

Advanced image Processing



Presentation

Learning objectives

The objective of this module is to present the essential links of the processing and analysis of images by a machine to extract information. It will provide the basic knowledge of each of the technological bricks of this chain and the fundamental elements concerning human and machine vision.

This knowledge can be used to understand, dimension, develop and integrate applications in the field of imaging.

Description of the programme

Whether in the industrial, medical or scientific fields or in our daily lives, images are at the heart of many systems and applications:

- Medical imaging, which plays a key role in the diagnosis, monitoring and treatment of human diseases
- Augmented reality and 3D display technologies that transform the way humans interact with their environment
- Autonomous systems based on the integration of artificial intelligence and data processing algorithms with vision systems
- Observation, risk prevention, and environmental monitoring sources from on-board (UAV) or satellite imagery
- Industrial vision for quality control, observation in hostile environments, robotics...

The course is structured in several parts:

- Digital Image and representations
- Image enhancement and filtering-Segmentation and classification
- Restoration -Inverse problems
- Tomography
- PDEs for Image processing

The courses will be complemented by practical work, experimental on the Photonics platform, and digital on PC

Generic central skills and knowledge targeted in the discipline

Engineers capable of working on complex systems based on imagery, whether it be to set up an imagery chain for an application, process digital images, or follow up on business or projects involving complex image and multimedia acquisition and processing

systems

How knowledge is tested

CC1 = Reports = 100 %

Bibliography

Handbook of Visual Display Technology, Springer, 2016 (# <https://link.springer.com/referencework/10.1007/978-3-319-14346-0>).
Raph  l C. Gonzalez and Richard E. Woods, Digital Image processing, Third edition Pearson 2007

Teaching team

Muriel Roche (muriel.roche@centrale-med.fr)

Total des heures		24h
CM	Master class	14h
TP	Practical work	10h

Useful info

Name responsible for EU

Lead Instructor

Muriel Roche

✉ muriel.roche@centrale-med.fr