4C8 Digital Media Processing [5 credits]

Lecturer(s): Ussher Assistant Professor François Pitié

Module organisation

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<tr>
<th>Semester</th>
<th>Start Week</th>
<th>End Week</th>
<th>Associated Practical Hours</th>
<th>Lectures</th>
<th>Tutorials</th>
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Total contact Hours: 44

Module description
The Digital Media Processing module develops the concepts learned in Signal Processing and Information Theory and applies them to images and video. Image and Video Processing is the basis of all digital media technology and is an active area of research over a wide range of applications such as Compression and Medical Image Analysis. The course features an introduction to digital image/video processing algorithms that form the core of digital media technology and can be found in important devices such as the iPod, SKY set-top boxes and the DVD/BluRay player. There is a particular emphasis placed the issues pertaining to the coding (compression) of both images and videos. At the end of this module students should have a basic knowledge of JPEG, MPEGx, Motion Estimation and other well established image/video processing applications. The students should also be able to implement and test the algorithms in software.

Learning outcomes
On completion of this module, the student will be able to:
1. describe the elements of current media broadcast formats;
2. describe the building blocks of emerging compression systems and select processing modules to enable efficient compression;
3. describe operations to perform simple image processing tasks such as histogram equalisation, gamma correction and image filtering.
4. use matlab to perform fundamental image processing applications such as image filtering, image segmentation and noise removal;
5. implement a simple motion estimator in Matlab and assess its performance for real image sequences;
6. Apply the above techniques to medical imaging scenarios.

Teaching strategies
The teaching strategy for this module is a mixture of lectures, problem-solving laboratories and interactive class demonstrations. There are 5 assignments to be undertaken throughout the course that complement the material covered in the lectures and are designed to deepen understanding of the course material. The
Assignments are MATLAB based which is a very popular platform for algorithm development and prototyping in Image Processing and Computer Vision.

**Assessment**
The final written end-of-year examination counts for 75% of overall mark with the remaining 25% comprised of continuous assessment made from laboratory work and one design problem. Note that it is expected that the student should be able to complete the problems posed in laboratories during the timetabled hours.

**Required textbook**
- Digital Video: An Introduction to MPEG2. Haskell, Puri and Netravali. Chapman and Hall (a reference for MPEG2)
- Two Dimensional Image Processing, J Lim, Prentice Hall (for 2D signal processing)