

Module Information

Module Identifier	CS34110
Module Title	Computer Vision
Academic Year	2014/2015
Co-ordinator	<u>Dr Hannah Mary Dee (mailto:hmd1@aber.ac.uk?subject=CS34110)</u>
Semester	Semester 1
Pre-Requisite	<u>CS12320 (?m=CS12320)</u>
Pre-Requisite	<u>CS10510 (?m=CS10510)</u> or <u>CS20410 (?m=CS20410)</u>
Other Staff	<u>Dr Hannah Mary Dee (mailto:hmd1@aber.ac.uk?subject=CS34110)</u>

Course Delivery

Delivery Type	Delivery length / details
Lecture	18 Hours.
Practical	2 x 1hr workshops

Assessment

Assessment Type	Assessment length / details	Proportion
Semester Assessment	A 2000 words essay on a method described in a scientific paper	30%
Semester Exam	2 Hours Written Exam	70%
Supplementary Exam	2 Hours Supplementary Exam Will take the same form, under the terms of the Department's policy.	100%

Learning Outcomes

On successful completion of this module students should be able to:

1. Express a consolidated and extended understanding and knowledge of Computer Vision techniques.
2. Compare, critically evaluate and discuss competing methods.
3. Explain the problems, techniques and difficulties associated with the different areas of Computer Vision.
4. Describe a method of solving a problem in Computer Vision and design experiments to evaluate that method in a scientific manner.

Brief description

The module will introduce the subject of Computer Vision in the context of robotics, in particular mobile and industrial robotics. It will start with low-level vision such as edge detection, feature detection, and segmentation. Intermediate vision will describe various techniques to infer 3 dimensional information from images. Some high-level techniques will be introduced

Content

Introduction to Computer Vision (2 lectures)

What is Computer Vision? Different paradigms will be presented (Marr, purposive, qualitative and active).

Image formation (1 lecture)

Imaging geometry, radiometry, digitisation

Edge and feature detection (4 lectures)

Edge formation and detection. Features in images and their detection. Grouping of features.

Shape from X (3 lectures)

Shading, texture, occlusion.

Binocular vision (4 lectures)

Stereo, correspondence, 3D

Motion (3 lectures)

Motion detection, optic flow, structure from motion.

High-level vision (3 lectures)

Object representation and recognition.

Module Skills

Skills Type	Skills details
Communication	Written communication will be developed through the writing of the essay.
Improving own Learning and Performance	The coursework and the compulsory pre-specified examination question will encourage and help students to develop and improve their individual learning skills.

Skills Type

Problem solving
Research skills

Skills details

Thinking through and designing a computer vision system involves the application of problem solving skills.
Students will be given reading material that will need to be complemented depending on their knowledge and desire/needs to know more for the coursework. The written examination will contain a compulsory question on a pre-specified subject.

Reading List**General Text**

Forsyth, David. (2003.) *Computer vision :a modern approach /David A. Forsyth, Jean Ponce*. Prentice Hall [Primo search \(http://primo.aber.ac.uk/primo_library/libweb/action/search.do?v1%28freeText0%29=Computer+vision+%3Aa+modern+approach+%2FDavid+A.+Forsyth%2C+Jean+Ponce.+Forsyth%2C+David.&fn=search&vid=ABERU_VU1\)](http://primo.aber.ac.uk/primo_library/libweb/action/search.do?v1%28freeText0%29=Computer+vision+%3Aa+modern+approach+%2FDavid+A.+Forsyth%2C+Jean+Ponce.+Forsyth%2C+David.&fn=search&vid=ABERU_VU1)

Marr, David (c1982.) *Vision :a computational investigation into the human representation and processing of visual information /David Marr*. W.H. Freeman [Primo search \(http://primo.aber.ac.uk/primo_library/libweb/action/search.do?v1%28freeText0%29=Vision+%3Aa+computational+investigation+into+the+human+representation+and+processing+of+visual+information+%2FDavid+Marr.+Marr%2C+David&fn=search&vid=ABERU_VU1\)](http://primo.aber.ac.uk/primo_library/libweb/action/search.do?v1%28freeText0%29=Vision+%3Aa+computational+investigation+into+the+human+representation+and+processing+of+visual+information+%2FDavid+Marr.+Marr%2C+David&fn=search&vid=ABERU_VU1)

Morris, Tim (2004.) *Computer vision and image processing /Tim Morris*. Palgrave Macmillan [Primo search \(http://primo.aber.ac.uk/primo_library/libweb/action/search.do?v1%28freeText0%29=Computer+vision+and+image+processing+%2FTim+Morris.+Morris%2C+Tim&fn=search&vid=ABERU_VU1\)](http://primo.aber.ac.uk/primo_library/libweb/action/search.do?v1%28freeText0%29=Computer+vision+and+image+processing+%2FTim+Morris.+Morris%2C+Tim&fn=search&vid=ABERU_VU1)

Notes

This module is at [CQFW \(http://wales.gov.uk/topics/educationandskills/qualificationsinwales/creditqualificationsframework/?lang=en\)](http://wales.gov.uk/topics/educationandskills/qualificationsinwales/creditqualificationsframework/?lang=en) Level 6