EE-805

Fundamentals of Image Analysis

Andò Edward, Sage Daniel, Unser Michaël

Cursus	Sem.	Type
Electrical Engineering		Opt.

Language of teaching	English
Credits	2
Session	
Exam	Written
Workload	60h
Hours	**41**
Courses	22
Exercises	9
TP	10
Number of positions	**25**

Frequency

Every year

Remark

July 3-7, 2023 Registration via https://forms.gle/BcQqmwboeWTAmact8

Summary

This summer school is an hands-on introduction on the fundamentals of image analysis for scientists. A series of lectures provide students with the key concepts in the field, and are followed by practical sessions with popular software on the participants' own image-analysis software.

Content

The summer school is structured around **7 sessions**, each covering a specific imaging topic (see below). There will be one to two sessions per day, each consisting of lectures and interactive practical works on the current thematic:
Fundamentals of Scientific Images
Key concepts in digital imaging (pixel level, contrast, histogram, file format, etc.), multidimensional data (visualisation)
Image Acquisition
Optics of image formation (light sources, PSF/MTF, etc.), noise, SNR, resolution, 3D scenes, stereo imaging
Operations on Digital Images
Digital filters, morphological operators, segmentation
Motion Tracking
Optical flow and registration, measuring a displacement field (local, global, discrete), representing and quantifying deformations, tracking of particles (detection and linking)
Machine Learning for Image Analysis
Key terminology, data preparation, existing ML software for image analysis
Deep Learning for Image Analysis
Building and training of models, running of pre-trained models, fine-tuning of pre-trained models
Good Practice for Open Imaging
Ethics of image publication, the do's and don't of figure preparation, storage, formats, licenses, open access, confidentiality

Note

This course is a transversal initiative from the EPFL Center for Imaging.

More information, as well as the schedule are available in this link **https://eias-epfl.org/program.**

Keywords

Image analysis, digital images, image acquisition, deep learning, open imagine.

Assessment methods

Written exam.