

Informatique

Artificial Intelligence and Computer Vision

IDENTIFICATION

CODE : TC-5-S1-EC-IAV
ECTS : 2.0

HOURS

Lectures : 12.0 h
Seminars : 20.0 h
Laboratory : 0.0 h
Project : 0.0 h
Teacher-student
contact : 32.0 h
Personal work : 8.0 h
Total : 40.0 h

ASSESSMENT METHOD

Individual assessment based on an advanced exercise related to one of the 6 study themes.

TEACHING AIDS

TEACHING LANGUAGE

English
French

CONTACT

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AIMS

IAV (Artificial Intelligence and Computer Vision) is the theoretical module of a two-course training in deep learning methods applied to computer vision problems. It focuses on methodological aspects through theoretical courses and labs applied to commonly used data in computer vision (2 and 3D images and videos).

CONTENT

1. Classification:
Introduction and reminders, getting to grips with the tools, presentation of methods more advanced than LeNet5, Inception/Resnet/DenseNet etc. Application on ImageNet or MS COCO, medical images (classification of pulmonary nodules, mammograms, etc.)
2. Segmentation:
FCN to U-Net through DeepLab and PSPNet. Application on Pascal VOC or Cityscapes, medical images (cardiac, cerebral, abdominal segmentation etc.)
3. Detection:
The R-CNN family, YOLO, SSD, RetinaNet, FCOS etc. Application on MS COCO, medical images (lesion detection)
4. Generative Models 1/2:
Autoencoder + variational autoencoder (VAE). Application on MNIST and medical data, visualization and manipulation of latent space (t-SNE)
5. Generative models 2/2:
DDPM and DPIM diffusion models for image generation and reconstruction. Applications on MNIST, medical data under MONAI.
6. Transformers:
Theory and models ViT, DETR. Classification applications on CIFAR and MedMNIST.

PRE-REQUISITE

Basic theoretical and practical knowledge in deep learning for classification (fully connected and convolutional networks, back-propagation, optimization) will be necessary. This knowledge is acquired in 4TC via the TIP module.