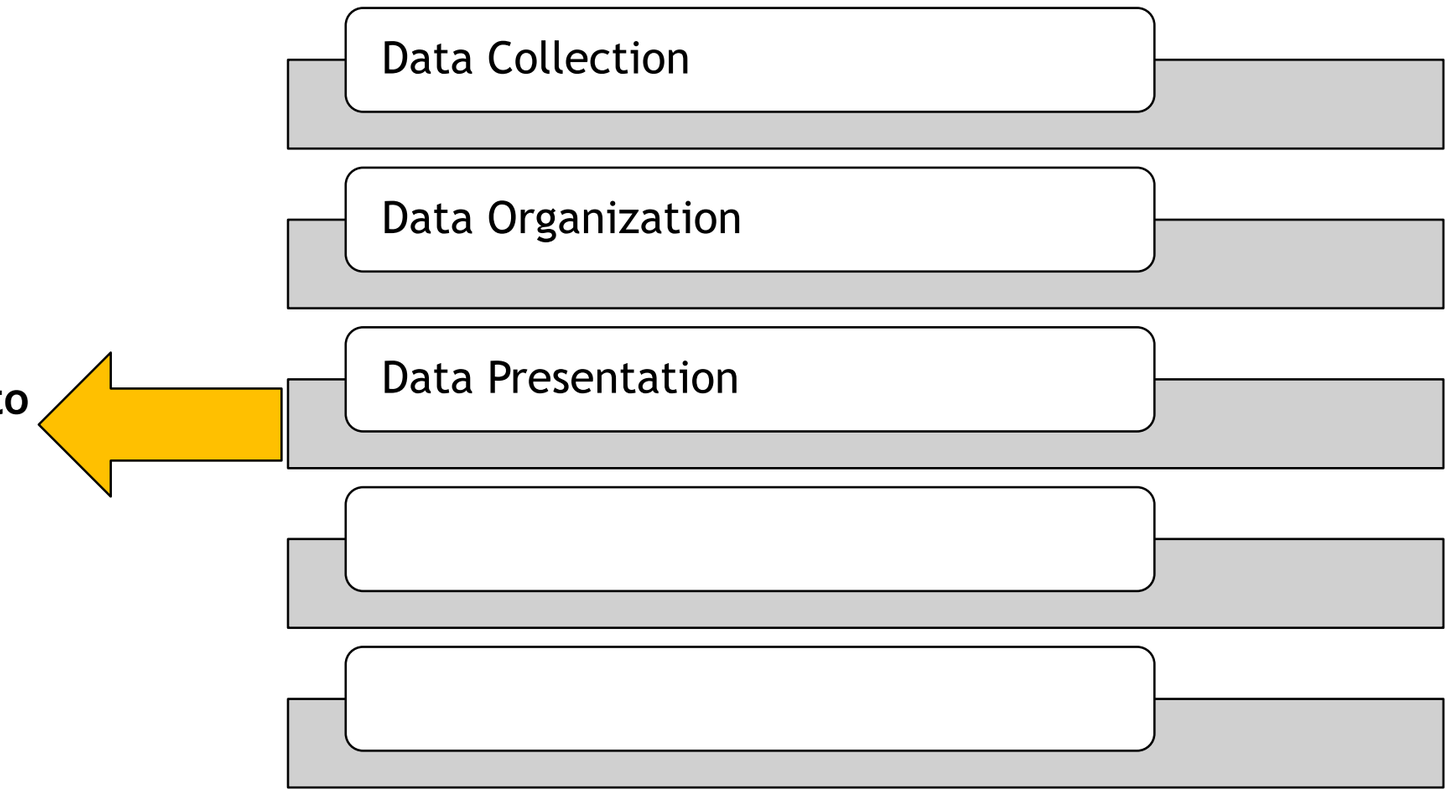
After organizing data, it's important to present it in a meaningful way.



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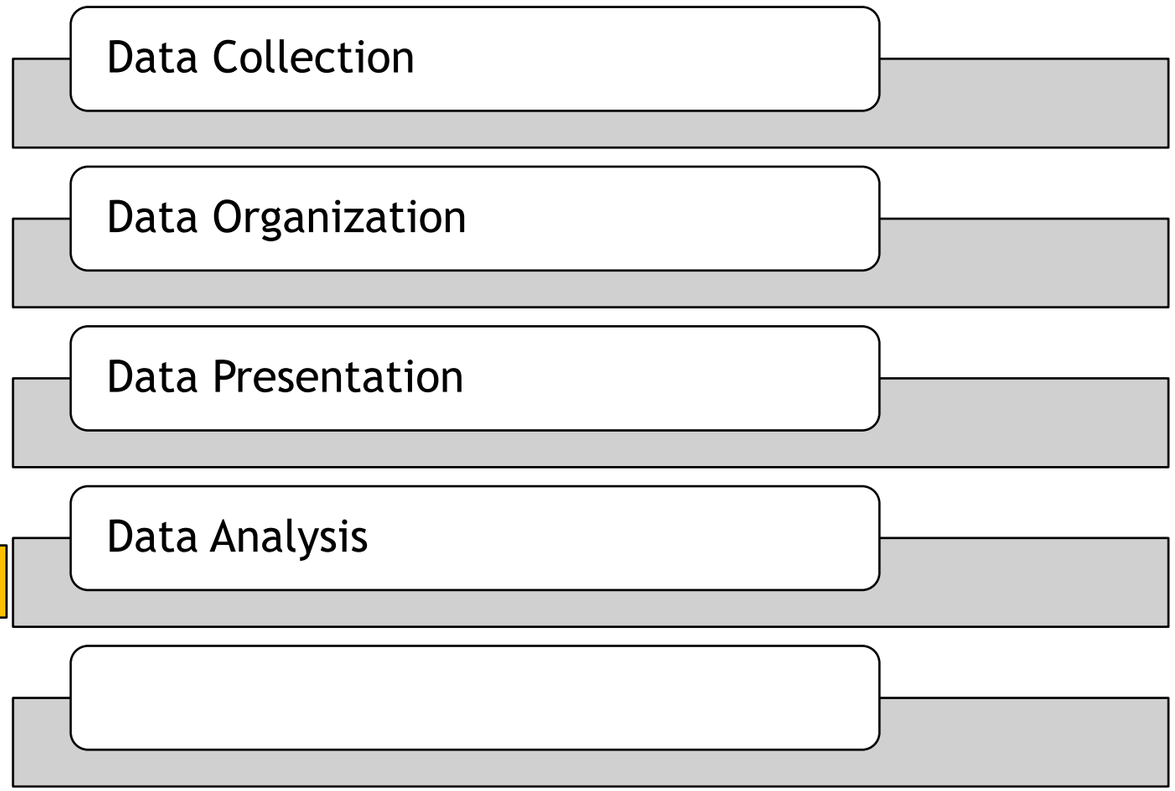

Statistical analysis involves applying various mathematical and statistical techniques to the collected data.

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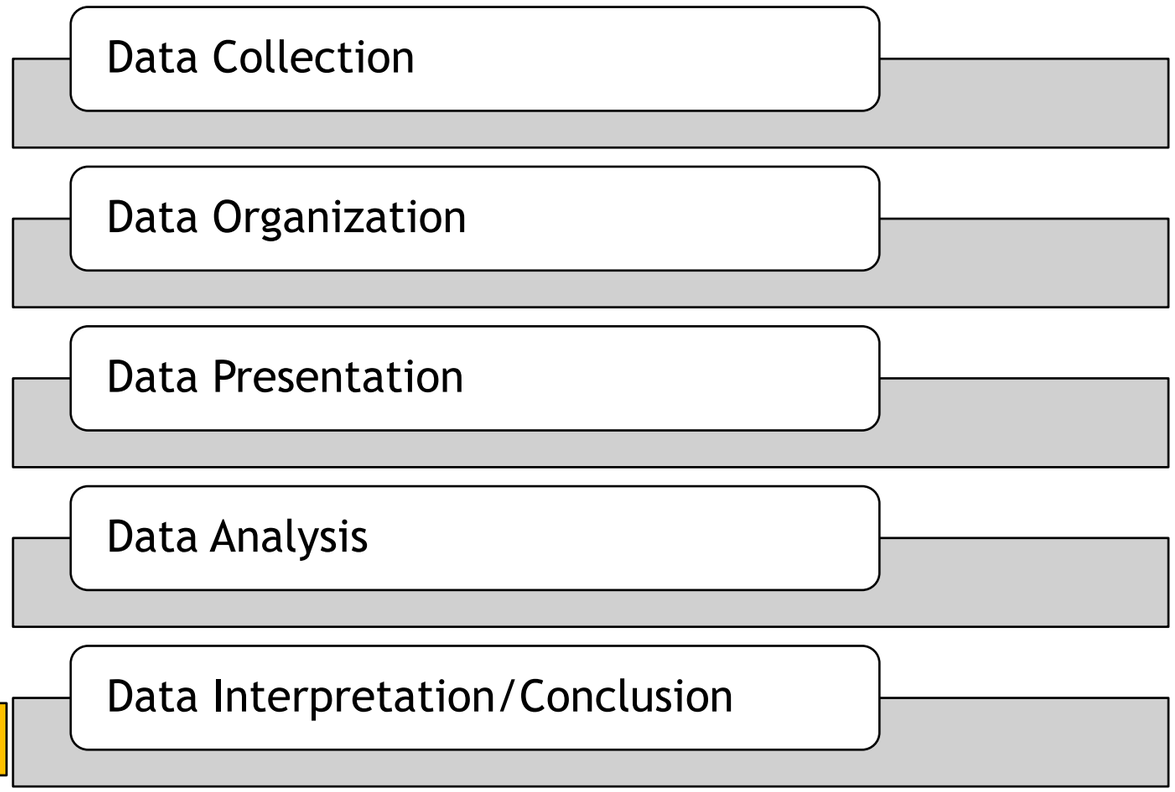


Once the analysis is done, the results need to be interpreted.

What is Statistics

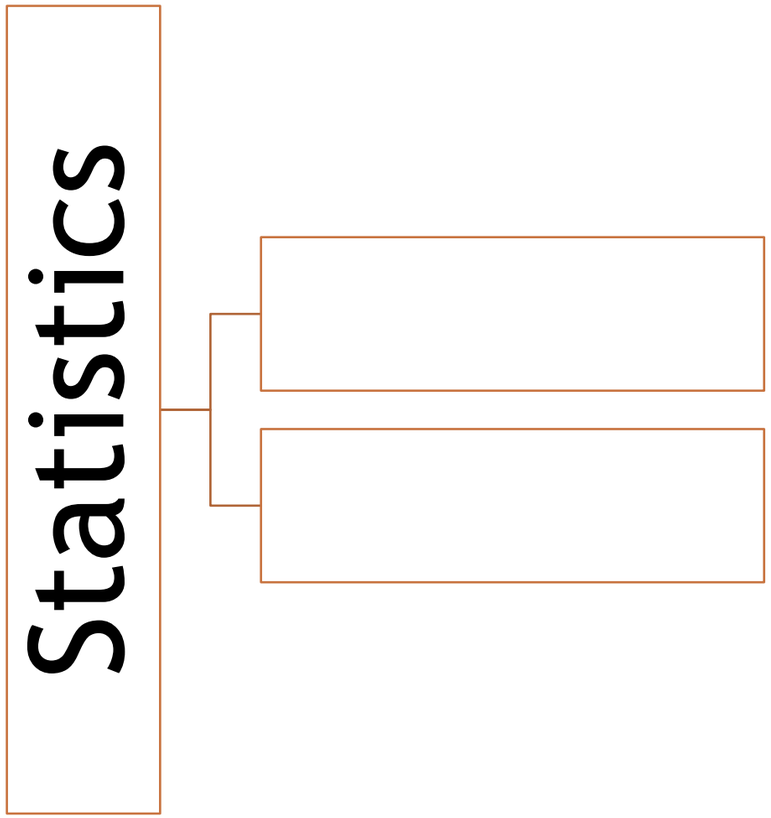
- Statistics is the science that deals with the collection, organization, summarization/presentation, analysis, and interpretation of data to assist in making more effective and reasonable decisions.

- Example: Child malnutrition status, Monthly expenditure of citizens of a city, Relationship of crime with space and time, Number of active users in a day of a website, average lifetime of the people of a country etc.

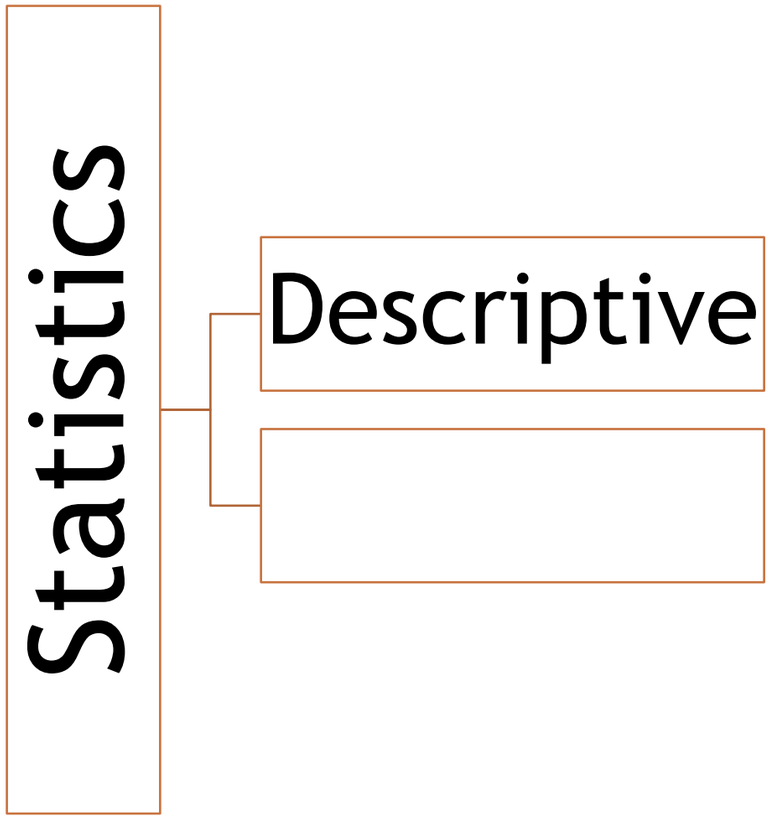
Statistics

- Data Collection
- Data Organization
- Data Presentation
- Data Analysis
- Data Interpretation/Conclusion

Types of Statistics

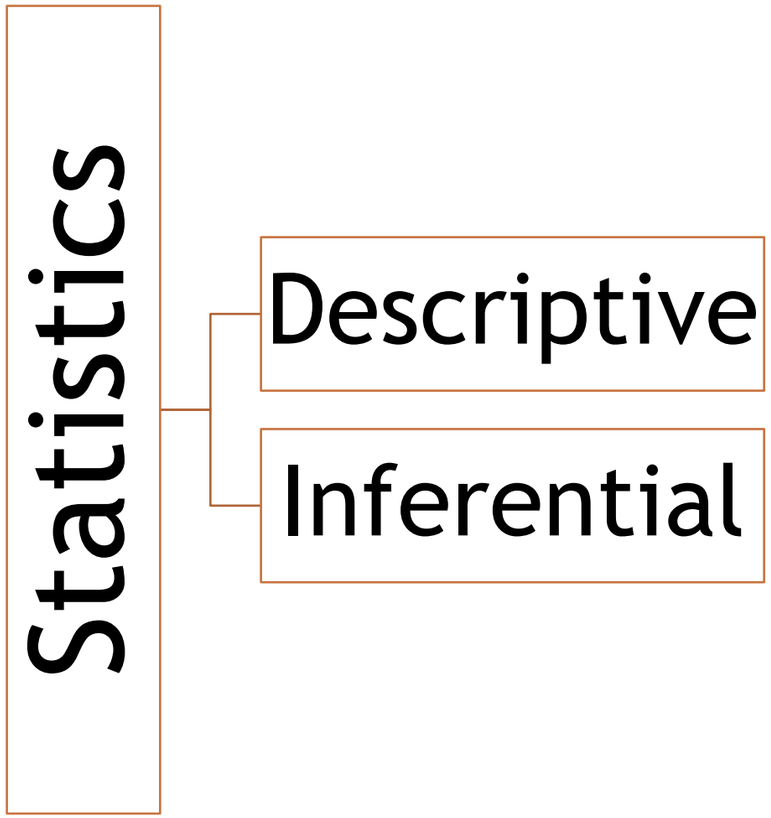


Types of Statistics



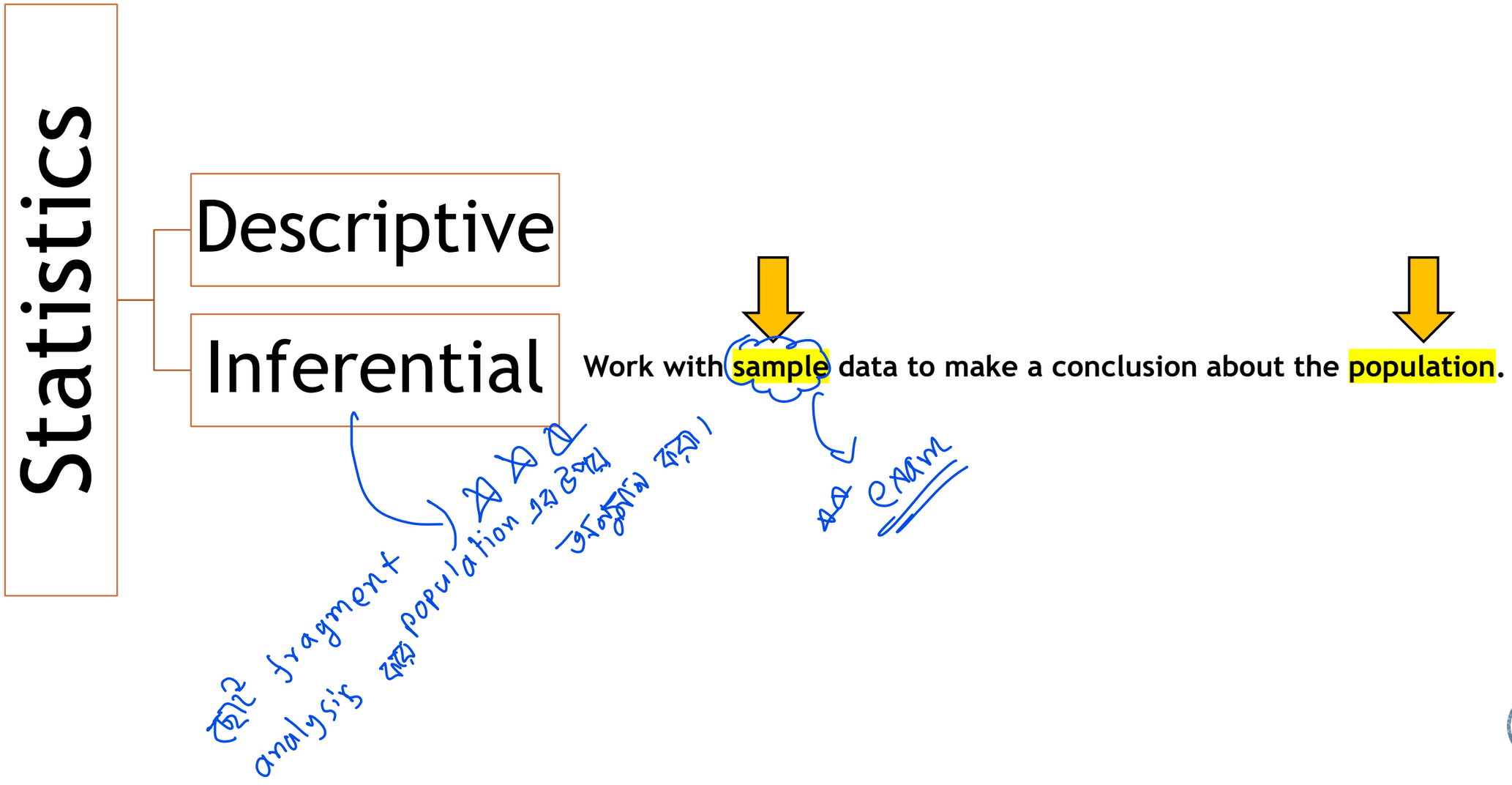
Which used to summarize, organize, and present a set of data/observations in a meaningful way (e.g., tables, graphs, numerical summaries).

Types of Statistics



Work with sample data to make a conclusion about the population.

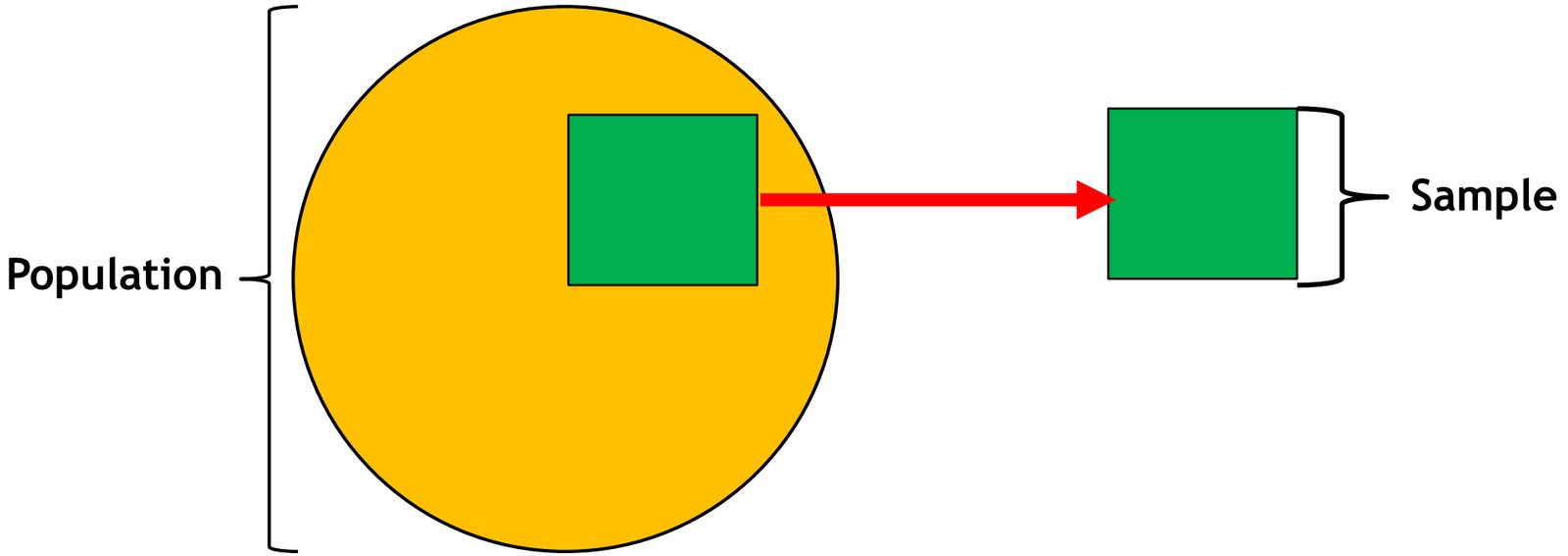
Types of Statistics



Population & Sample

- A population is the entire collection of individuals, objects.

- A small but representative part of the population is called sample.



Descriptive vs Inference

Descriptive Statistics	Inferential Statistics
Describe and summarize the main characteristics of Data	Make conclusion about population based on sample data
Applicable to both populations and samples	Applicable to only for samples
Uses measures of central tendency, measures of dispersion, and graphical representations to summarize and present the data	Utilizes statistical techniques such as hypothesis testing, confidence intervals, and regression analysis

Census & Survey

- To collect data about an entire population is called “Census”.
- To collect data from the part of the population is called “Survey”

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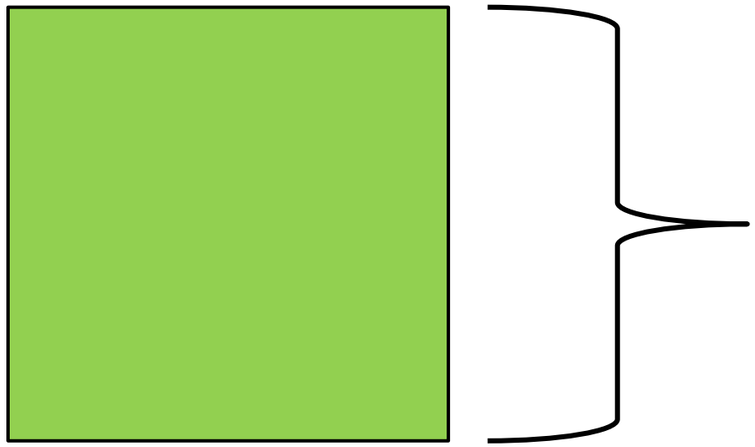

Collects data from this entire box is “???”

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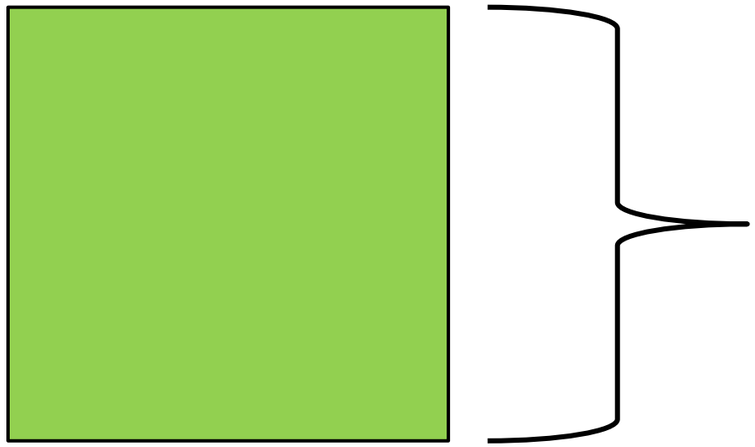

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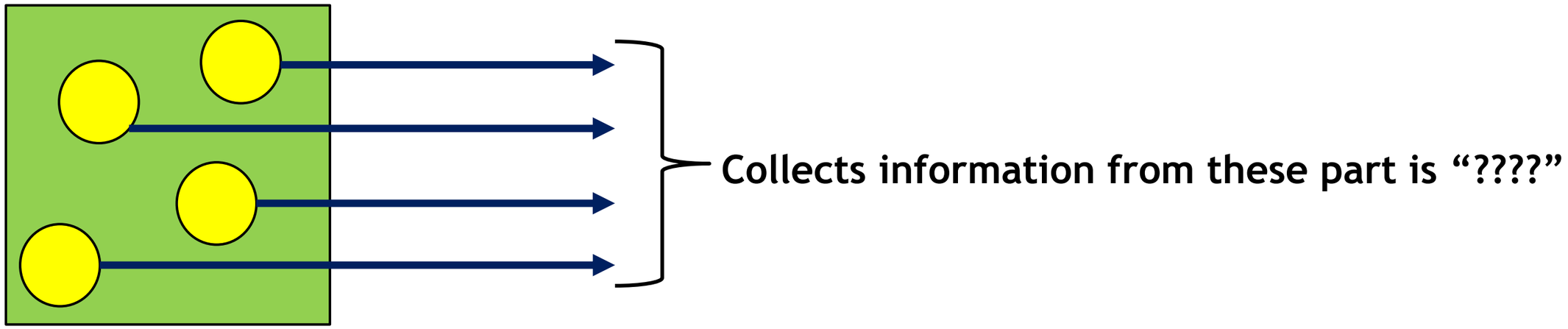

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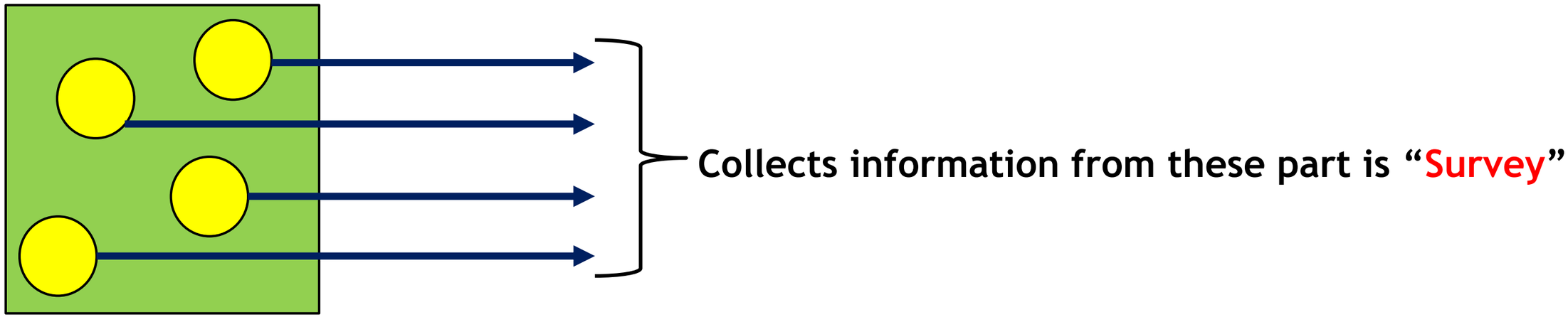
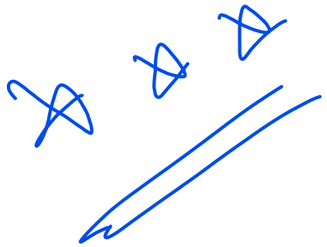


Parameter & Statistic



- A parameter is a numerical value that describes a characteristic (mean, variance etc.) of a population.

- A statistic is a numerical value that describes a characteristic (mean, variance etc.) of a sample.

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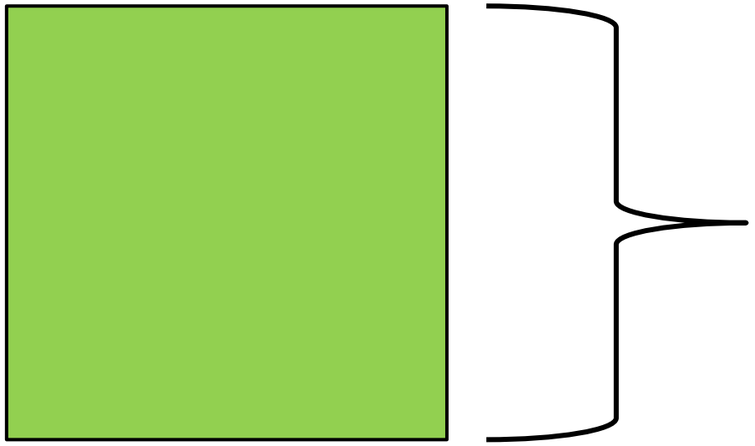

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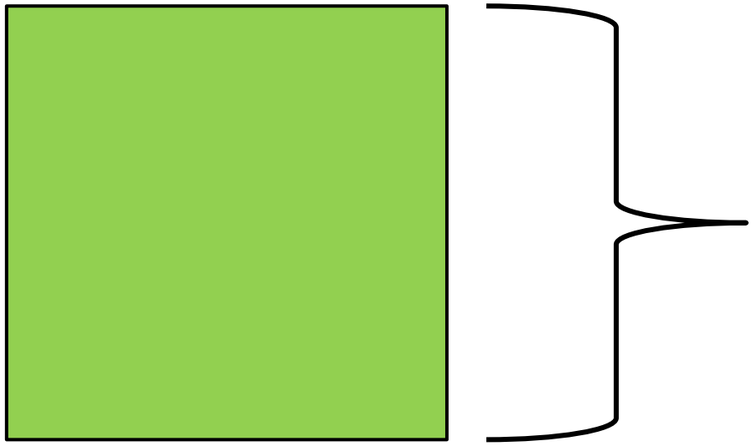

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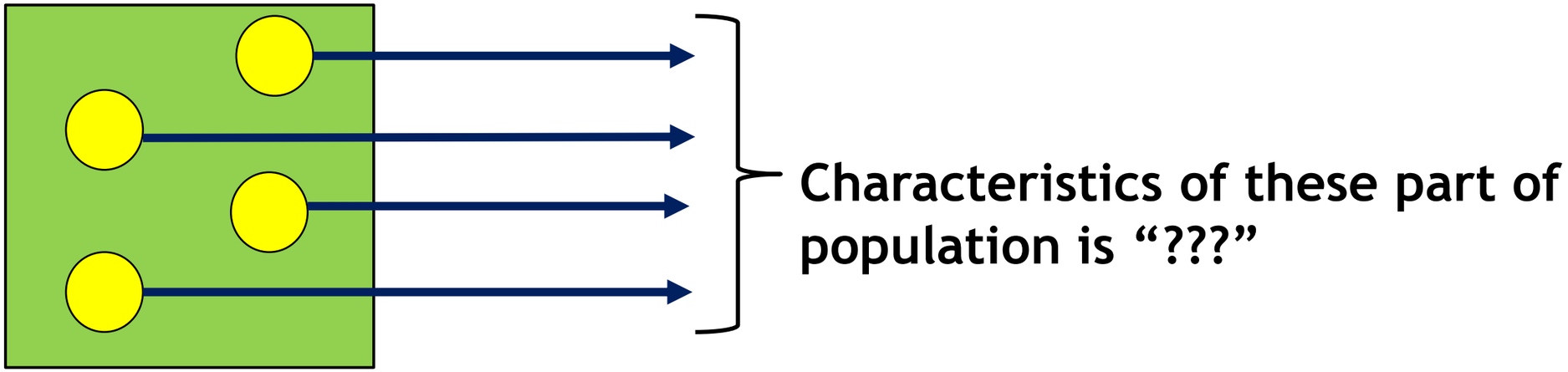

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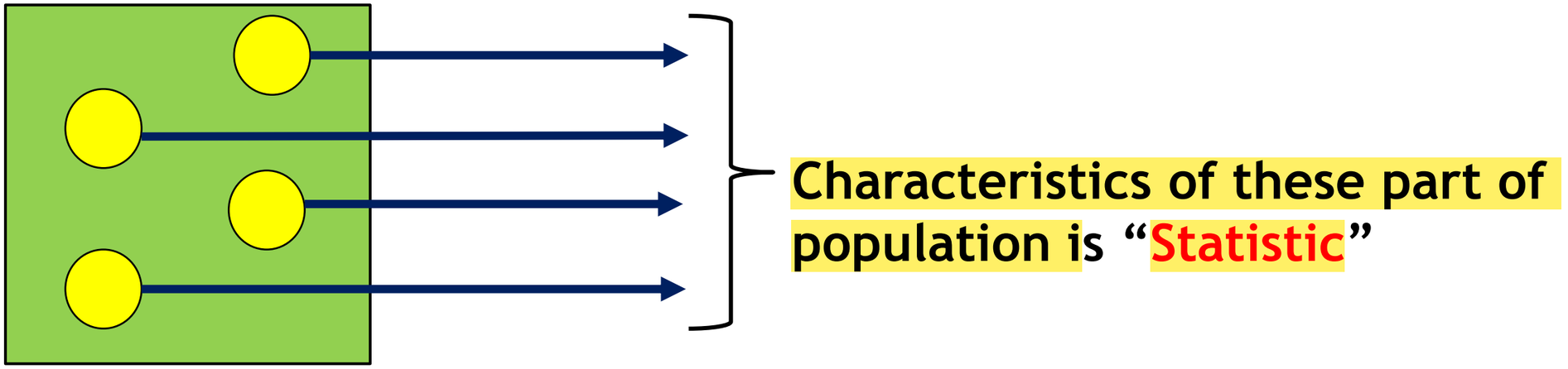

Sampling Techniques

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- Refer to the methods and approaches used to select a subset of individuals or observations from a larger population.

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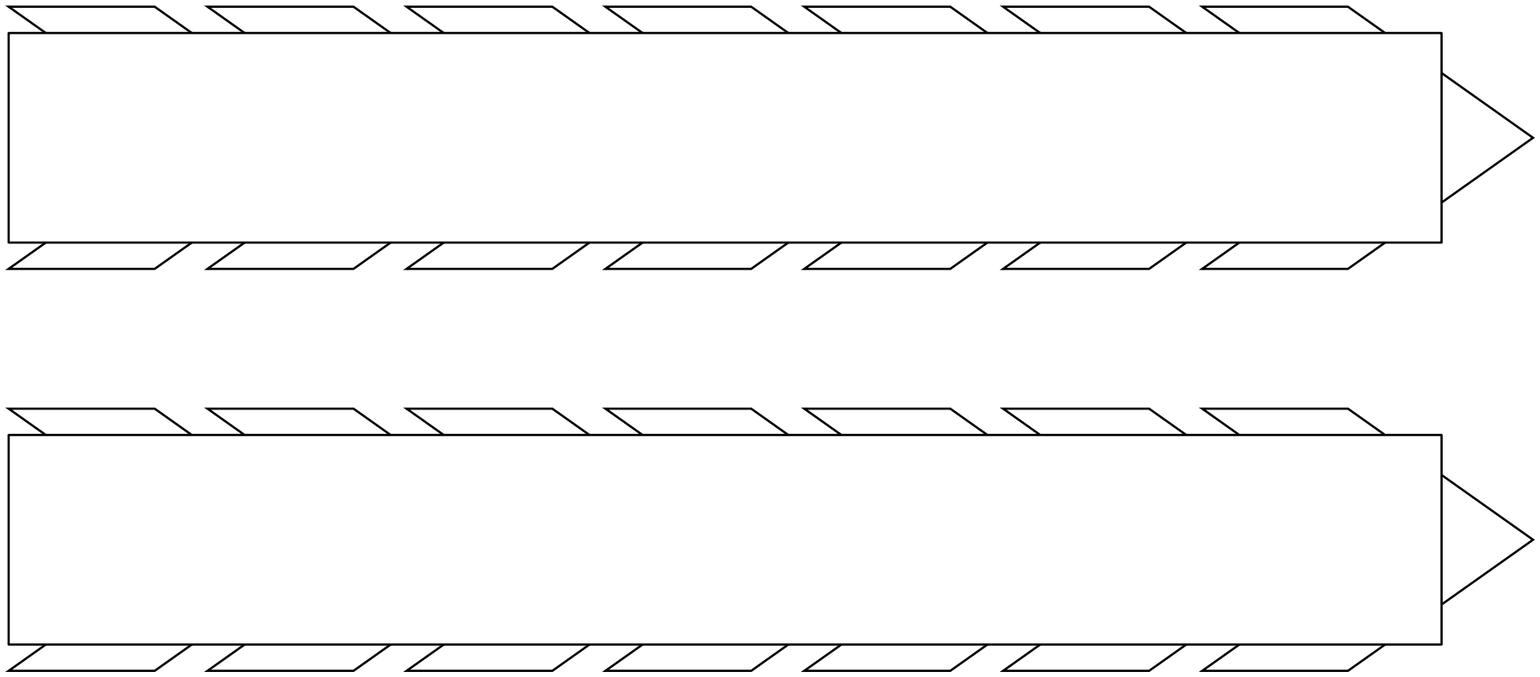
Probability Sampling



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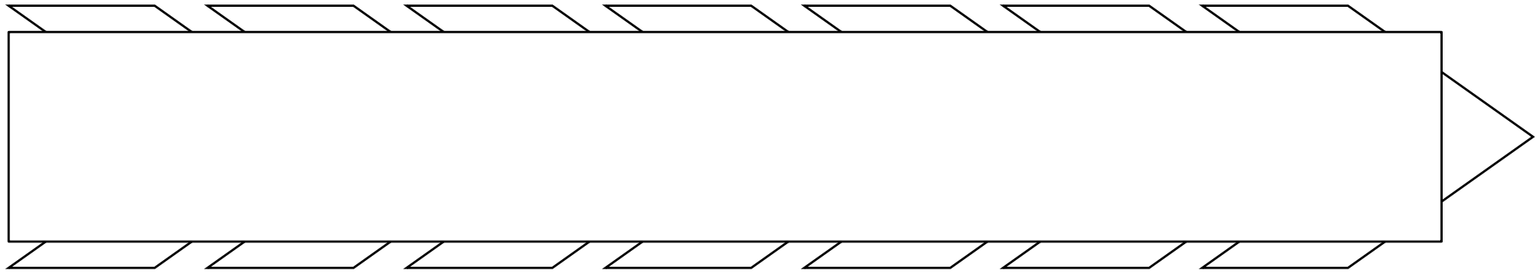
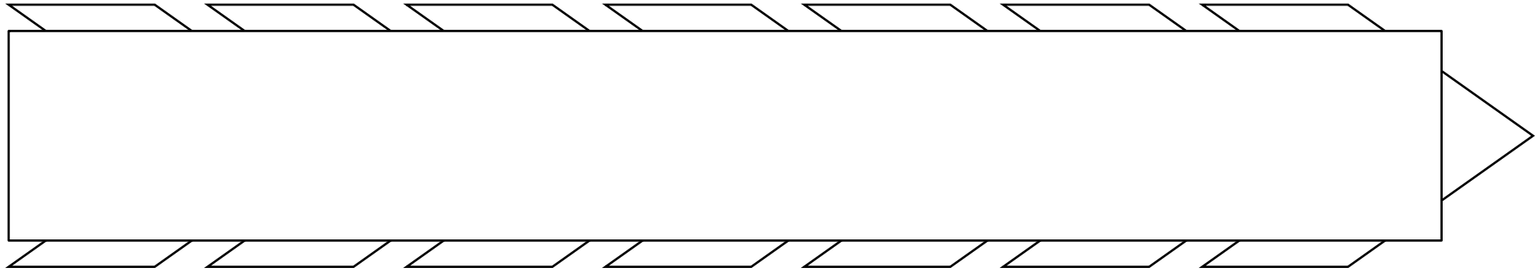


Non- probability Sampling



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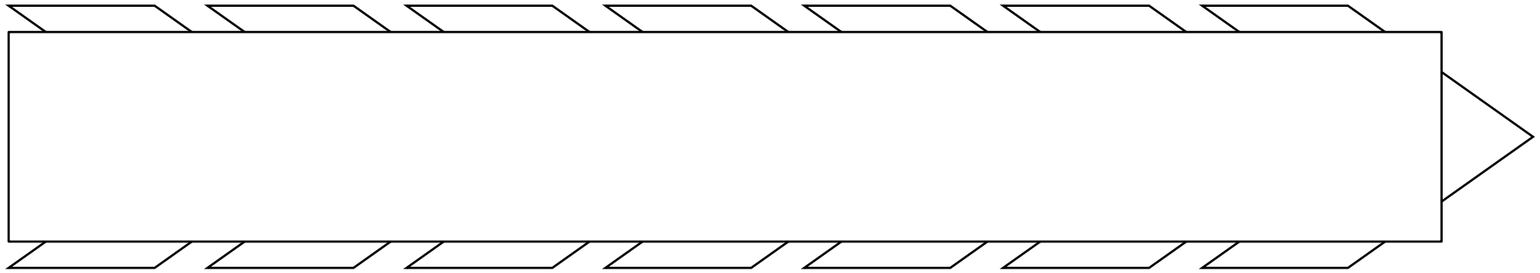
Probability Sampling: Selection is based on the principle of randomization



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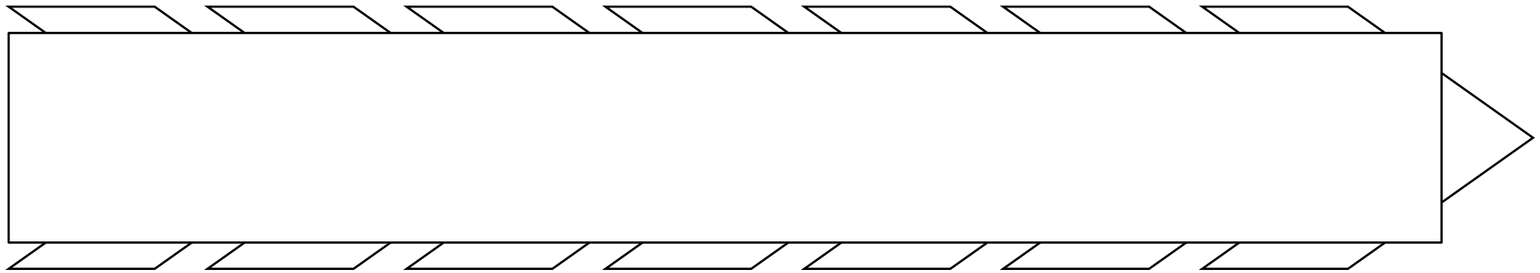

Sampling Techniques

- Refer to the methods and approaches used to select a subset of individuals or observations from a larger population.

Probability Sampling: Selection is based on the principle of randomization

- Simple Random Sampling
- Systematic Sampling
- Cluster Sampling
- Stratified Sampling

Non- probability Sampling

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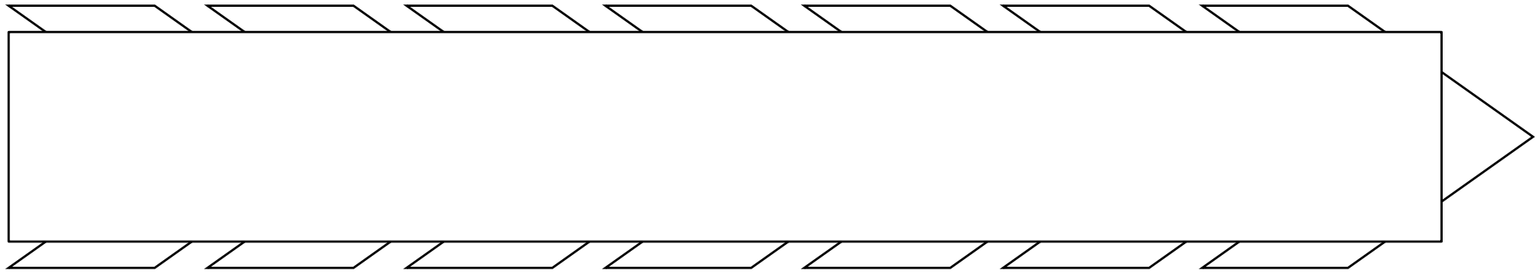
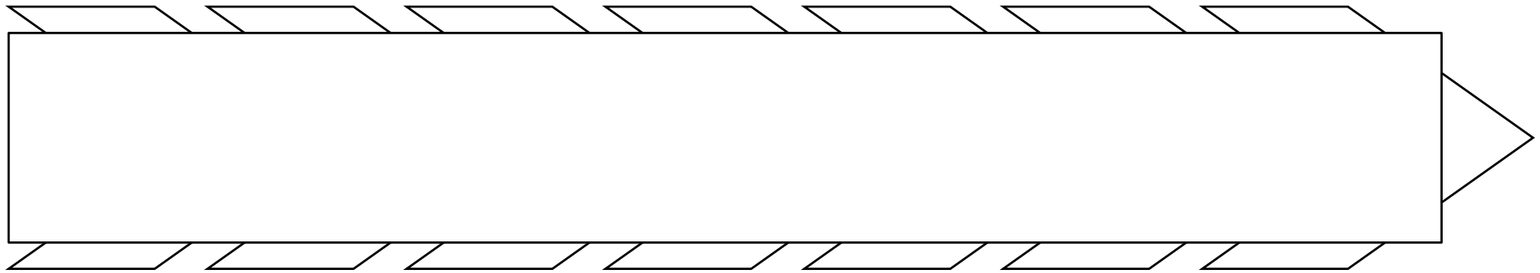


Non- probability Sampling: Selection is based on non-random method



Sampling Techniques

- Refer to the methods and approaches used to select a subset of individuals or observations from a larger population.

Probability Sampling: Selection is based on the principle of randomization

Non- probability Sampling: Selection is based on non-random method

- Convenience Sampling
- Snowball Sampling
- Purposive Sampling
- Quota Sampling

Variable

For example, Gender is a variable

For example, Height is a variable

- If the values of a characteristics vary
- From person to person
- From object to object
- From phenomenon to phenomenon

Variable

Male or Female

For example, Gender is a variable

For example, Height is a variable

5, 5.1, 4.1, 5.7

Types of Variable

- Two types of variable:

1. Qualitative variable (Values can not be measured numerically)

2. Quantitative variable (Values can be measured numerically)

    a. Discrete variable (Countable values)
    b. Continuous variable (Any values within a range)

????

Male or Female

For example, Gender is a variable

For example, Height is a variable

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Data

Male or Female

For example, Gender is a variable

For example, Height is a variable

5, 5.1, 4.1, 5.7

Data

- Data are “some information”
- That has been “collected” from field
- Translated into a form that is efficient for processing.

Data

Male or Female

For example, Gender is a variable

For example, Height is a variable

5, 5.1, 4.1, 5.7

Types of Data

- Two types of data:

1. Qualitative data (Values can not be measured numerically)

2. Quantitative data (Values can be measured numerically)

    a. Discrete data (Countable values)
    b. Continuous data (Any values within a range)

Sources of Data

- There are two sources of getting statistical data:

1. Primary data (Fresh and First time)

2. Secondary data (Has already been collected by someone)

Levels of measurements

Scales of Measurements

Data measurements

- Refer to the different ways in which variables or data can be categorized or measured.

- Four measurements
  1. Nominal
  2. Ordinal
  3. Interval
  4. Ratio

Scales of Measurements

Scales of Measurements

Nominal	Ordinal
Must be categorical/qualitative	Must be categorical/qualitative
Can't be find differences	Can't be find differences
Can't be find ratios	Can't be find ratios
Can't be ranked	Can be ranked

Scales of Measurements

Scales of Measurements

Interval	Ratio
Must be quantitative	Must be quantitative
Can be ranked	Can be ranked
Zero is not absolute	Zero is absolute
Can be find difference but not ratios	Can be find both difference and ratios

Scales of Measurements

Levels	Property			Example
	Order	Difference	Ratio	
Nominal				Gender
Ordinal				Wealth index
Interval				Temperature
Ratio				Person’s age

Scales of Measurements

Levels	Property			Example
	Order	Difference	Ratio	
Nominal	No	No	No	Gender
Ordinal	Yes	No	No	Wealth index
Interval	Yes	Yes	No	Temperature
Ratio	Yes	Yes	Yes	Person's age

Scales of Measurements

- Identify the scale of measurement for a variable that measures a person's level of education as "High School," "Bachelor's Degree," "Master's Degree," and "Ph.D".

Ordinal

ANY
QUESTIONS
?