

What are some of Examples Using the Central Limit Theorem?

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The Central Limit Theorem is a statistical concept commonly used in a variety of fields to estimate population parameters and make predictions based on sample data. In manufacturing, it is used to determine the acceptable range of quality for a product, while in opinion polls and surveys, it allows for accurate predictions about the entire population based on a random sample. In stock market analysis, the theorem can be used to predict future performance, and in medical research, it helps to analyze data from clinical trials and experiments to determine the effectiveness of treatments. Overall, the Central Limit Theorem plays a crucial role in making reliable inferences and predictions in various industries and fields of study.

5 Examples of Using the Central Limit Theorem in Real Life

The central limit theorem states that if we take repeated random samples from a population and calculate the mean value of each sample, then the distribution of the sample means will be approximately , *even if the population the samples came from is not normal.*

The central limit theorem also states that the mean of the sampling distribution will be equal to the mean of the population distribution:

$$\bar{x} = \mu$$

The central limit theorem is useful because it allows us to use a sample mean to draw conclusions about a larger .

The following examples show how the central limit

theorem is used in different real-life situations.

Example 1: Economics

Economists often use the central limit theorem when using sample data to draw conclusions about a population.

For example, an economist may collect a of 50 individuals in a town and use the average annual income of the individuals in the sample to estimate the average annual income of individuals in the entire town.

If the economist finds that the average annual income of the individuals in the sample is \$58,000, then her best guess for the true average annual income of individuals in the entire town will be \$58,000.

Example 2: Biology

Biologists use the central limit theorem whenever they use data from a sample of organisms to draw conclusions about the overall population of organisms.

For example, a biologist may measure the height of 30 randomly selected plants and then use the sample mean height to estimate the population mean height.

If the biologist finds that the sample mean height of the 30 plants is 10.3 inches, then her best guess for the population mean height will also be 10.3 inches.

Example 3: Manufacturing

Manufacturing plants often use the central limit theorem to estimate how many products produced by the plant are defective.

For example, the manager of the plant may randomly select 60 products produced by the plant in a given day and count how many of the products are defective. He can use the proportion of defective products in the sample to estimate the proportion of all products that are defective that are produced by the entire plant.

If he finds that 2% of products are defective in the sample, then his best guess for the proportion of defective products produced by the entire plant is also 2%.

Example 4: Surveys

Human Resources departments often use the central limit theorem when using surveys to draw conclusions about overall employee satisfaction at companies.

For example, the HR department of some company may randomly select 50 employees to take a survey that assesses their overall satisfaction on a scale of 1 to 10.

If it's found that the average satisfaction among employees in the survey is 8.5 then the best guess for the average satisfaction rating of all employees at the company is also 8.5.

Example 5: Agriculture

Agricultural scientists use the central limit theorem whenever they use data from samples to draw conclusions about a larger population.

For example, an agricultural scientist may test a new fertilizer on 15 different fields and measure the average crop yield of each field.

If it's found that the average field produces 400 pounds of wheat, then the best guess for the average crop yield for all fields will also be 400 pounds.

Additional Resources

The following tutorials provide additional information about the central limit theorem: