Basics of Spectral Imaging

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Spectral imaging – How and why it works

- What is a digital image – how does the computer “see” an image
- How is a colour image formed?
- Spectra and Wavelength
- Prototype System
- Results
- Spectra – what it means
What is a digital image?

Numbers from 0 to 255 (range of 256 values)
What is a digital image?

Numbers from 0 to 255 (range of 256 values)

13 x 17 = 221 pixel image

13 pixels

17 pixels
Monochrome Image - grayscale

Black and white image – 1 spectral band
Wavelength

Color (RGB) image – 3 spectral bands - RED
Wavelength

Color (RGB) image – 3 spectral bands - GREEN
Wavelength

Color (RGB) image – 3 spectral bands - BLUE
Wavelength

Color (RGB) image – 3 spectral bands - Colour
How does Red Green Blue form an image?

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More information than visible

Infrared

Ultraviolet

In between RGB
Multispectral Images

Multispectral image – 10’s of spectral bands
Prototype system

Narrowband lights (LEDs)

Raspberry Pi

Monochrome camera

Palimpsest (14th century music score)
Images Captured

Different wavelengths

Different wavelengths
Images Captured

Different wavelengths
Results
Plotting spectra - RGB
Plotting spectra - Multispectral
Spectral differences – RED ink
Results after image processing

True color Image

PCA band 3

False Color
This is not magic
Just very cool science!
Results after image processing

- True color Image
- False color Image
- Two bands subtracted from one another