



Statistical Methods in MATLAB



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Statistical Methods in MATLAB

This two-day course focuses on performing statistical data analysis with MATLAB and Statistics and Machine Learning Toolbox. Examples and exercises demonstrate the use of appropriate MATLAB and Statistics and Machine Learning Toolbox functionality throughout the analysis process; from importing and organizing data, to exploratory analysis, to confirmatory analysis and simulation.

Prerequisites

MATLAB Fundamentals and knowledge of basic Statistics and Machine Learning Toolbox.

DURATION	LEVEL
2 Days	Medium
	

TOPICS

Day 1

- Importing and Organizing Data
- Exploring Data
- Distributions
- Hypothesis Tests

Day 2

- Analysis of Variance
- Regression
- Working with Multiple Dimensions
- Random Numbers and Simulation

Importing and Organizing Data

OBJECTIVE: Bring data into MATLAB and organize it for analysis. Perform common tasks, such as merging data and dealing with missing data.

- Importing data
- Data types
- Tables of data
- Merging data
- Categorical data
- Missing data

Exploring Data

OBJECTIVE: Perform basic statistical investigation of a data set, including visualization and calculation of summary statistics.

- Plotting
- Central tendency
- Spread
- Shape
- Correlations
- Grouped data

Distributions

OBJECTIVE: Investigate different probability distributions and fit distributions to a data set.

- Probability distributions
- Distribution parameters
- Comparing and fitting distributions
- Nonparametric fitting

Hypothesis Tests

OBJECTIVE: Determine how likely an assertion about a data set is. Apply hypothesis tests for common uses, such as comparing two distributions and determining confidence intervals for a sample mean.

- Hypothesis tests
- Tests for normal distributions
- Tests for nonnormal distributions

Analysis of Variance

OBJECTIVE: Compare the sample means of multiple groups and find statistically significant differences between groups.

- Multiple comparisons
- One-way ANOVA
- N-way ANOVA
- MANOVA
- Nonnormal ANOVA
- Categorical correlations

Regression

OBJECTIVE: Perform predictive modeling by fitting linear and nonlinear models to a data set. Explore techniques for improving model quality.

- Linear regression models
- Fitting linear models to data
- Evaluating the fit
- Adjusting the model
- Logistic and generalized linear regression
- Nonlinear regression

Working with Multiple Dimensions

OBJECTIVE: Simplify high-dimensional data sets by reducing the dimensionality.

- Feature transformation
- Feature selection

Random Numbers and Simulation

OBJECTIVE: Use random numbers to evaluate the uncertainty or sensitivity of a model, or perform simulations. Generate random numbers from various distributions, and manage the MATLAB random number generation algorithms.

- Bootstrapping and simulation
- Generating numbers from standard distributions
- Generating numbers from arbitrary distributions
- Controlling the random number stream



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knowledge**

