

Artificial Intelligence using MATLAB

Training Contact:

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TRAINING PROPOSAL

COURSE INFORMATION

Course Objective

Day 1-2 : MATLAB Fundamentals

Day 3: Machine Learning with MATLAB

Day 4: Machine Learning with MATLAB - contd. and Deep Learning with MATLAB

Day 5: Deep Learning with MATLAB - contd.

Prerequisites

Knowledge of Engineering Mathematics

Schedule

Instruction 9:00am - 5:00 pm with scheduled breaks and lunch.

Session handled by Mathworks Team

COURSE OUTLINE

Day 1 - MATLAB Fundamentals

Working with the MATLAB User Interface (2 hrs)

Become familiar with the main features of the MATLAB integrated design environment and its user interfaces. Get an overview of course themes.

- Reading data from files
- Saving and loading variables
- Plotting data
- Customizing plots
- Exporting graphics for use in other applications

Variables and Commands (2.5 hrs)

Enter MATLAB commands, with an emphasis on creating variables, accessing and manipulating data in variables, and creating basic visualizations. Collect MATLAB commands into scripts for ease of reproduction and experimentation.

- Entering commands
- Creating numeric and character variables
- Making and annotating plots
- Getting help
- Creating and running live scripts

Analysis and Visualization with Matrices (2 hrs)

Use matrices as mathematical objects or as collections of (vector) data. Understand the appropriate use of MATLAB syntax to distinguish between these applications.

- Creating and manipulating matrices
- Performing calculations with matrices
- Calculating statistics with matrix data
- Visualizing matrix data

Day 2 - MATLAB Fundamentals

Tables of Data (1.5 hrs)

Import data as a MATLAB table. Work with data stored as a table.

- Storing data as a table
- Operating on tables
- Extracting data from tables
- Modifying tables

Conditional Data Selection (2 hrs)

Extract and analyze subsets of data that satisfy given criteria.

- Logical operations and variables
- Finding and counting
- Logical indexing

Increasing Automation with Programming Constructs (2 hrs)

Create flexible code that can interact with the user, make decisions, and adapt to different situations.

- Programming constructs

- User interaction
- Decision branching
- Loops

Increasing Automation with Functions (2 hrs)

Increase automation by encapsulating modular tasks as user-defined functions. Understand how MATLAB resolves references to files and variables. Use MATLAB development tools to find and correct problems with code.

- Creating functions
- Calling functions
- Setting the MATLAB path
- Debugging
- Using breakpoints
- Creating and using structures

Day 3 - Machine Learning with MATLAB

Finding Natural Patterns in Data (2 hrs)

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 hrs)

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

Improving Predictive Models (2 hrs)

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

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

Day 4 - Machine Learning with MATLAB...- contd and Deep Learning with MATLAB

Building Regression Models (2.5 hrs)

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 (1 hrs)

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

Transfer Learning for Image Classification (2.5 hrs)

Perform image classification using pretrained networks. Use transfer learning to train customized classification networks.

- Pretrained networks
- Image datastores
- Transfer learning
- Network evaluation

Interpreting Network Behavior (1 hrs)

Gain insight into how a network is operating by visualizing image data as it passes through the network. Apply this technique to different kinds of images.

- Activations
- Feature extraction for machine learning

Day 5 - Deep Learning with MATLAB

Creating Networks (2 hrs)

Build convolutional networks from scratch. Understand how information is passed between network layers and how different types of layers work.

- Training from scratch
- Neural networks
- Convolution layers and filters

Training a Network (1 hrs)

Understand how training algorithms work. Set training options to monitor and control training.

- Network training
- Training progress plots
- Validation

Improving Network Performance (2 hrs)

Choose and implement modifications to training algorithm options, network architecture, or training data to improve network performance.

- Training options
- Directed acyclic graphs
- Augmented datastores

Performing Image Regression (1 hrs)

Create convolutional networks that can predict continuous numeric responses.

- Transfer learning for regression
- Evaluation metrics for regression networks

Using Deep Learning for Computer Vision (1 hrs)

Train networks to locate and label specific objects within images.

- Image application workflow
- Object detection

ADDITIONAL INFORMATION

About our Services

MathWorks training is the fastest way to master MATLAB, Simulink, and other MathWorks products for technical computing and Model-Based Design. All courses are taught by highly experienced MathWorks engineers who guide you through workflows, techniques, and the latest product features. Instructors customize the curriculum based on attendees' learning styles and abilities. Course content is created to meet your team's specific goals and includes company-specific or industry-specific examples. By investing in training, you can enhance your skills, accelerate your projects, and advance your career.

MathWorks Deliverables

1. 5-day training course
2. Course Materials to include:
 - Training Course Notes
 - Examples and exercises files
 - MathWorks' software for the duration of the training

Public Training Deliverables

1. Computer training facility with one computer per student
2. Student roster per course