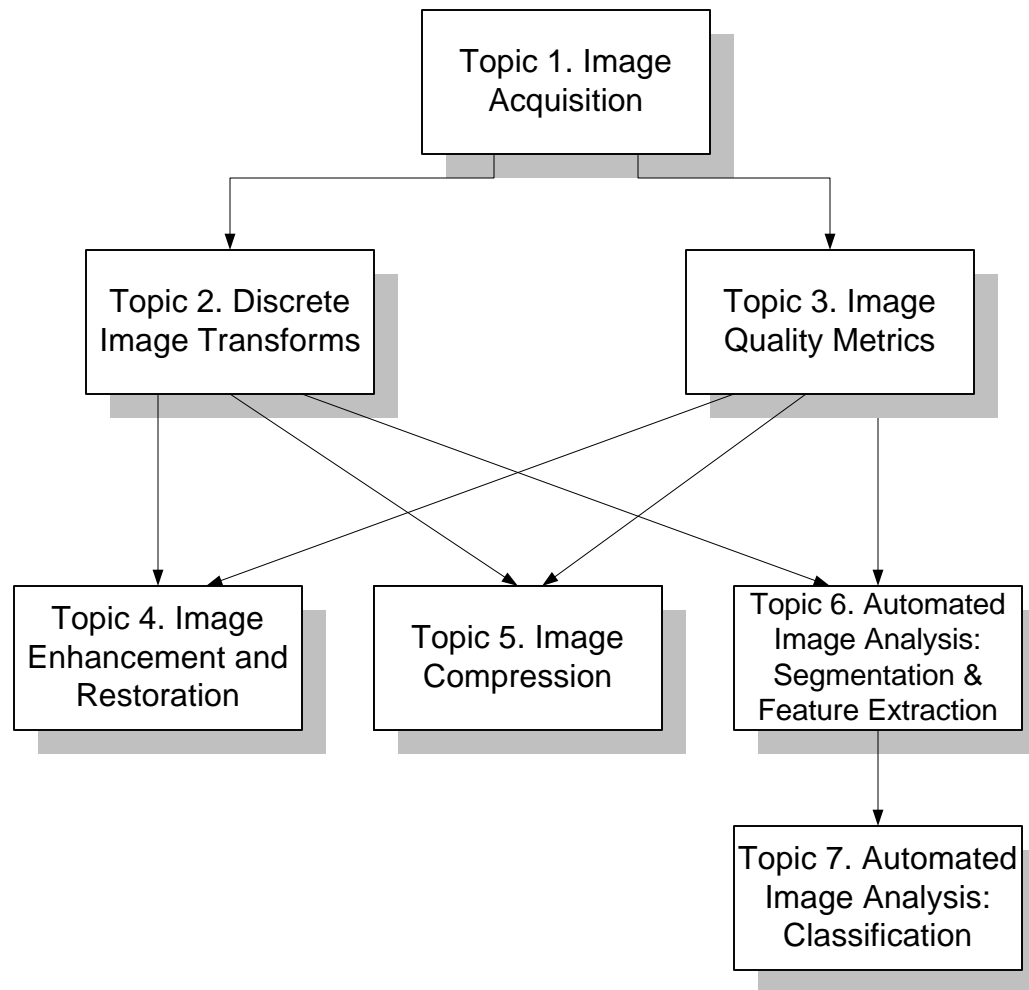
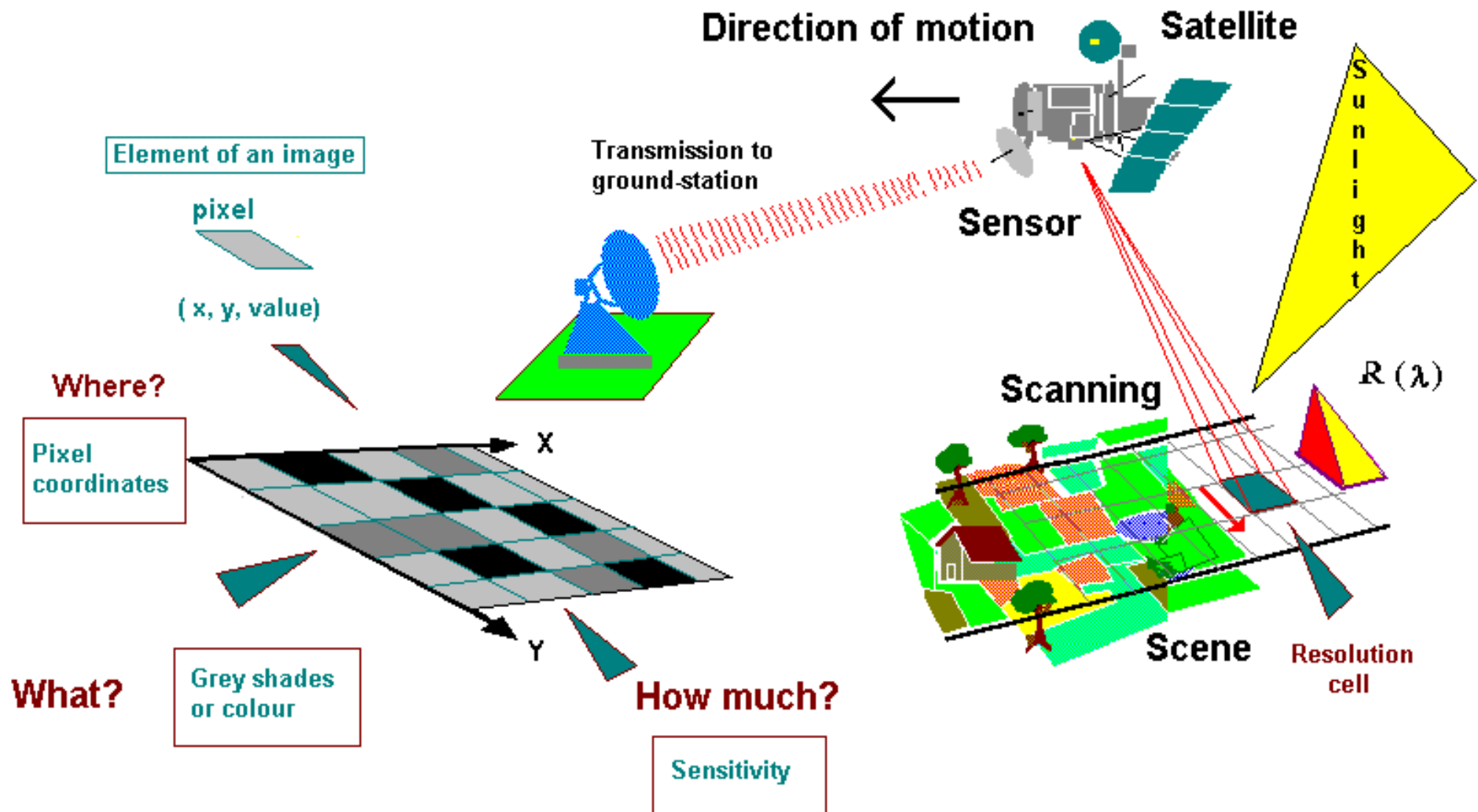


# Digital Image Processing

## Topical Overview

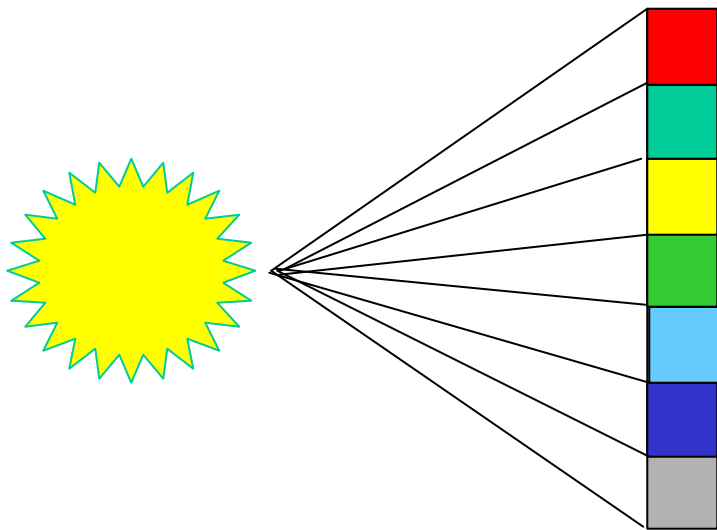


# Remote Sensing Image Acquisition

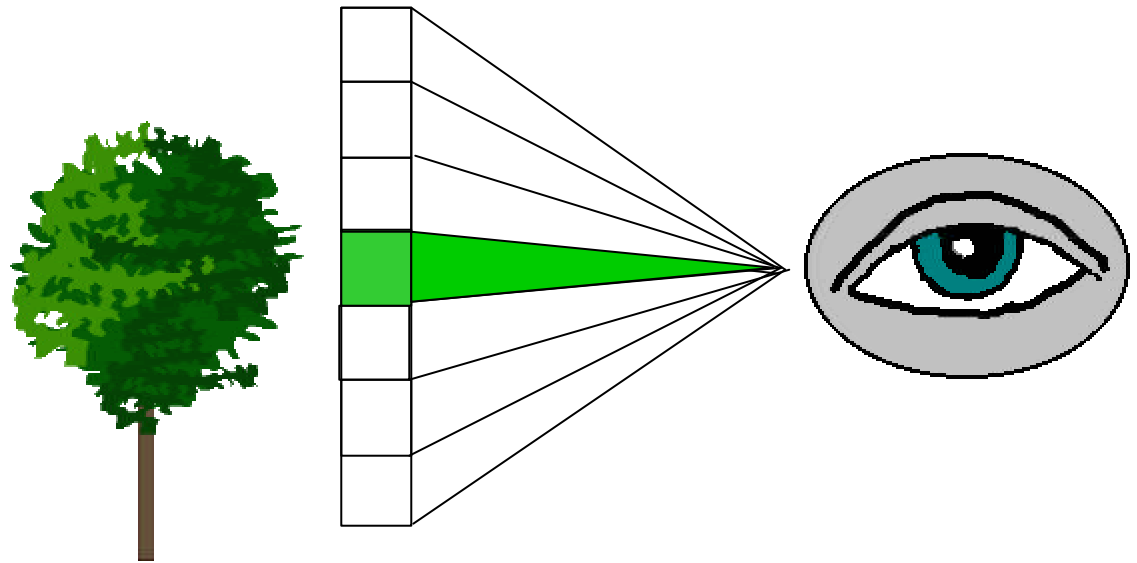


# Human Optical Remote Sensing

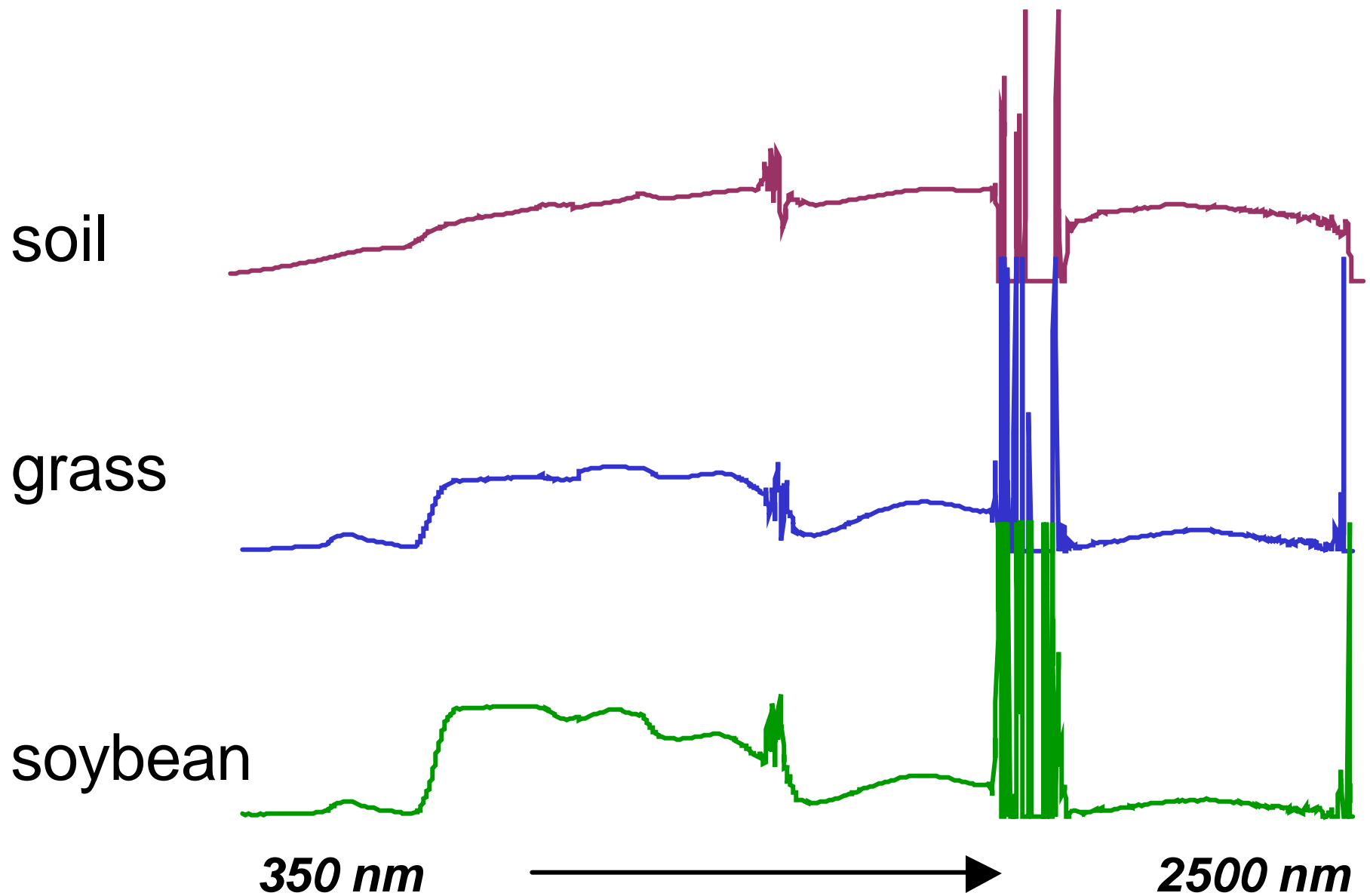
Visible Spectrum  
( $\lambda \approx 400-700\text{nm}$ )



Reflected Portion  
( $\lambda \approx 550\text{nm}$ )



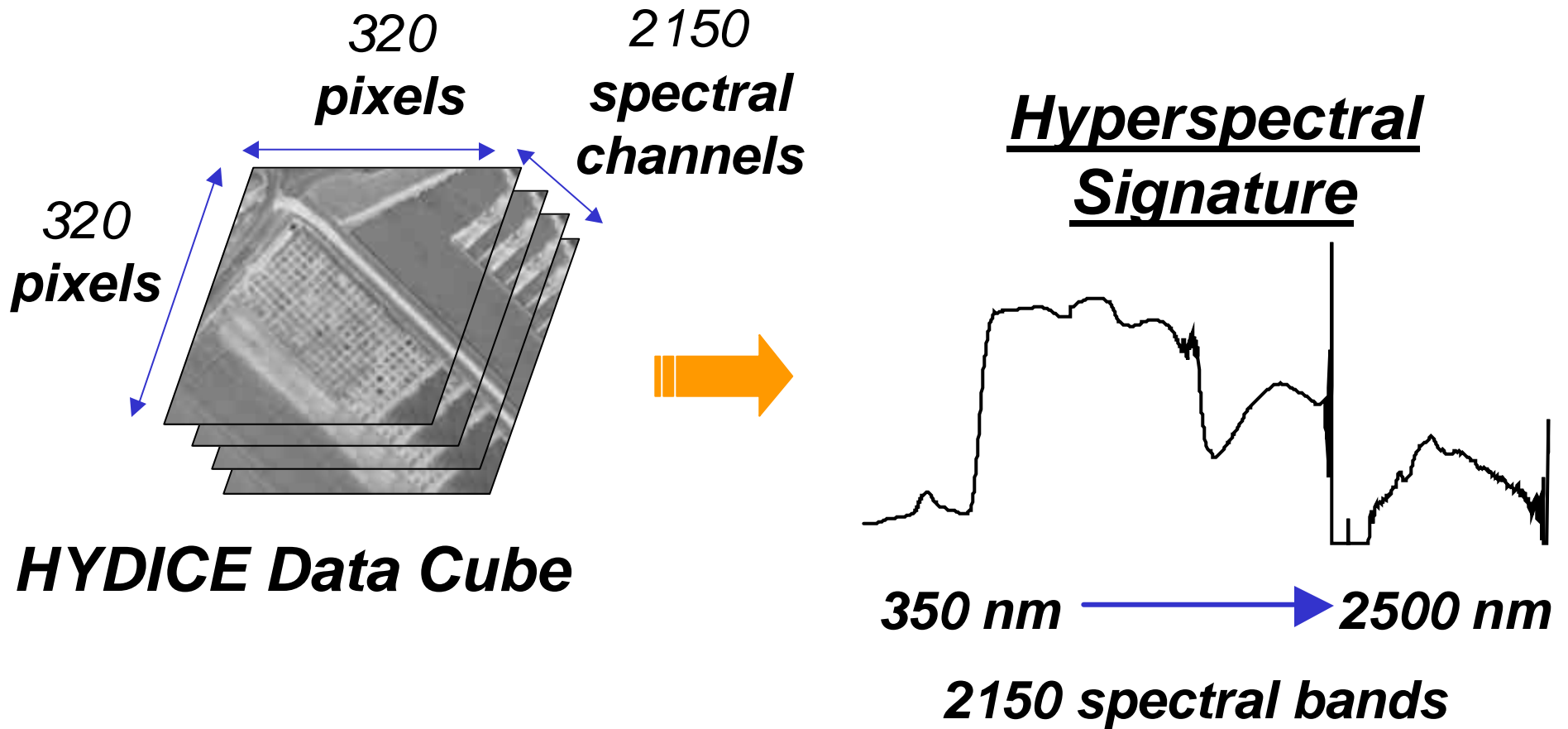
# Light & Electromagnetic Spectrum



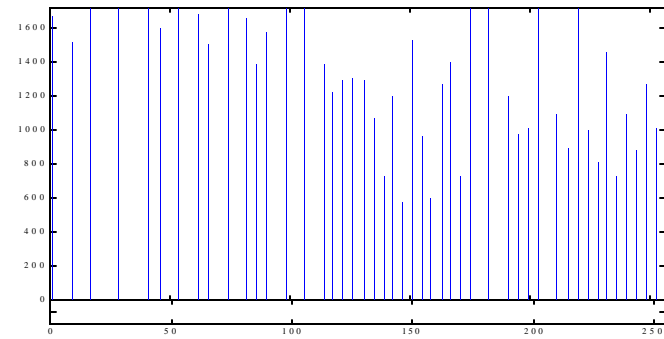
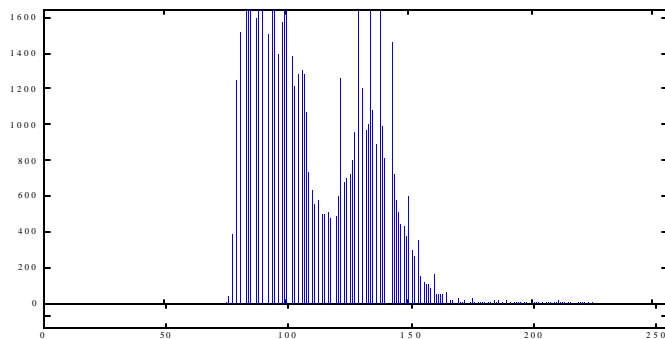
# Light & Electromagnetic Spectrum



# TRWIS Airborne Hyperspectral Sensor



# Image Enhancement (Histogram Equalization)




# Image Restoration ( 3x3 Median Filtering)




# Image Coding (Discrete Cosine Transform)

Original Saturn Image




DCT coefficients




1 64

64 Coefficients Selected

Reconstructed Image



Error Image



Apply

Select an Image:

Saturn

Info


Close

The MSE (with images normalized) is 0.

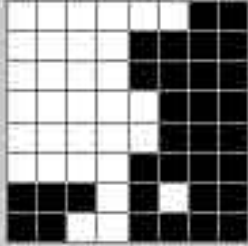
The image shows a software interface for image coding using the Discrete Cosine Transform (DCT). It features three main image windows: 'Original Saturn Image' (top left), 'Reconstructed Image' (bottom left), and 'Error Image' (bottom center). The 'Original Saturn Image' and 'Reconstructed Image' both show a grayscale image of Saturn with its rings. The 'Error Image' is a solid gray square, indicating zero error. To the right of the 'Original Saturn Image' is a 'DCT coefficients' window showing a 16x16 grid. Below the grid is a slider control with arrows and the numbers '1' and '64', with the text '64 Coefficients Selected' below it. At the bottom right is a control panel with buttons for 'Apply', 'Info', and 'Close', and a 'Select an Image:' dropdown menu currently set to 'Saturn'. At the bottom center, a red text label states 'The MSE (with images normalized) is 0.'

# Image Coding (Discrete Cosine Transform)

Original Saturn Image




DCT coefficients




1 64  
32 Coefficients Selected

Reconstructed Image



Error Image



Apply

Select an Image:  
Saturn


Info

Close

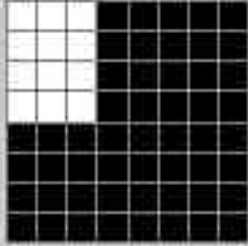
The MSE (with images normalized) is 0.000169.

# Image Coding (Discrete Cosine Transform)

Original Saturn Image




DCT coefficients




1 64  
12 Coefficients Selected

Reconstructed Image



Error Image



Apply

Select an Image:  
Saturn


Info

Close

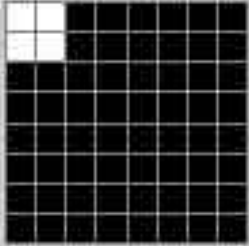
The MSE (with images normalized) is 0.000591 .

# Image Coding (Discrete Cosine Transform)

Original Saturn Image




DCT coefficients




1 64

4 Coefficients Selected

Reconstructed Image



Error Image



Apply

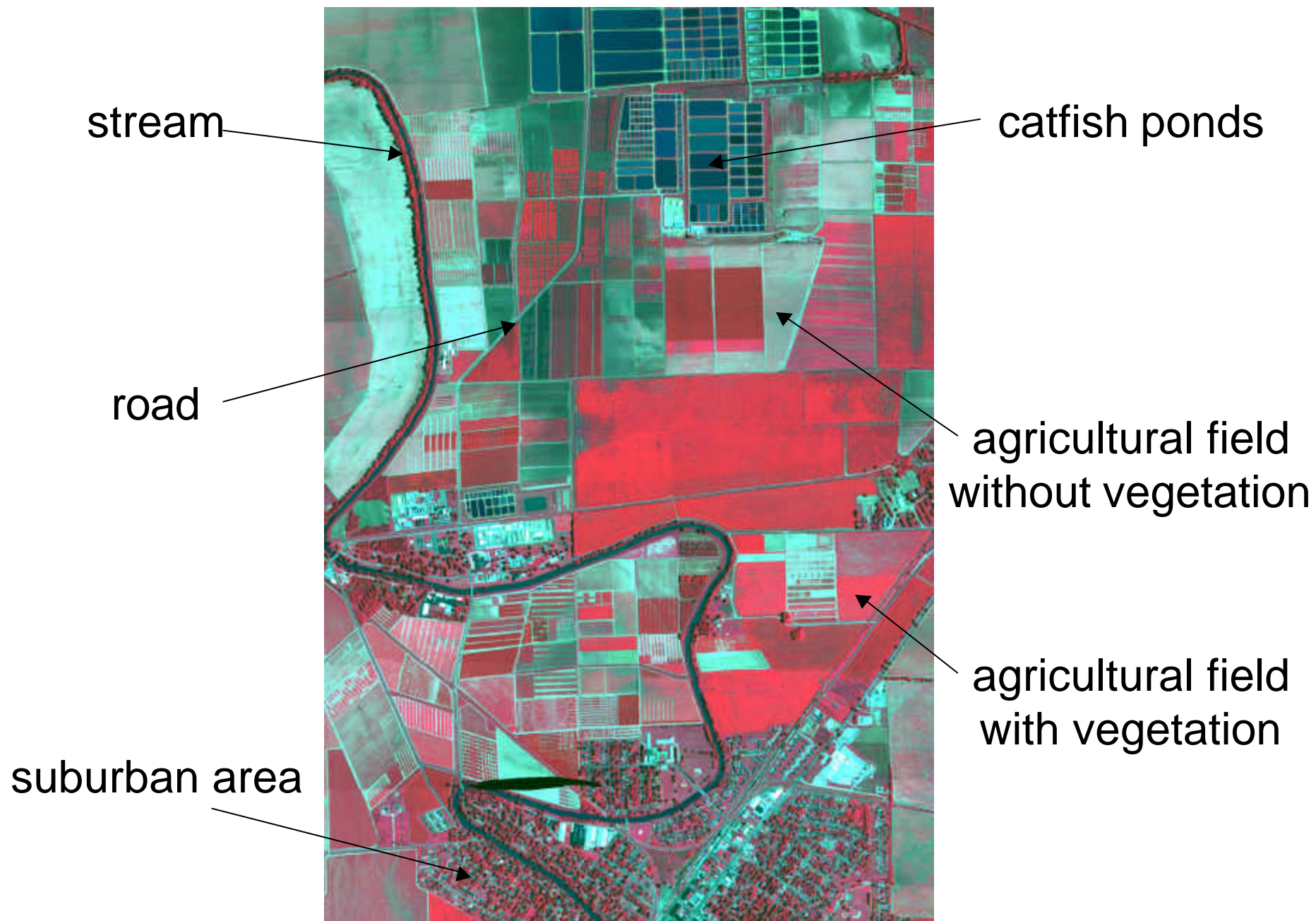
Select an Image:

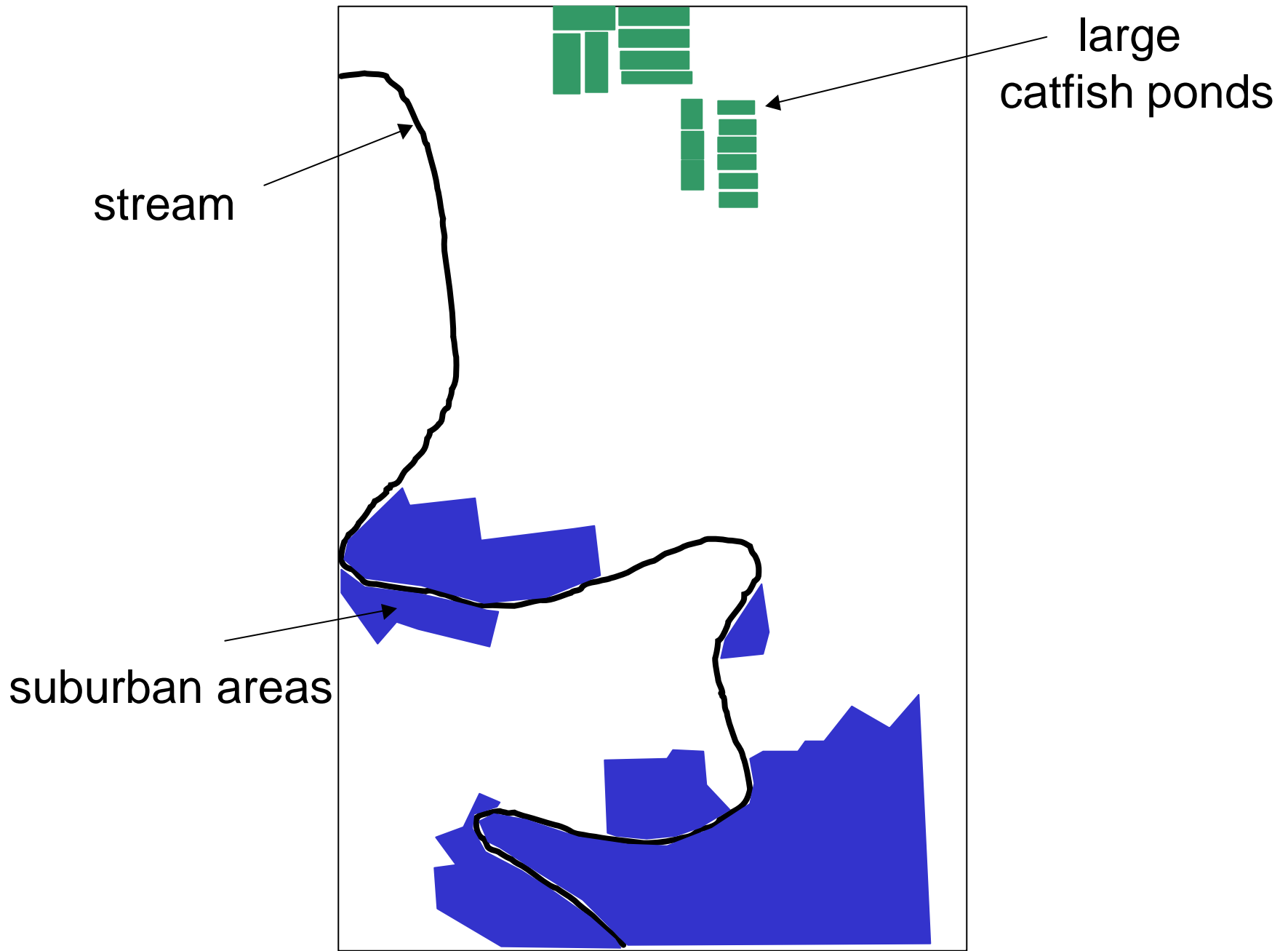
Saturn

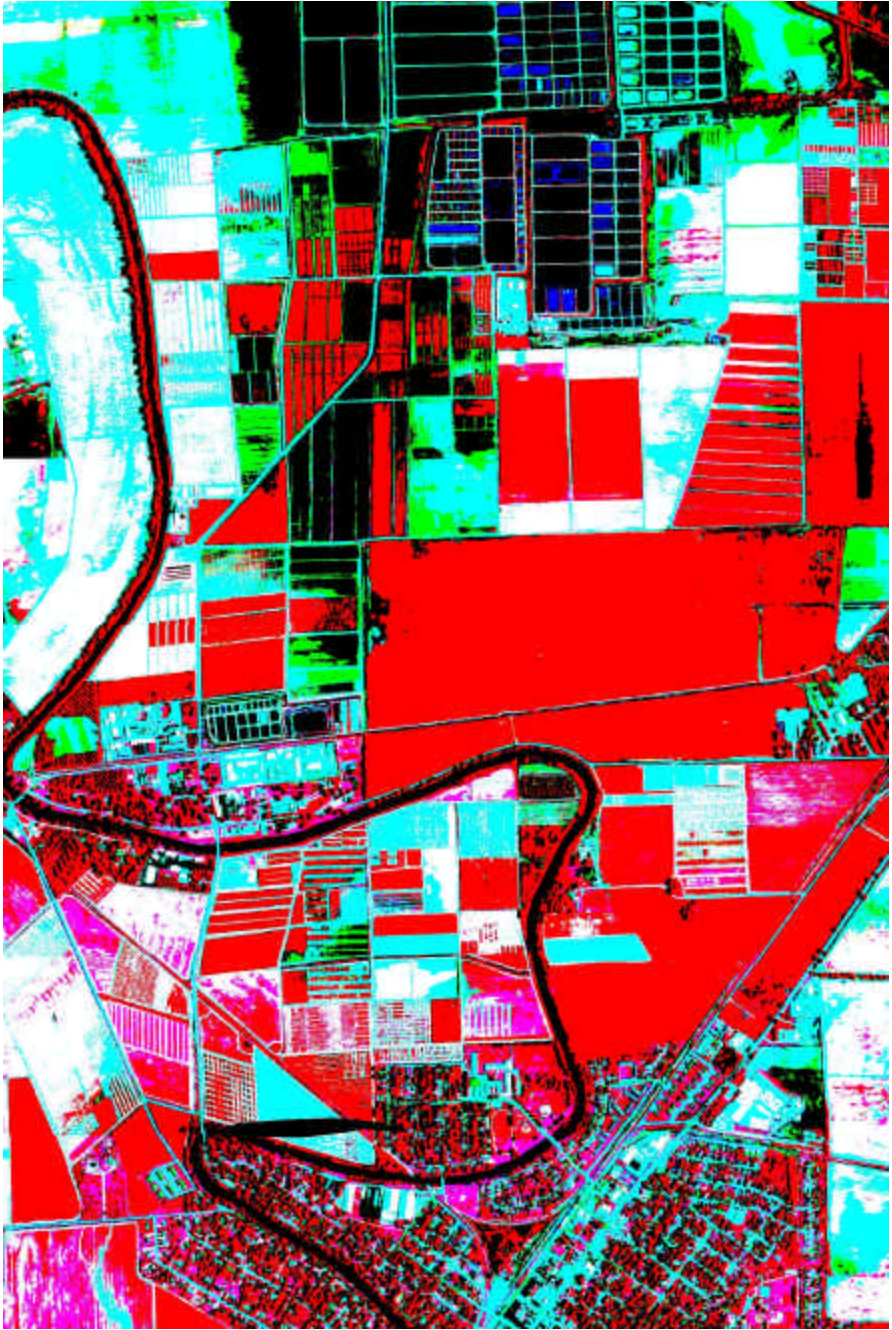
Info

Close

The MSE (with images normalized) is 0.00203 .







# Automated Pattern Recognition

