DD2423 Image Analysis and Computer Vision 7.5 credits

Bildbehandling och datorseende

This is a translation of the Swedish, legally binding, course syllabus.

Establishment

Course syllabus for DD2423 valid from Autumn 2015

Grading scale

A, B, C, D, E, FX, F

Education cycle

Second cycle

Main field of study

Computer Science and Engineering

Specific prerequisites

Single course students: 90 university credits including 45 university credits in Mathematics and/or Information Technology and the courses SF1604 Linear algebra, SF1625 Calculus in one variable, SF1626 Calculus in several variables, SF1901 Probability theory and statistics, DD1337 Programming and DD1338 Algorithms and Data Structures or equivalent.

Language of instruction

The language of instruction is specified in the course offering information in the course catalogue.

Intended learning outcomes

After completing the course you will be able to:

* identify basic concepts, terminology, theories, models and methods in the field of computer vision, image analysis and image processing,

* describe known principles of human visual system,

* develop and systematically test different basic methods of computer vision, image analysis and image processing,

* experimentally evaluate different image analysis algorithms and summarize the results,

* choose appropriate image processing methods for image filtering, image restauration, image reconstruction, segmentation, classification and representation,

* describe basic methods of computer vision related to multi-scale representation, edge detection and detection of other primitives, stereo, motion and object recognition,

* build a toolbox for image processing consisting of methods for grey-level transformations, image filtering functions and methods for edge and corner detection,

* suggest a design of a computer vision system for a specific problem

in order to

* get acquainted with basic possibilities and constraints of computer vision, image processing and image analysis and therefore assess which problems can be solved in the field of robotics, medical and industrial image processing, processing of satelite images and similar,

* be able to implement, analyse and evaluate simple systems for automatic image processing and computer vision,

* have a broad knowledge base so to easily read the related literature.

Course contents

Overview of goals and methods of image analysis and computer vision. Introduction to biological vision and visual perception. Perspective projection.

Basic image analysis: signal theory, filtering, image enhancement, image reconstruction, segmentation, classification, representation.

Basic computer vision: multi-scale representation, detection of edges and other features. Stereo and multi-camera systems. Object recognition.

Course literature

R. C. Gonzalez and R. E. Woods: Digital Image Processing Prentice Hall, 3rd edition, 2008.

Examination

- TEN1 - Written exam, 3.5 credits, grading scale: A, B, C, D, E, FX, F
- LAB1 - Laboratory Work, 4.0 credits, grading scale: A, B, C, D, E, FX, F

Based on recommendation from KTH's coordinator for disabilities, the examiner will decide how to adapt an examination for students with documented disability.

The examiner may apply another examination format when re-examining individual students.

If the course is discontinued, students may request to be examined during the following two academic years.

In this course all the regulations of the code of honor at the School of Computer science and Communication apply, see: http://www.kth.se/csc/student/heder-skodex/1.17237?l=en_UK.

Other requirements for final grade

LAB1 - Laboratory Work, 4 cr
TEN1 - Examination, 3,5 cr

Ethical approach

- All members of a group are responsible for the group's work.
- In any assessment, every student shall honestly disclose any help received and sources used.
- In an oral assessment, every student shall be able to present and answer questions about the entire assignment and solution.