Computational Vision
Revision Notes

James Brown

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1 Introduction

These are notes I have written in preparation of the 2017 Computation Vision exam. This year the module was run by Hamid Deghani (H.Dehghani@cs.bham.ac.uk).

Computational vision is the acquisition of knowledge about objects and events in the environment through information processing of light emitted or reflected from objects. In short - we want to make a computer know what is where, by looking through information. We can also use computational vision to do automatic inference of properties of the world from images.

2 Human Vision

As humans we have evolved eyes which percieve the visible section of the electromagnetic spectrum, which falls between the wavelengths of 380nm - 760nm. Red light lies at the longer end (760nm) of visible light, and purple at the shorter end (380nm). This evolutionary process began more than 3 billion years ago with the formation of photopigments. These are molecules where light incident upon them will trigger a physical or chemical change. Photopigments capture photons which lead to the release of energy in the photopigment. This is may be used for photosynthesis or a behavioural reaction (a nerve reaction).

Photocells contain a light sensitive patch of photopigments. Using a single cell we can capture light in 1 dimension and with multiple cells we can have better direction resolution.

3 Edge Detection

An intensity image is a data matrix whose values represent intensities within some range. Each element of the matrix corresponds to one image pixel.