Image Processing & Analysis

Summary Syllabus (Level 8[1])

EE425: Image Processing & Analysis and EE453: Image Processing & Analysis (Plus)

Section	Indicative Content
Introduction	• Introduction to Matlab for Image Processing & Analysis • IPA Pipeline • Learning Outcomes • Module Protocol • Assessment Requirement • Code Development • Support Material & Website • Human/Computer/Machine Vision • Ethics • Case Studies.
Basic Techniques	• Image Representation • Point Operators • Thresholding • Local Operators • Non-linear Local Operators • Template Matching • Histograms • Binary Images • Simple Shape Descriptors • Edge Detection • Corner Detector
Morphology	• Binary Mathematical Morphology • Grey Scale Morphology • Top-Hat Transform • Covariance • Conditional Dilation • Reconstruction by Dilation • Opening/Closing by Reconstruction
Transforms	• Global Image Transforms • Distance Transform • Hough Transform • Two-Dimensional Discrete Fourier Transform
Classification & Performance Characterization	• Supervised vs Unsupervised • Feature Selection • Nearest Neighbour Classifier (KNN) • Maximum-likelihood Classifier • Performance Characterisation
Colour	• Human Perception of Colour • Colour Spaces • Colour Scattergrams • Programmable Colour Filter
Texture	• Histogram Features • Co-occurrence (Matrix) Approach • Morphological Texture Analysis • Local Binary Patterns (LBP)
EE453: Image Processing & Analysis (Plus) ONLY	
Systems Engineering	• Optical Terminology • Lens & Filters • Monochrome Aberrations • Lighting Design • Image Sensors • Chromatic Aberrations • Pixel Level Effects
3D Imaging	• Passive Stereoscopic Methods • Camera Calibration • Shape from Stereo • Image Rectification • Stereo Feature Matching • Colour / Multiple Views Stereo Vision • Active Stereoscopic Methods

This is an introductory module.

See **EE544: Computer Vision**[2] for an advanced Level 9 module in this area.

[1] NFQ Level 8 – Honours Bachelor's Degree.

[2] http://paulwhelan.eu/resources/EE544_summary_syllabus.pdf