Scope of Statistics

EGI SAFITRI, S.MAT., M.SI

Course Contract

- **Attendance**: 75% out of 16 meetings.
- **Tardiness**: Maximum of 10 minutes.
- **Active Participation** in learning.
- **Dress Code**: Neat, polite, and in accordance with campus regulations.
    1. **Men**: Collared shirt/T-shirt, must wear shoes.
    2. **Women**: Shirt/Blouse, polite, must wear shoes.
- During class, mobile phones must be kept away and set to silent or non-active mode.
- **Assignments must always be completed**; otherwise, the score will automatically be **0**.

Topics Covered in Statistics

- Definition and Users of Statistics
- Statistics vs. Statistical Science
- Scope of Statistics
- Types of Statistics
- Types of Data
- Sources of Statistical Data
- Measurement Scales

Basic Definition of Statistics

- A collection of numbers obtained from measurement or calculation, referred to as **data**.
- Can be interpreted as **sample statistics.**
- A **scientific method** used as a tool to aid decision-making, conduct data analysis, and interpret research results.

Definition of Statistics by Experts

1. **Sudjana (2004, in Ridwan and Sunarto, 2007)**
    - Defines statistics as knowledge related to methods of collecting facts, processing, and making well-reasoned decisions based on facts and analysis.
    - **"Statistic"** is used to express a collection of facts, generally in numerical form, arranged in tables or diagrams to illustrate a particular issue.
2. **Marguerite F. Hall**
    - A technique used to collect data, analyze data, summarize, and interpret numerical data.
3. **Anderson & Bancroft**
    - The science and art of developing and applying the most effective methods for collecting, tabulating, and interpreting quantitative data to minimize errors in conclusions and estimations, using **inductive reasoning based on probability mathematics.**

Definition of Statistics According to the Indonesian Dictionary (KBBI)

1. The science of collecting, tabulating, classifying, analyzing, and searching for meaningful information from numerical data.
2. Knowledge related to data collection, investigation, and drawing conclusions based on numerical evidence (KBBI, 2017).

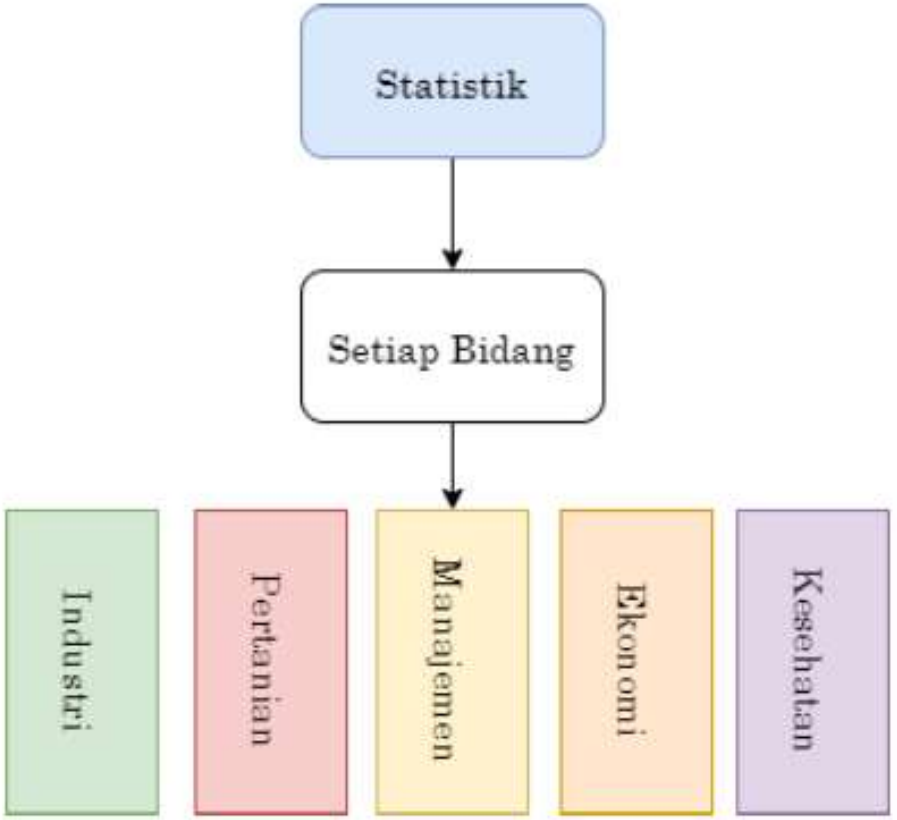
Definition of "Statistic"

1. A record of numbers (numerical figures); numerical data.
2. Data in numerical form that is collected, tabulated, and classified to provide meaningful information about a problem or phenomenon (KBBI, 2017).

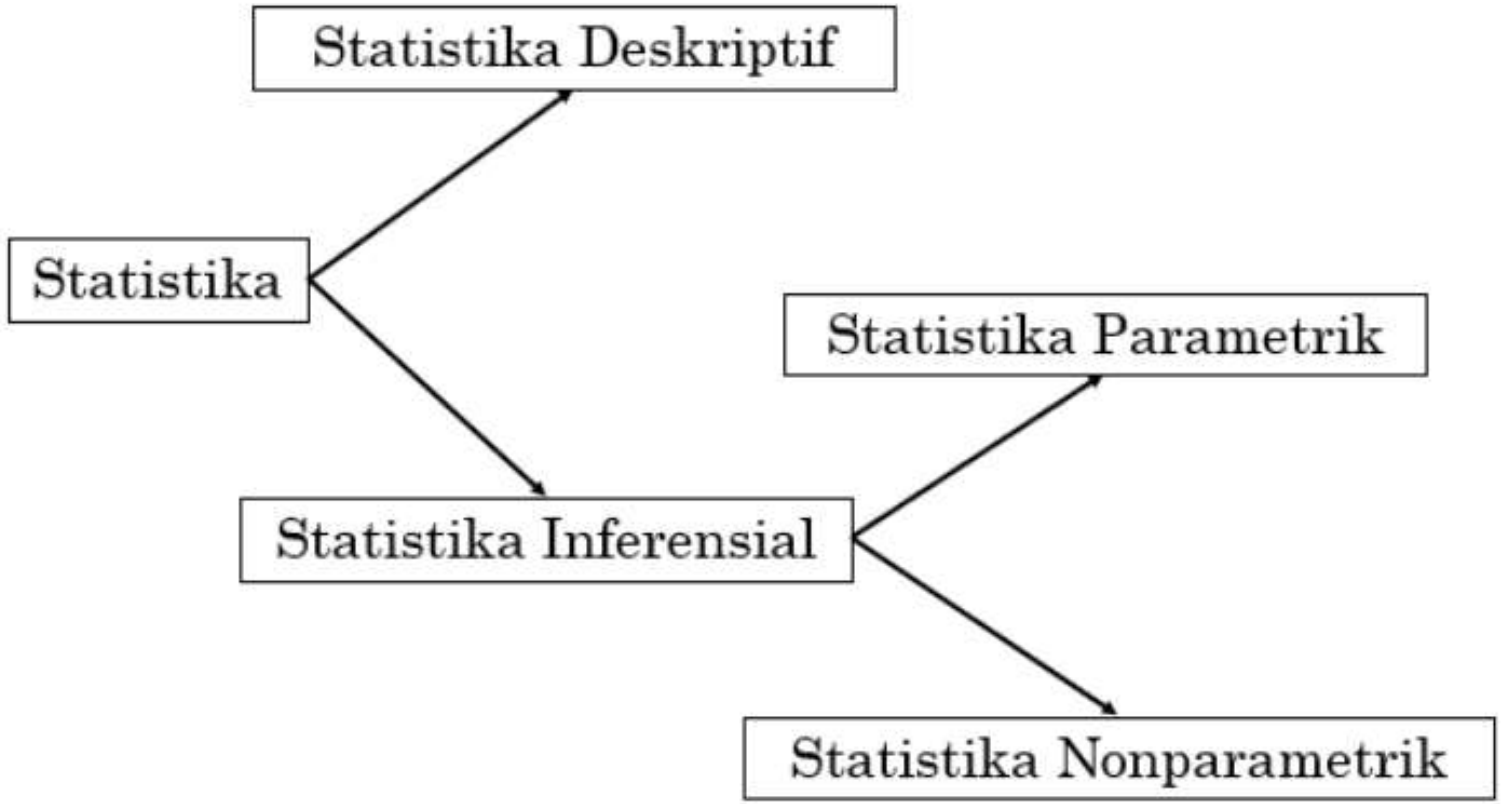
Objectives of Statistics

1. To **answer problems and verify** something that has not yet been proven true.
2. To **summarize data** so that it produces **easily understandable information.**

Application of Statistics



Scope of Statistics



Descriptive Statistics:
Statistical activities include data collection, data processing, data presentation, and data summarization to describe characteristics, forms, and traits of populations, communities, or organizations based on collected data.

Parametric Statistics:
Statistics used to analyze data obtained from normally distributed populations.

Inferential Statistics:
A branch of statistics that estimates a population using samples, including estimation theories and hypothesis testing.

This statistical activity begins with data collection and ends with hypothesis testing.

Non-Parametric Statistics:
Statistics used to analyze data from populations without assuming normal distribution.

Data and Measurement of Data

Data is Raw materials that need to be processed to produce information, whether qualitative or quantitative. Data can represent facts, numbers, or anything whose accuracy is reliable and can be used as a basis for drawing conclusions.

Data Classification

Data Classification Based on Acquisition Method

- **Primary Data:** Data collected directly by the researcher from the first-hand source or research site.
- **Secondary Data:** Data published or used by an organization that did not process it.

Data Classification Based on Time of Collection

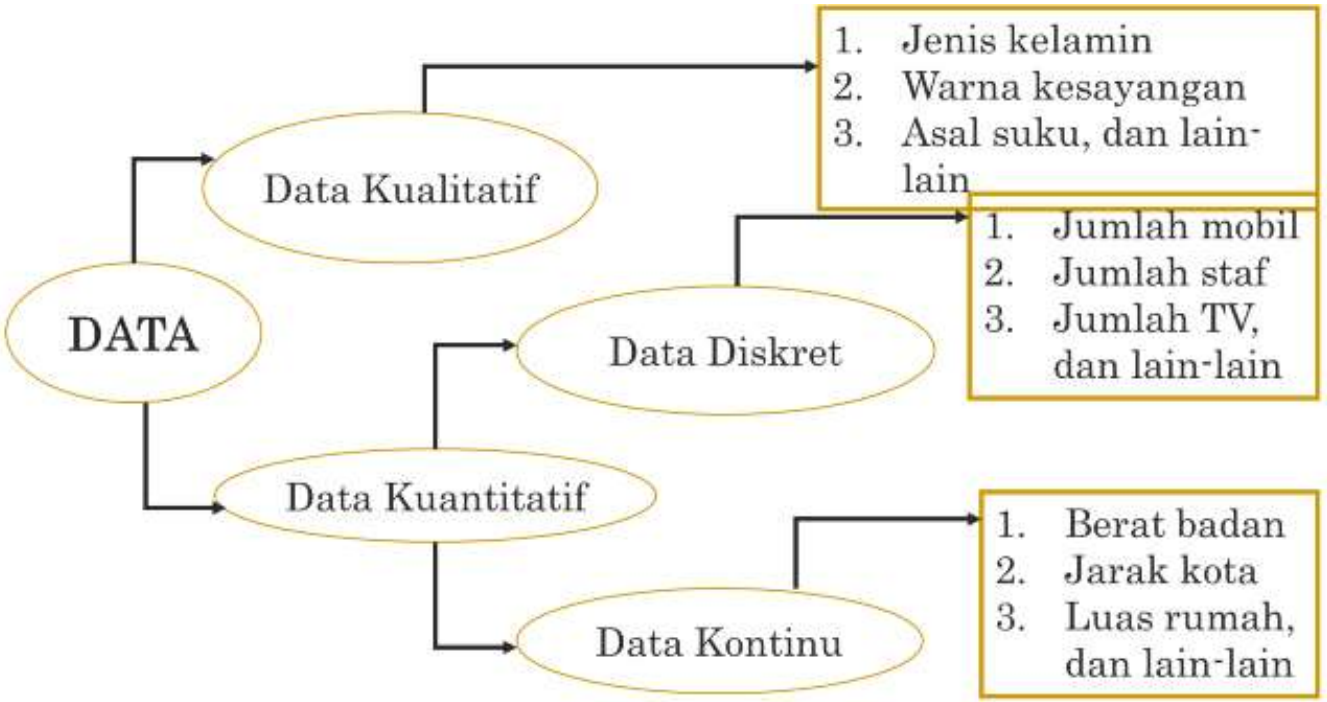
- **Time-Series Data:** Data collected over time for a single object to illustrate trends or developments.
- **Cross-Section Data:** Data collected at a specific time from multiple objects to depict a situation.

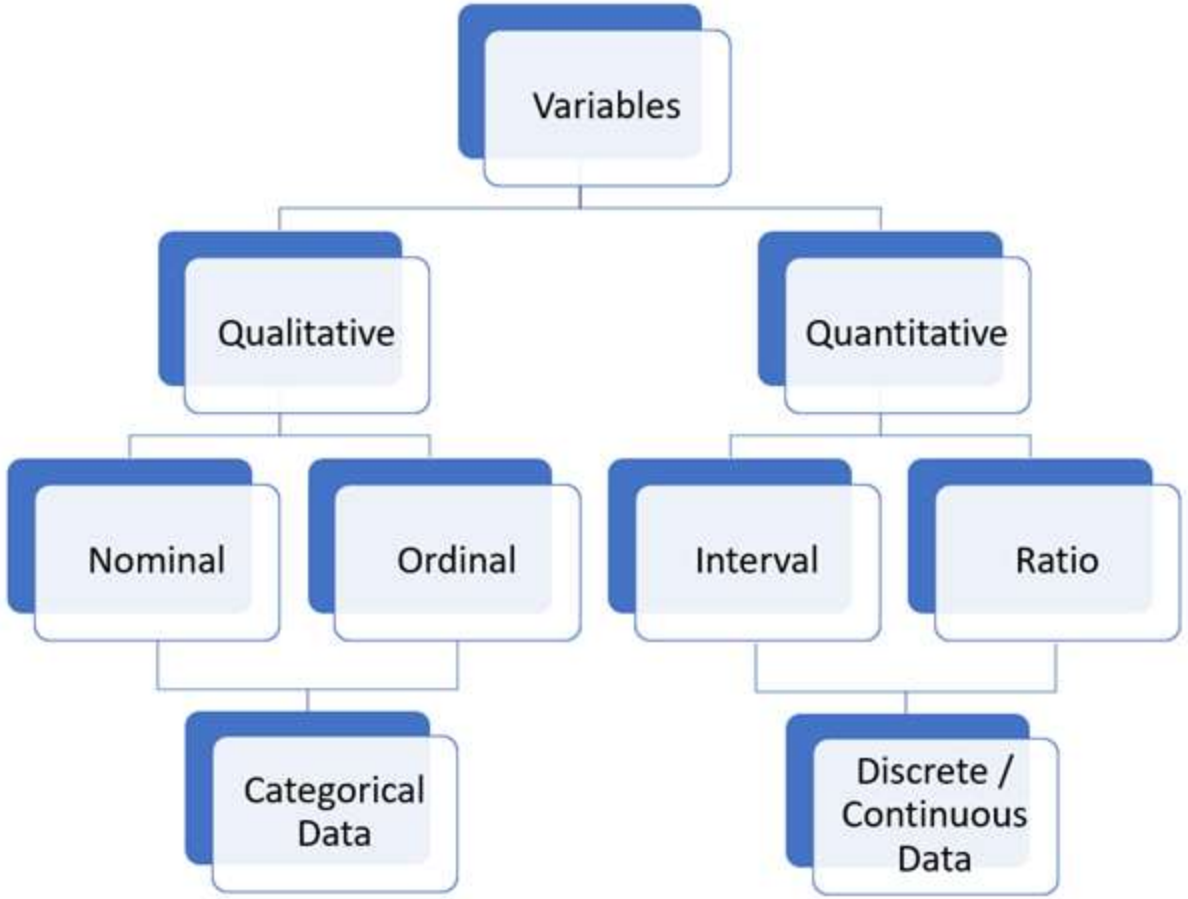
Data Classification

Data Classification Based on Nature

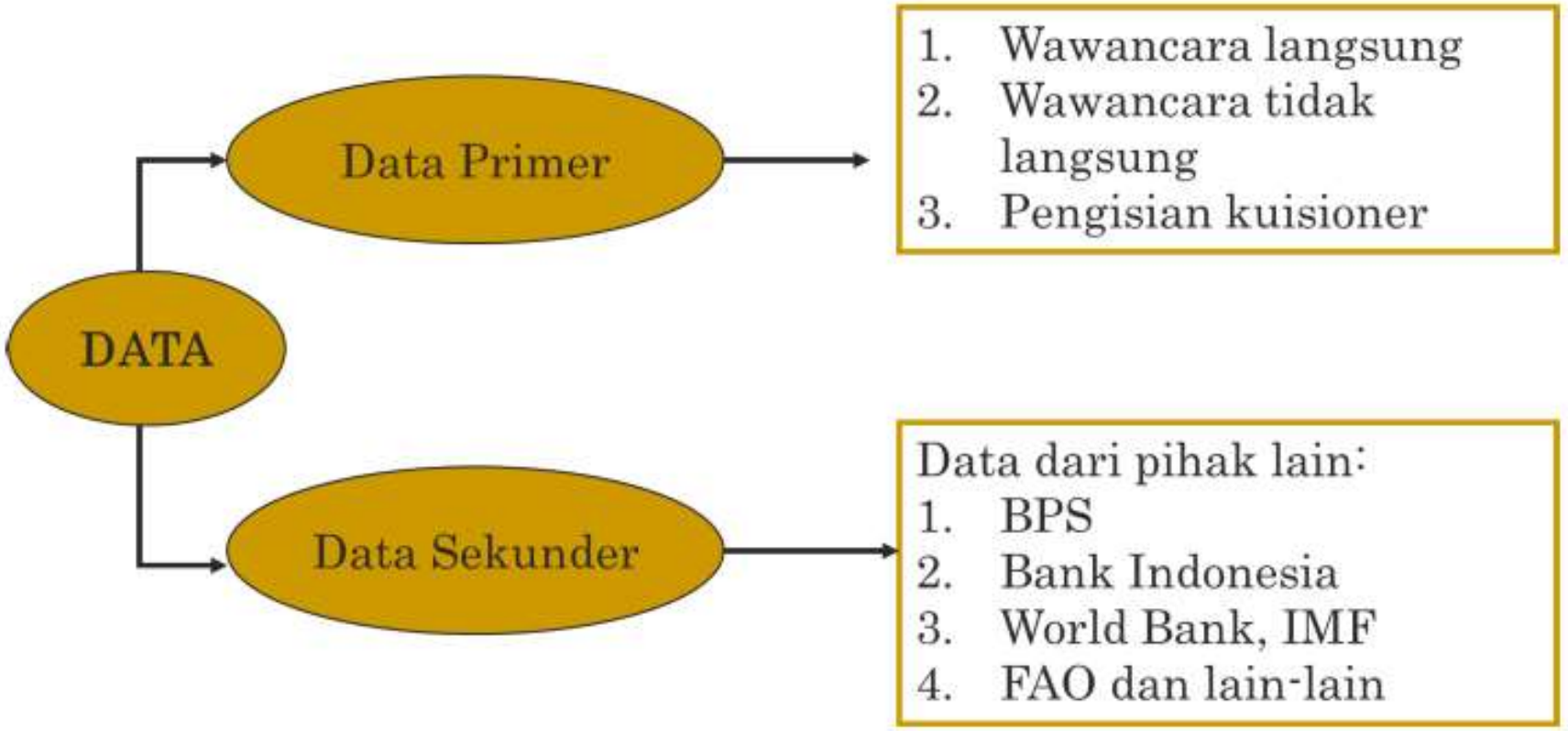
1. **Qualitative Data**: Data in the form of statements or judgments, not numbers. It can be obtained through interviews, document analysis, and field observations.
2. **Quantitative Data**: Numerical data that can be processed using statistical calculations.
    - **Discrete Data**: Whole numbers obtained by counting.
    - **Continuous Data**: Numbers that include decimals or fractions obtained through measurement.

Data


DATA
Data Kualitatif
Data Kuantitatif
Data Diskret
Data Kontinu
1. Jenis kelamin
2. Warna kesayangan
3. Asal suku, dan lain-lain
1. Jumlah mobil
2. Jumlah staf
3. Jumlah TV, dan lain-lain
1. Berat badan
2. Jarak kota
3. Luas rumah, dan lain-lain


Variables
Qualitative
Quantitative
Nominal
Ordinal
Interval
Ratio
Categorical Data
Discrete / Continuous Data

Sources of Statistical Data



Data Collection Methods

1. **Interview**:
    - A process of obtaining data through face-to-face question-and-answer sessions between an interviewer and a respondent.
    - There are two types of interviews: structured and unstructured.
2. **Observation**:
    - Collecting data by directly observing the environmental conditions of the research object to clearly understand the subject being studied.
3. **Questionnaire (Survey)**:
    - A technique for collecting information that allows analysts to study attitudes, beliefs, behaviors, and characteristics of key individuals in an organization.

Measurement Scales

Nominal Scale:
Numbers are used only as labels.
Example: Male = 1, Female = 2, Non-binary = 3.

Ordinal Scale:
Numbers indicate ranking or level.
Example: Ranking 1, 2, and 3, where rank 1 is higher than ranks 2 and 3.

Interval Scale:
Numbers have an ordinal nature and also an interval.
Example: Stock price range Rp 736,878 - Rp 592,735.

Ratio Scale:
Includes nominal, ordinal, and interval properties while also having an absolute zero value.
Example: BCA interest rate 7% and Mandiri interest rate 14%, meaning Mandiri's rate is twice BCA's.

Nominal Scale

Discrete data is data obtained by counting or enumerating (not measuring). For example, the number of second-semester students is 278, the number of teachers at High School Z is 67, and so on. Similarly, the **Nominal Scale** is the simplest scale, categorized by type (category) where numbers function only as symbols to differentiate one characteristic from another.

Characteristics:

- The result of counting, and no fractions are found.
- Numbers are used as labels only.
- Does not have an order (ranking).
- Does not have a new measurement.
- Does not have an absolute zero.

Ordinal Scale

The ordinal scale is a scale based on ranking/order or data that is structured in levels from lower to higher or from higher to lower.

Example:

1. Rank 1 (Score 100)
2. Rank 2 (Score 90)
3. Rank 3 (Score 80)
4. Rank 4 (Score 70)

Interval Scale

The interval scale represents the distance between one data point and another with equal weight or equal intervals. However, it does not have an absolute (true) zero value.

Example:

1. Very Good (Score 5)
2. Good (Score 4)
3. Average (Score 3)
4. Poor (Score 2)
5. Very Poor (Score 1)

Ratio Scale

The ratio scale is a measurement scale that has an absolute zero value and maintains equal intervals between data points.

Example:

1. 0 months, 1 month, 2 months, 3 months, ...
2. -3 cm, -2 cm, -1 cm, 0 cm, 1 cm, 2 cm, 3 cm
3. ..., 500 kg, 600 kg, 700 kg, ...


THANK
YOU