Variables and Statistics [1]

Admin Name [2]

In statistics, variables are central to any analysis and they need to be understood well by the researcher. Even though the concept looks deceptively simple, many studies and experienced researchers can go wrong by using the wrong variables.

Like any variable [3] in mathematics, variables can vary, unlike mathematical constants like pi or e. In statistics, variables contain a value or description of what is being studied in the sample [4] or population [5].

For example, if a researcher aims to find the average height of a tribe in Columbia, the variable would simply be the height of the person in the sample. This is a simple measure for a simple statistical study. However, most statistical analyses are not as straightforward.

In many cases, statistical variables do not contain numerical values but rather something descriptive, such as the color of fins of a fish or the kind of species in a given natural habitat.

Qualitative to Quantitative Conversion

In many studies, the qualitative [6] aspects of study are converted into numerical data for statistical analysis. In this case, the final variable used in the statistical analysis is a number instead of an attribute. This is central to good design of experiments [7].

For example, a research study might aim to find out how happy the sample group of students is before and after eating a bar of chocolate. In this case, it is very difficult to describe happiness, which is a very subjective and qualitative attribute. Converting this into a numerical scale of say 1-10 is what will give the study some credibility and help the researchers draw the right conclusions [8] and inferences.

Quantitative Variables: Discrete and Continuous

Quantitative [9] variables in statistics can be of different types [10], but the most commonly used classification is that they can either be discrete or continuous. These types of variables have some inherent differences that the researcher needs to be aware of.

For example, the test scores of a sample of students is clearly a discrete type of data that will be represented by discrete variables [11].

On the other hand, the signal noise produced in a study involving communicating devices is continuous in nature because the noise can take any value. This would be represented by a continuous variable.

Discrete to Continuous Conversion

These different types of variables require different kinds of analysis. For example, a number of continuous variables can be described using normal distribution [12]. In fact, many discrete variables can also be represented in this manner when the sample space is so large that it looks like a continuous variable.

For example, the results of a coin toss involving 5 tosses is very discrete but if the number of flips is increased to 5000, the data looks smooth and continuous and the probability of obtaining say at least 2300 heads can be computed with a very good level of accuracy using continuous variables (coin tosses follow a normal distribution).

Links
[1] https://staging.explorable.com/en/variables-and-statistics
[2] https://staging.explorable.com/en
[3] https://staging.explorable.com/research-variables
[4] https://staging.explorable.com/sample-group
[5] https://staging.explorable.com/research-population
[6] https://staging.explorable.com/qualitative-research-design
[7] https://staging.explorable.com/experimental-research
[8] https://staging.explorable.com/drawing-conclusions
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[10] http://stattrek.com/descriptive-statistics/variables.aspx?tutorial=stat
[11] https://staging.explorable.com/discrete-variables
[12] https://staging.explorable.com/normal-probability-distribution