NTNU

TTK4255

Robotvision

Hyperspectral imaging

Mads Formo

March 15, 2020

Contents

1 Getting familiar with the data

1.1 Finding the spectral resolution

1.2 Relation to human color perception

1.3 Create a pseudo RGB image from the hyperspectral bands

1.4 Representative spectra for selected points

2 Classification & Bio-geophysical Parameter Retrieval

2.1 Can we predict where there is chlorophyll through classification?

2.2 How well can we directly estimate the chlorophyll content?

2.3 How can we estimate the reflectance from the surface of the ocean?

2.4 Compute chlorophyll concentration using atmosphere-corrected data

2.5 Classify land versus water

2.6 Other bio-geophysical parameters

2.7 Alternative atmospheric correction methods

3 Dimensionality Reduction & Noise Filtering

3.1 What is dimensionality reduction?

3.2 Principal Component Analysis (PCA)

3.3 How does dimensionality reduction via PCA afect classification?

3.4 Maximum Noise Fraction

3.5 Maximum Noise Fraction on HICO noisy

3.6 Discuss your results

3.7 How can we best use the subspace?

4 Fun but definitely hard problems

4.1 Deep learning

4.2 Multispectral-hyperspectral image fusion

4.3 Spatial-spectral methods

4.4 Locating methane emissions