

# Inferential Statistics with Stats-models

# What is Inferential Statistics?



A statistical approach used to make conclusions about a larger population using sample data.



Allows us to generalize findings beyond the immediate data set.



Essential for research, business decisions, and predictive analytics.

# Applications of Statsmodels



**Hypothesis Testing:**  
Determines if differences between groups are statistically significant.



**Regression Analysis:**  
Explores relationships between variables and makes predictions.



**Confidence Intervals & Statistical Significance:**  
Assesses the reliability of estimates.



**Time Series Analysis:**  
Analyzes trends and forecasts future values.

# Example Use Cases of Inferential Statistics



Medical Research: Evaluating the effectiveness of new treatments or medications.



Finance: Identifying trends in stock prices and market movements.



Transportation: Studying the impact of traffic congestion on delivery times.



Marketing: Measuring the success of an advertising campaign.



Education: Analyzing student performance to improve learning outcomes.

# Lesson Objectives



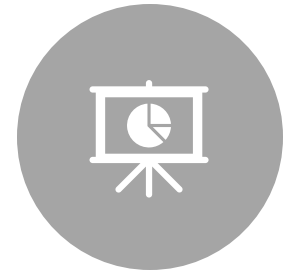
UNDERSTAND HOW TO  
SELECT AND SUBSET DATA  
FOR STATISTICAL ANALYSIS.



LEARN KEY CONCEPTS OF  
INFERENCE STATISTICS  
AND THEIR APPLICATIONS.



PERFORM STATISTICAL  
TESTS USING STATSMODELS  
IN PYTHON.



INTERPRET P-VALUES AND  
CONFIDENCE INTERVALS TO  
DRAW CONCLUSIONS.

# Understanding Hypothesis Testing

Null Hypothesis ( $H_0$ ): Assumes no effect or difference in data.

Alternative Hypothesis ( $H_1$ ): Assumes there is an effect or difference.

Statistical tests determine if we reject or fail to reject  $H_0$ .

Helps in validating claims and making evidencebased decisions.

# Understanding p-Values & Confidence Intervals



$p\text{-value} < 0.05$ : Indicates a statistically significant result, allowing rejection of  $H_0$ .



$p\text{-value} > 0.05$ : Suggests no significant evidence to reject  $H_0$ .



Confidence Interval (CI):  
Provides a range where the true population parameter is likely to fall.



Narrower CI indicates higher precision in estimation.

# Key Takeaways from This Lesson



Inferential statistics helps make datadriven decisions from sample data.



Statsmodels is a powerful Python library for statistical analysis.



Understanding hypothesis testing and pvalues is essential for significance testing.



Confidence intervals provide insights into the precision of estimates.



Proper data selection and statistical tests lead to reliable conclusions.