

MICRO-723

Deep Learning for Optical Imaging

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Cursus	Sem.	Type
Electrical and Electronical Engineering	MA2, MA4	Opt.
Microtechnics	MA2, MA4	Opt.
Photonics		Opt.
Robotics	MA2, MA4	Opt.

Language of teaching	English
Credits	2
Withdrawal Session	Unauthorized Summer
Semester Exam	Spring During the semester
Workload	60h
Weeks	14
Hours	3 weekly
Courses	1 weekly
Exercises	1 weekly
TP	1 weekly

Number of positions

It is not allowed to withdraw from this subject after the registration deadline.

Remark

Next time: Spring 2022

Summary

This course will focus on the practical implementation of artificial neural networks (ANN) using the open-source TensorFlow machine learning library developed by Google for Python.

Content

This course will focus on the practical implementation of artificial neural networks (ANN) using the open-source TensorFlow machine learning library developed by Google for Python. After a brief introduction to deep neural networks, the course will focus on the use and functionality of TensorFlow, and how it can be used to build models of different complexity for different types of optical imaging applications. Models will range from simple linear regression to convolutional neural networks (CNN) for image classification and mapping. The course will be assessed through coursework and group projects where the students will apply TensorFlow to specific machine learning applications.

Keywords

Deep learning, TensorFlow, Artificial neural networks, Imaging

Learning Prerequisites**Required courses**

Proficiency in Python, basic optics

Recommended courses

MICRO-567 Optical Wave Propagation

Important concepts to start the course

Python familiarity, linear systems, basic optics

Learning Outcomes

By the end of the course, the student must be able to:

- Choose A computational imaging model
- Structure The database for training artificial neural networks
- Implement Artificial neural networks using the TensorFlow machine learning library.

Teaching methods

1 hour/week lecture

1 hour/week interactive artificial neural network development for selected problems

Expected student activities

Attend lectures weekly

Attend exercise sessions

Participate in a class project

Turn in homework every two weeks

Assessment methods

Homeworks

Project report

Resources

Bibliography

Tensor flow

Notes/Handbook

Class notes will be posted on Moodle