

Image classification in natural scenes:
Are a few selective spectral channels
sufficient?

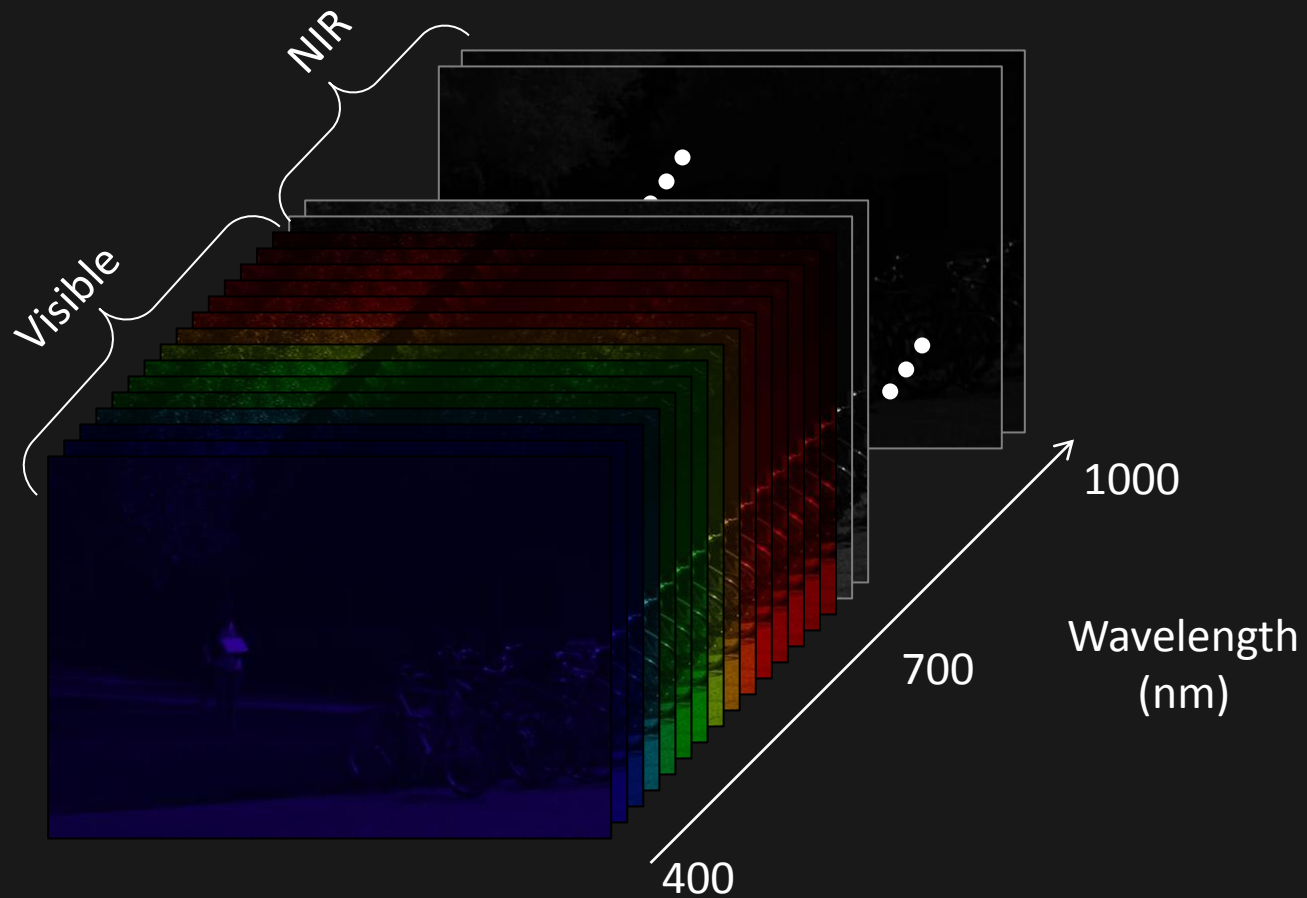


Rich Spectral Information in Natural Scenes

- Common cameras capture three (wideband) spectral channels
 - Red, Green, Blue
- Ignore information outside of the visible spectrum



Rich Spectral Information in Natural Scenes

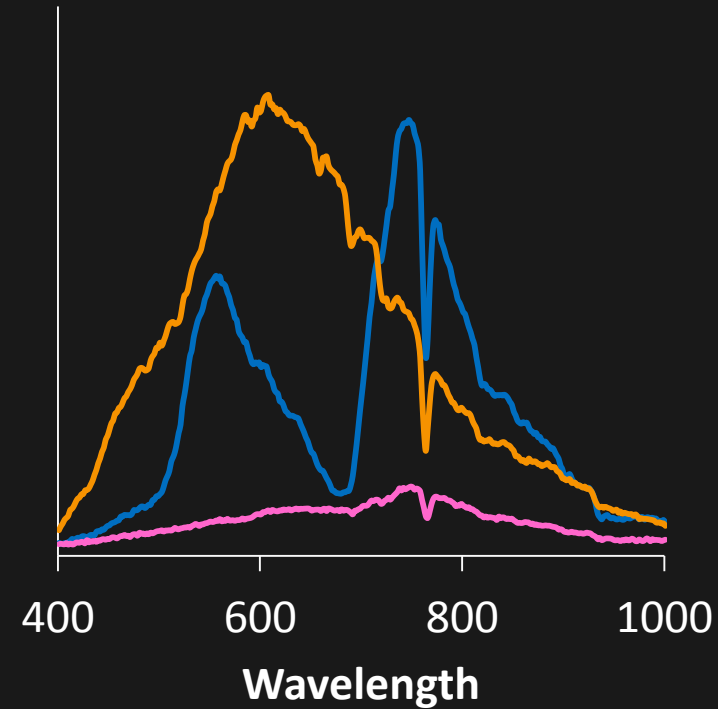


Rich Spectral Information in Natural Scenes



- Hyperspectral imaging gives detailed spectral profiles for each pixel

Rich Spectral Information in Natural Scenes

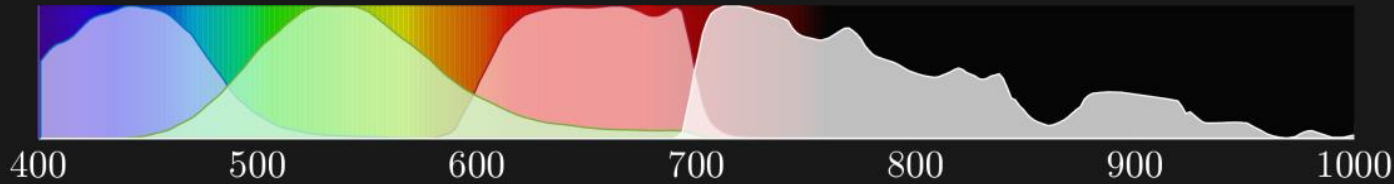


- Hyperspectral imaging gives detailed spectral profiles for each pixel

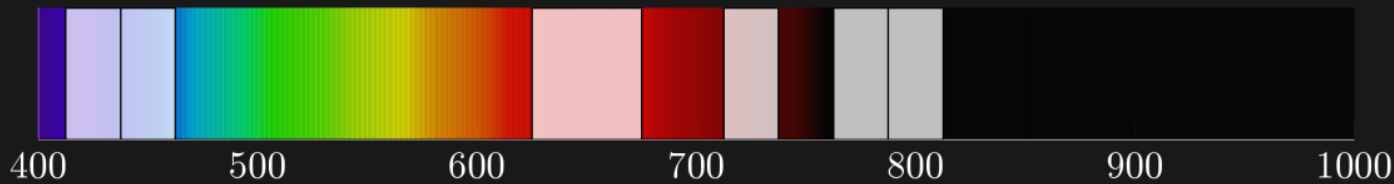
Reducing Dimensionality of Data Capture

- Capturing 325 bands requires specialized equipment
 - Costly, heavy, low SNR
 - Needs dedicated computer interface
- What if we can get similar performance from only a few bands?
 - We find that using 6 bands is as good as using 325
- Which bands to choose? Can we also increase SNR?

Improving classification accuracy



RGB + NIR

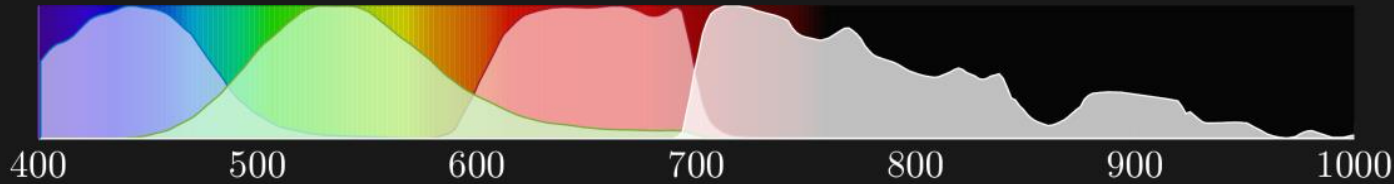


6 bandpass
filters

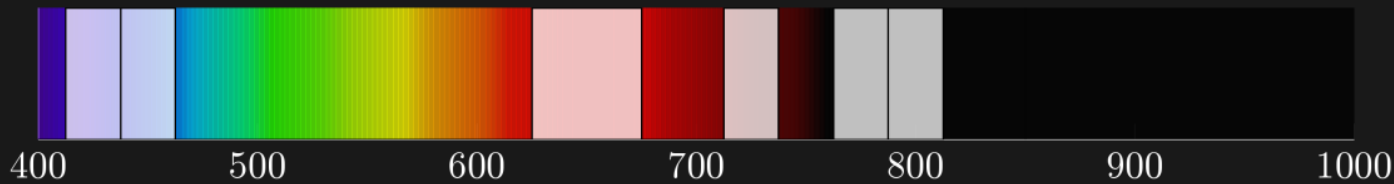
Train SVM classifiers to identify 7 classes of material in natural scenes:

Vegetation, Metal, Concrete, Pathway,
Skin, Fabric, Rubber

Improving classification accuracy



RGB + NIR



6 bandpass filters

Wavelength (nm)

Average classification accuracy

