



# Deep Learning with TensorFlow

Duration 3 day(s) (TENSORFLOW)

Understand and develop neural network algorithms with TensorFlow

## Description

Deep Learning was introduced about 30 years ago to exploit the concepts related to neural networks, derived from Artificial Intelligence. This branch of machine learning has recently undergone the most significant advances, making it particularly effective in learning contexts underpinned by non-linear relationships. This training is aimed at data scientists and developers who already have a minimum of knowledge and practices in machine learning: the basic concepts will be reviewed as an introductory part. The main goal is to focus on concrete manipulations of TensorFlow. Several functional themes will be applied to it, especially those highly media-based images and text recognition. The training will present, in a relatively detailed form, the most interesting algorithms proposed by TensorFlow. Some very useful features, allowing for example the dynamic visualization of data with TensorBoard or the putting into production of the models built thanks to TensorServing, will also be studied.

## Goals

- Understand neural networks
- Understanding Deep Learning
- Develop models with TensorFlow

### *Public*

Developers, Data Scientists, Architects

### *Prerequisites*

- Knowledge in Machine Learning
- Basic knowledge of algebra (matrices) and statistics
- Knowledge of Python programming

### *Structure*

50% Theory, 50% Practice

## Program

# Introduction and reminders about Machine Learning

- Machine Learning and its Applications
- Deep learning and its applications

## The basics of TensorFlow

- Tensors
- Variables vs. Placeholders
- Runtime graph
- Session (session, interactiveSession)
- First program in TensorFlow
- Manipulation of data \* Visualization of data with Tensorboard
- TensorFlow API: Tf.contrib.learn
- Running on CPUs vs. GPUs
- Running on Cluster
- Going into production with TensorServing
- **Lab 1**: Manipulation of TensorFlow Basics

## Machine Learning with TensorFlow

### Regression with TensorFlow

- Use case: Prediction of sale prices of houses
- Linear regression, multiple
- Optimization
- Comparison of models
- **Lab 2**: Regression

### Classification with TensorFlow

- Use case: Image classification - MNIST dataset
- Logistic Regression, Random Forests, ...
- Compare models \* **Lab 3**: Classification

## Deep learning

### Perceptron and multilayer neural networks

- Motivation
- Use case: Image classification - MNIST dataset
- Principle and operation
- **Lab 4**: Classification with multilayer networks

### Convolutional Neural Networks (CNN)

- Motivation

- Use case: Image classification - MNIST dataset
- Principle and operation
- **Lab 5**: Image recognition with convolutional networks

### Recurrent Neural Networks (RNN)

- Motivation
- Use case: Natural language processing
- Long Short-Term Memory (LSTM)
- Recurrent Neural Networks (RNN)
- **Lab 6**: Natural Language Processing (NLP) with Recurring Networks

### Restricted Boltzmann Machine and Neural Networks Autoencoders

- Motivation
- Use case: Dimension reduction
- Restricted Boltzmann Machine (RBM)
- Deep Belief Network (DBN)
- **Lab 7**: Dimension reduction with autoencoders