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# Computer Vision training: Image Processing with Tensorflow

3 days (21 hours)

## Presentation

Since 2012, deep learning methods in computer vision have become an extremely popular field of study. The emergence of convolutional neural networks known as CNNs has contributed greatly to major advances. These models have gone from strength to strength in their image processing processes. Today, they can be used to classify images, detect multiple objects in an image by framing each detected object, then labeling each image pixel, etc. Discover how to implement these different architectures using the Open Source TensorFlow library, Google's revolutionary deep learning system. This hands-on training course will show you the different architectures of CNN networks. You'll learn how to design systems capable of classifying an image, detecting objects in images, and labeling each image pixel for more precise detection. Then you'll discover the latest advances in the field. We'll cover these concepts through practical examples, so that you can use this technology in your AI projects. As with all our training courses, this one will introduce you to the latest stable version of TensorFlow 2.8, released in January 2022, coupled with Python 3.10.

## Objectives

- Pre-process and augment data
- Master the concepts of image classification
- Understand and implement object detection, semantic and instance segmentation
- Implement transfer learning by reusing existing models
- Discover new transformer-based architectures

## Target audience

- Data Analyst / Data Scientist / Data Engineer
- Developers, Big Data Architects, Lead Developers

# Prerequisites

- Knowledge of Python
- Knowledge of deep learning & TensorFlow
- Mathematical knowledge (example: gradient)

# Program of our computer vision training with Tensorflow

## Day 1: From image classification to object detection

### Introduction to computer vision

- Architecture of the visual cortex
- ISLVRC competition

### Data preparation

- Pre-treatment
- Data enhancement Image

### classification

- Feature extraction
- Classification
- Localization & Bounding Box
- Labs: Create an image classifier by expanding the dataset

## Day 2: From object detection to pixel labeling

### Transfer Learning

- TensorFlow Hub
- Keras Layer

### Object detection

- Region Proposal Networks RPN
- Single Shot Detector
- Lab: Using a pre-trained model

## Semantic and instance segmentation

- Fully Convolutional
- DownSampling and UpSampling
- Some models
- Lab: Setting up a segmentation model

# Day 3: Advanced computer vision & what's new

## Object tracking and action recognition

- Stock recognition & Laying Estimation
- Lab: Applying a Pose Estimation algorithm

## Generative models

- Sequence 2 Sequence
- GAN
- Lab: Inside a GAN Style

## transfer

- StyleNet
- Lab: Apply a style to an image

## Transformers & Capsules

- From NLP to computer vision
- Attention mechanisms
- Lab: Setting up a transformer

Introduction to Deep Learning

Pytorch training

Tensorflow training

Deep Learning training for image interpretation and processing

Deep Learning training for language processing

Deep Reinforcement Learning training

# Companies concerned

This training course is aimed at both individuals and companies, large or small, wishing to train their teams in a new advanced computer technology, or to acquire specific business knowledge or modern methods.

# Positioning on entry to training

Positioning at the start of training complies with Qualiopi quality criteria. As soon as registration is finalized, the learner receives a self-assessment questionnaire which enables us to assess his or her estimated level of proficiency in different types of technology, as well as his or her expectations and personal objectives for the training to come, within the limits imposed by the selected format. This questionnaire also enables us to anticipate any connection or security difficulties within the company (intra-company or virtual classroom) which could be problematic for the follow-up and smooth running of the training session.

# Teaching methods

Practical course: 60% Practical, 40% Theory. Training material distributed in digital format to all participants.

# Organization

The course alternates theoretical input from the trainer, supported by examples, with brainstorming sessions and group work.

# Validation

At the end of the session, a multiple-choice questionnaire verifies the correct acquisition of skills.

# Sanction

A certificate will be issued to each trainee who completes the course.