GHENT UNIVERSITY

Course Specifications

Valid in the academic year 2023-2024

Computer Vision (E640920)

Course size *(nominal values; actual values may depend on programme)*

Credits 6.0 **Study time 180 h**

Course offerings and teaching methods in academic year 2023-2024

A (semester 2)	Dutch, English	Kortrijk	lecture
			practical

Lecturers in academic year 2023-2024

Sartor, Jennifer	TW06	staff member
Verstockt, Steven	TW06	lecturer-in-charge

Offered in the following programmes in 2023-2024	**crdts**	**offering**
Master of Science in Machine and Production Automation Engineering Technology	6	A

Teaching languages

English, Dutch

Keywords

compression, digital image processing and enhancement, classification and –annotation, object recognition, motion estimation, object tracking, human action recognition, VR/AR, GIS/BIM, spatio-temporal analysis

Position of the course

This course aims to familiarize students with the basic principles and techniques of image processing and understanding. Furthermore, different feature engineering and (deep) learning based approaches will be studied and evaluated on a variety of industrial use cases. The student is also given the opportunity to gain some experience with some practical computer vision applications. Through integrated exercises and examples in the labs, the student will have the ability to visualize, analyze and manipulate images/video according to the learned techniques.

Contents

- Introduction: computer vision applications
- Multimedia coding (compression, transformations, quantization, prediction, ...) and its impact on quality and bandwidth
- Image processing (light, colour and visual observation, pixel transformations, filtering in place and frequency domain, image restoration, morphological operators, image transformations)
- Video analysis (background modeling, tracking, multi-view and multi-modal analysis)
- Object recognition: feature engineering and feature learning approaches
- Texture analysis: Gabor filters, co-occurency matrices, local binary patterns
- Classification and –evaluation metrics
- Interdisciplinary computer vision applications: VR/AR + GIS/BIM

Initial competences

Have a basic knowledge of mathematics and a sufficient programming experience to work out labs and exercises.

Final competences

1 Know the different building blocks in a computer vision application
2 Know and apply basics of image classification and –annotation, object recognition and -tracking.
3 Formeel beschrijven en evalueren van een algoritme.
4 Adequately solve/describe complex computer vision problems and evaluate different algorithms.

5 5. Act and judge with the necessary critical self-reflection in an uncertain context.
6 Apply scientific-disciplinary insights to complex engineering technical problems in the field of computer vision.

Conditions for credit contract

Access to this course unit via a credit contract is determined after successful competences assessment

Conditions for exam contract

This course unit cannot be taken via an exam contract

Teaching methods

Lecture, Practical

Extra information on the teaching methods

By means of lectures, the substantive topics are explained. During these lectures, examples are cited and worked out to illustrate the processing principles and algorithms. The lectures are supported by practicals. During the practical sessions, students make coached classroom exercises in depth with the computer.

Learning materials and price

- Annotated powerpoint on the electronic learning platform
- Task Descriptions on the electronic learning platform

References

Course content-related study coaching

Interactive support via Ufora; guided lab exercises; contact with teacher and lab supervisors via e-mail and personally after appointment

Assessment moments

end-of-term and continuous assessment

Examination methods in case of periodic assessment during the first examination period

Written assessment

Examination methods in case of periodic assessment during the second examination period

Written assessment

Examination methods in case of permanent assessment

Participation, Assignment

Possibilities of retake in case of permanent assessment

examination during the second examination period is not possible

Extra information on the examination methods

During examination period: written closed book examination.
During semester: evaluation of labs (no second evaluation possible).

Calculation of the examination mark

Written closed book examination (PGE): 60%
Labs (NPGE): 40%

The assessment and the realization of the final quota is done via the mathematical average according to the assigned coefficients. In order to pass for the course, at least 7/20 must be obtained for both parts. If this

Facilities for Working Students

No facilities for working students