

## Quantifying Central Limit Theorem Convergence: A Monte Carlo Simulation Approach to Minimum Sample Size

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### Abstract

This study determined the minimum sample size that ensures the sampling distribution is normal. The Central Limit Theorem states that as the sample size gets larger, the sampling distribution of the mean becomes normal, regardless of the population distribution. This study used a Monte Carlo simulation. The data came from a population of 10,000, which had a skewed distribution. For each sample size, the software selected data 200 times. It then calculated the means for these selections. The Kolmogorov-Smirnov test checked if these sample means were normal. This process was repeated 10,000 times for each sample size. The results show that at sample size 200, about 99% are normal. The findings support that a sample size of 200 is enough for the sampling distribution of the mean to be normal. The study suggests that using a sample size of at least 200 satisfies the CLT. This helps researchers use statistical tests that need normality. The study also notes that future research may look at how other characteristics of the population affect the sampling distribution.

### Keywords

Sample size, normality, central limit theorem, skewness, sampling distribution