Introduction to Statistics

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Overview of Statistics

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- **collecting**,
- **organizing**,
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- **presenting** *data*

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as well as **drawing conclusions** *and* **making decisions** *on the basis of such analysis.*

Importance of Statistics

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- Example: Medical research, opinion polls, sports analysis, AI, etc.

Key Concepts

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- **Parameters vs. Statistics**: Parameters (numerical summary of a population) and statistics (numerical summary of a sample).

Descriptive vs. Inferential Statistics

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- **Inferential Statistics**: Making inferences or predictions about a population based on sample data.

Data Types

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- Examples of qualitative data: gender, eye color, type of car.
- Examples of quantitative data: height, weight, temperature.

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- Example: Nominal - Colors (red, blue, green); Ordinal - Educational level (elementary, high school, college).

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- Example: Discrete (with definite "next value")- number of siblings; Continuous - weight, height.

Check Point

Classify the following data according to their types (nominal, ordinal, quantitative discrete, quantitative continuous)

- Color of cars in the parking lot.
- Number of cars in the parking lot.
- Temperatures recorded in Celsius
- Ratings of movies (Excellent, Good, Average, Poor)
- Ages of students in a class
- Number of siblings a person has
- Blood types of individuals (A, B, AB, O)
- Heights of students in inches
- Brands of smartphones owned by students

Levels of Measurement

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- There are four levels of measurement: **Nominal, Ordinal, Interval, and Ratio**.

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- It involves categorizing data into distinct groups or categories.
- Examples: Gender (Male, Female, . . .), Colors (Red, Blue, Green, . . .), Marital Status (Single, Married, Divorced, . . .).

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- Examples: Educational Level (Elementary, High School, College), Letter Grades (A, B, C), Likert Scale (Strongly Disagree, Disagree, Neutral, Agree, Strongly Agree).

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- Examples: Temperature (Celsius, Fahrenheit), date when measured from an arbitrary epoch (such as AD), time of day, shoe sizes.

Ratio Scale

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- Ratios between values are meaningful.
- Examples: length, mass, duration.

Summary

- Nominal: Categorizes data into distinct groups (no order).
- Ordinal: Ranks data with a specific order.
- Interval: Equal intervals, but lacks a true zero point.
- Ratio: Equal intervals with a true zero point (ratios are meaningful).

For more information about levels of measurements see this page, this page and this wikipedia page.