Training - Object Detection

DETECOB-EN-D | **Distance only** | **3 days**

Deep learning, a branch of artificial intelligence has recently provided some new approach to recognize objects (patterns) in images and videos. In the domain of Oil & Gas activities, this has a lot of applications like: seismic interpretation seismic attributes micro-paleontology petrography video surveillance The object detection has proven his efficiency in some domain to increase the O&G engineers capabilities, this training is about to explain by lecture and practical exercises the fundamentals of theses algorithms

Level

Awareness

Public

Geoscientists who have to work with data scientists to develop object detection tools, or for geoscientists who have to use object detection tools to reach their business objective. The notebook workshops are designed for people having or not a python experience, but some general knowledge of coding is required

Objectives

Attendees will be able to implement the following skills:

- Know about the various strategies offered by deep learning to detect objects
- Measure the accuracy of the models
- Understand the current limitation of object detection

Pedagogical & technical resources

This course can be delivered using in-person lectures or virtual classrooms. Each training module contains lectures, hands-on practices and/or case studies

Assessment of achievements

- Trainees are assessed throughout the training through practical application phases and interactions with the trainer
- A final on-the-spot evaluation may also be carried out at the end of the course and/or at the end of each module using tests designed to verify the learners' understanding and assimilation of the knowledge linked to the training objectives

Prerequisites

No prerequisites are necessary to follow this course

Responsable

IFP Training instructors, with expertise in the field and trained in modern teaching methods adapted to the specific needs of learners from the professional world

Program

DAY 1

INTRODUCTION

Problem statement.

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Machine learning versus deep learning.

CLASSIFICATION USING A CNN ALGORITHM

Neural network and CNN.
Classifying hand written numbers using a CNN:

- MNIST dataset.
- Building a LeNet5 notebook.
- Analyzing the benchmark, how to measure the performance of a model.

What does happen is the image dataset is more complex: classifying CIFAR-10 dataset.

DAY 2

THE R-CNN FAMILY ALGORITHMS

R-CNN.
Fast R-CNN.
Faster R-CNN.

THE YOLO APPROACH

UNBOXING YOLO, TESTING IT ON A VIDEO

Training a YOLO architecture.
Performance.

DAY 3

IMPROVING IMAGES WITH GAN - GENERATIVE ADVERSARIAL NETWORKS

How GAN works, discriminative and generative models.
Generator and discriminator models.
Improving object detection with GAN.
Application in seismic modeling.

FROM UNSUPERVISED TO SUPERVISED MODELS FOR SEISMIC INTERPRETATION

The issue with supervised CNN.
3 unsupervised classification of seismic data:

- K-means clustering.
- Agglomerative hierarchical clustering.
- Kohonen self-organizing feature map (SOFM).

Supervised models for seismic interpretation, the state of the art.

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