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How Stratified Random Sampling Works

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Stratified random sampling is a method of sampling that involves dividing a population into smaller groups–called strata. The groups or strata are organized based on the shared characteristics or attributes of the members in the group. The process of classifying the population into groups is called stratification.

Stratified random sampling is also known as quota random sampling and proportional random sampling. Stratified random sampling has numerous applications and benefits, such as studying population demographics and life expectancy.

> **KEY TAKEAWAYS**
> - Stratified random sampling is a sampling method that involves taking samples of a population subdivided into smaller groups called strata.
> - Stratified random sampling involves taking random samples from stratified groups, in proportion to the population.
> - Stratified random sampling is a more precise metric since it's a better representation of the overall population.

Understanding Stratified Random Sampling

Stratified random sampling divides a population into subgroups. Random samples are taken in the same proportion to the population from each of the groups or strata. The members in each stratum (singular for strata) formed have similar attributes and characteristics.

Stratified random sampling is a method of sampling, which is when a researcher selects a small group as a sample size for study. This subset represents the larger population. Organizing a population into groups with similar characteristics helps researchers save time and money when the population being studied is too large to analyze on an individual basis. Stratified random sampling helps by allowing researchers to organize the groups based on similar characteristics whereby a random sample is then taken from each stratum or group.

Stratified random sampling can be used, for example, to study the polling of elections, people that work overtime hours, life expectancy, the income of varying populations, and income for different jobs across a nation.

Stratified vs. Simplified Random Sampling

A simple random sample is a sample of individuals that exist in a population whereby the individuals are randomly selected from the population and placed into the sample. This method of randomly selecting individuals seeks to select a sample size that is an unbiased representation of the population. However, a simple random sample is not advantageous when the samples of the population vary widely.

Conversely, stratified random sampling breaks down the population into subgroups and organizes them by similar traits, characteristics, and behavior. As a result, stratified random sampling is more advantageous when the population varies widely since it helps to better organize the samples for study.

However, a simple random sample is more advantageous when the population can't be organized into subgroups because there are too many differences within the population. Also, simple random samples are best when there's little-to-no information about the population, which prevents the population from being broken into subsets based on characteristics or traits.

Example of Stratified Random Sampling

A research team has decided to perform a study to analyze the grade point averages or GPAs for the 21 million college students in the U.S. The researchers decide to obtain a random sample of 4,000 college students within the population of 21 million. The team wants to review the various majors and subsequent GPAs for the students or sample participants.

Out of the 4,000 participants, the breakdown of majors is as follows:

- English: 560
- Science: 1,135
- Computer science: 800
- Engineering: 1,090
- Math: 415

The researchers have their five strata from the stratified random sampling process. Next, the researchers study the data of the population to determine the percentage of the 21 million students that major in the subjects from their sample. The findings show the following:

- 12% major in English
- 28% major in science
- 24% major in computer science
- 21% major in engineering

- 15% major in mathematics

The team decides to employ a proportional stratified random sample whereby they want to determine if the majors for the students in the sample represent the same proportion as the population.

However, the proportions in the sample are not equal to the percentages in the population. For example, 12% of the student population are English majors, while 14% of the students in the sample are English majors (or 560 English majors / 4,000).

As a result, the researchers decide to resample the students to match the percentage of majors in the population. Out of the 4,000 students in their sample, they decide to randomly select the following:

- 480 English majors (12% of 4,000)
- 1,120 science majors (28% of 4,000)
- 960 computer science majors (24% of 4,000)
- 840 engineering majors (21% of 4,000)
- 600 mathematics majors (15% of 4,000)

The researchers now have a proportionate stratified random sample of college students and their respective majors, which more accurately reflects the majors for the overall student population. From there, the researchers can analyze the GPAs of each stratum as well as their characteristics to get a better sense of how the overall student population is performing.

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