What are the measurement levels and statistics used in data analysis?

Authored by

stats writer

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Data analysis is the process of collecting, organizing, and interpreting data to gain insights and make informed decisions. In this process, it is important to understand the measurement levels and statistics used to accurately analyze the data. Measurement levels refer to the ways in which data can be measured, namely nominal, ordinal, interval, and ratio. These levels determine the type of statistical analysis that can be applied to the data. Statistics, on the other hand, are mathematical techniques used to summarize and interpret data. They include measures of central tendency, such as mean, median, and mode, as well as measures of variability, such as range, variance, and standard deviation. These statistics help to identify patterns, trends, and relationships within the data, which are crucial for making informed decisions. Overall, understanding the measurement levels and statistics used in data analysis is essential for accurate and meaningful interpretation of data.

Statistics - Measurement Levels

Different data types have different measurement levels.

Measurement levels are important for what types of statistics can be calculated and how to best present the data.

Measurement Levels

The main types of data are Qualitative (categories) and Quantitative (numerical). These are further split into the following measurement levels.

These measurement levels are also called measurement 'scales'

Nominal Level

Categories (qualitative data) without any order.

Examples:

Brand namesCountriesColors

Ordinal level

Categories that can be ordered (from low to high), but the precise "distance" between each is not meaningful.

Examples:

Letter grade scales from F to AMilitary ranksLevel of satisfaction with a product

Consider letter grades from F to A: Is the grade A precisely twice as good as a B? And, is the grade B also twice as good as C?

Exactly how much distance it is between grades is not clear and precise. If the grades are based on amounts of points on a test, you can say that there is a precise "distance" on the point scale, but not the grades themselves.

Interval Level

Data that can be ordered and the distance between them is objectively meaningful. But there is no natural 0-value where the scale originates.

Examples:

Years in a calendarTemperature measured in Fahrenheit

Note: Interval scales are usually invented by people, like degrees of temperature.

0 degrees Celsius is 32 degrees of Fahrenheit. There is consistent distances between each degree (for every 1 extra degree of
Celsius, there is 1.8 extra Fahrenheit), but they do not agree on where 0 degrees is.

Ratio Level

Data that can be ordered and there is a consistent and meaningful distance between them. And it also has a natural 0-value.

Examples:

MoneyAgeTime

Data that is on the ratio level (or "ratio scale") gives us the most detailed information. Crucially, we can compare precisely how big one value is compared to another. This would be the ratio between these values, like twice as big, or ten times as small.