



LUNDS UNIVERSITET
Lunds Tekniska Högskola

Course syllabus

Datorseende Computer Vision

FMAN85, 6 credits, A (Second Cycle)

Valid for: 2019/20

Decided by: PLED F/Pi

Date of Decision: 2019-03-26

General Information

Elective for: BME4, C4, D4-bg, D4-mai, E4-bg, F4, F4-bg, F4-mai, Pi4-bam

Language of instruction: The course will be given in English on demand

Aim

The aim of the course is to give an overview of the theory of and practically useful methods in computer vision, with applications within e.g. vision systems, non-invasive measurements and augmented reality. In addition the aim is to make the student develop his or her ability in problem solving, with and without a computer, using mathematical tools taken from many areas of the mathematical sciences, in particular geometry, optimization, mathematical statistics, invariant theory and transform theory.

Learning outcomes

Knowledge and understanding

For a passing grade the student must

- be able to clearly explain and use basic concepts in computer vision, in particular regarding projective geometry, camera modelling, stereo vision, recognition, and structure and motion problems.
- be able to describe and give an informal explanation of the mathematical theory behind some central algorithms in computer vision (the least squares method and Newton based optimization).

Competences and skills

For a passing grade the student must

- in an engineering manner be able to use computer packages to independently solve problems in computer vision.
- be able to show good ability to independently identify problems which can be solved with methods from computer vision, and be able to choose an appropriate method.
- be able to independently apply basic methods in computer vision to problems which are relevant in industrial applications or research.
- with proper terminology, in a well-structured way and with clear logic, be able to explain the solution to a problem in computer vision.

Contents

Projective geometry. Geometric transformations. Modelling of cameras. Stereo vision. Photogrammetry. Recognition. 3D-modelling. Geometry of surfaces and their silhouettes. Visualisation.

Examination details

Grading scale: TH - (U,3,4,5) - (Fail, Three, Four, Five)

Assessment: Compulsory assignments comprising both theory and computer work.

Approved results on all these is enough to pass the course. To get a higher grade it is necessary to pass a written and an oral test

The examiner, in consultation with Disability Support Services, may deviate from the regular form of examination in order to provide a permanently disabled student with a form of examination equivalent to that of a student without a disability.

Admission

Required prior knowledge: FMAF05 Systems and Transforms, or equivalent (for example FMAF10).

The number of participants is limited to: No

The course overlaps following course/s: FMA270, FMA271

Reading list

- Image group: 2015. Lecture notes available on the web.

Contact and other information

Course coordinator: Studierektor Anders Holst, Studierektor@math.lth.se

Teacher: Carl Olsson, carl.olsson@math.lth.se

Course administrator: Studerandeexpeditionen, expedition@math.lth.se

Course homepage: <http://www.maths.lth.se/course/datorseendenykod/>