

Python; Deep Learning with neural networks

Duration: 3 days

Audience: Analyste de données

Who is this training for?

- Developers who want to integrate advanced AI capabilities into their applications
- Beginner to intermediate data analysts and data scientists who want to deepen their deep learning skills
- IT professionals interested in neural networks and machine learning
- Anyone with a background in programming and who wants to explore applied artificial intelligence

Training objectives

- Understand deep learning and its subfields
- Familiarize yourself with some common algorithms in deep learning
- Acquire the expertise to choose the right algorithm to use for your case
- Acquire the expertise to analyze the results of machine learning algorithms

Summary

This course offers you a hands-on immersion in the field of deep learning applied with Python, with a focus on neural network learning. Through a step-by-step approach, you'll learn the fundamental concepts of deep learning, while developing real-world skills to design, train, and evaluate high-performance models.

Course outline

Introduction

- Basic concepts: (Fully connected network, layer, forward propagation)
- Non-linearity functions
- Loss functions for supervised learning
- Initialization and regularization
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Backward propagation

- Optimization and algorithms
- Introduction to Pytorch
- OCR

Convolution network use case for image recognition

- Motivation and key concepts (local connectivity, parameter sharing)
- Convolution: kernels, filters and maps
- Aggregation, downsampling and pooling
- Popular architectures: VGG, ResNet, GoogleNet
- Image pre-processing • Pre-trained network use Recurring networks:
- Motivation and key concepts (windows size, memory, etc.)
- Recurrent network architecture (LSTM, GRU) + loss and gradients
- Discrete sequences: One-hot encoding and embeddings
- Application for classification
- Application for sequence prediction

Representation learning

- Autoencoders
- Mutual Neural Information Estimator
- Deep Info Max
- Contrastive Predictive coding

Generative models

- Variational autoencoders
- GANs
- Reinforcement generation
- Conditional generation
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Style transfer

- Generative model evaluation

Advanced concepts

- Multi-tasking learning
- Semi-supervised learning
- Transfer learning
- Debugging

Approach and methodology

Practical and progressive approach combining targeted theory and workshops. Participants apply deep learning concepts through real-world exercises, covering the key steps: data preparation, design, training, and model optimization.

Prerequisites

Knowing how to program in Python

- Introduction to machine learning

Recommendations

Review: Python basics Machine learning fundamentals

Familiarize yourself with: development environments (Jupyter Notebook, IDE Python)

Identify your goals: understanding neural networks developing AI models processing complex data