

Deep Learning with MATLAB

Training Objectives

This two-day course provides a comprehensive introduction to practical deep learning using MATLAB®. Attendees will learn how to create, train, and evaluate different kinds of deep neural networks. Topics include:

- Importing image and sequence data
- Using convolutional neural networks for image classification, regression, and other image applications
- Using long short-term memory networks for sequence classification and forecasting
- Modifying common network architectures to solve custom problems
- Improving the performance of a network by modifying training options

Prerequisites

MATLAB Fundamentals

Products

- MATLAB
- Deep Learning Toolbox™
- Statistics and Machine Learning Toolbox™
- Image Processing Toolbox™
- Computer Vision System Toolbox™

Course Outline

Day 1 of 2

Transfer Learning for Image Classification (2.5 hrs)

Objective: 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 (2 hrs)

Objective: 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

Creating Networks (2.5 hrs)

Objective: 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

Day 2 of 2

Training a Network and Improving Performance (3.0 hrs)

Objective: Understand how training algorithms work. Set training options to monitor and control training. Choose and implement modifications to training algorithm options, network architecture, or training data to improve network performance.

- Network training
- Training progress plots
- Validation
- Training options
- Directed acyclic graphs
- Augmented datastores

Performing Image Regression (1.0 hrs)

Objective: Create convolutional networks that can predict continuous numeric responses.

- Transfer learning for regression
- Evaluation metrics for regression networks

Using Deep Learning for Computer Vision (1.0 hrs)

Objective: Train networks to locate and label specific objects within images.

- Image application workflow
- Object detection

Sequence Data Classification and Generation (2.0 hrs)

Objective: Build and train networks to perform classification on ordered sequences of data, such as time series or sensor data. Use recurrent networks to create sequences of predictions.

- Long short-term memory networks
- Sequence classification
- Sequence preprocessing
- Categorical sequences
- Sequence to sequence classification
- Sequence forecasting