Issues in analysis of images from space borne platforms

Earth observation image data are mainly characterised by (i) Spatial resolution – the ability of the imaging sensor to focus on very small areas and thereby distinguish between closely spaced features, and (ii) Spectral resolution – ability to observe the targets in a number of narrow wavelength bands of the electromagnetic spectrum.

High spatial resolution images allow image analysis based on objects (regions) in terms of their shape, size, and spectral homogeneity, examples which can be seen below:

The images are first segmented into homogeneous parts using innovative techniques based on pixel properties and theory of graphs. Each object is then characterised based on its shape, aspect ratio (length to width ratio), and homogeneity of pixels to extract desired targets like roads.





Latest techniques based such as convolutional neural networks are used to process the hyperspectral images. The gray scale images show the low resolution and the super-resolved images.







The color image is a low resolution hyperspectral image and the images below show the fraction of different classes within each image pixel. Black shows absence of a class.



Hyperspectral images with very high spectral resolution offer opportunities as well as processing challenges for information extraction at sub-pixel level and estimating the image at higher spatial resolution than what the sensor captured (super-resolution).

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