

Machine Learning with MATLAB

Training Objectives

This two-day course focuses on data analytics and machine learning techniques in MATLAB® using functionality within Statistics and Machine Learning Toolbox™ and Deep Learning Toolbox™. The course demonstrates the use of unsupervised learning to discover features in large data sets and supervised learning to build predictive models. Examples and exercises highlight techniques for visualization and evaluation of results. Topics include:

- Organizing and preprocessing data
- Clustering data
- Creating classification and regression models
- Interpreting and evaluating models
- Simplifying data sets
- Using ensembles to improve model performance

Prerequisites

MATLAB Fundamentals

Products

- MATLAB
- Statistics and Machine Learning Toolbox
- Deep Learning Toolbox

Course Outline

Day 1 of 2

Importing and Organizing Data (2.0 hrs)

Objective: Bring data into MATLAB and organize it for analysis, including normalizing data and removing observations with missing values.

- Data types
- Tables
- Data preparation

Finding Natural Patterns in Data (2.0 hrs)

Objective: Use unsupervised learning techniques to group observations based on a set of explanatory variables and discover natural patterns in a data set.

- Unsupervised learning
- Clustering methods
- Cluster evaluation and interpretation

Building Classification Models (3.0 hrs)

Objective: Use supervised learning techniques to perform predictive modeling for classification problems. Evaluate the accuracy of a predictive model.

- Supervised learning
- Training and validation
- Classification methods

Day 2 of 2

Improving Predictive Models (2.0 hrs)

Objective: Reduce the dimensionality of a data set. Improve and simplify machine learning models.

- Cross validation
- Hyperparameter optimization
- Feature transformation
- Feature selection
- Ensemble learning

Building Regression Models (2.5 hrs)

Objective: Use supervised learning techniques to perform predictive modeling for continuous response variables.

- Parametric regression methods
- Nonparametric regression methods
- Evaluation of regression models

Creating Neural Networks (2.5 hrs)

Objective: Create and train neural networks for clustering and predictive modeling. Adjust network architecture to improve performance.

- Clustering with Self-Organizing Maps
- Classification with feed-forward networks
- Regression with feed-forward networks