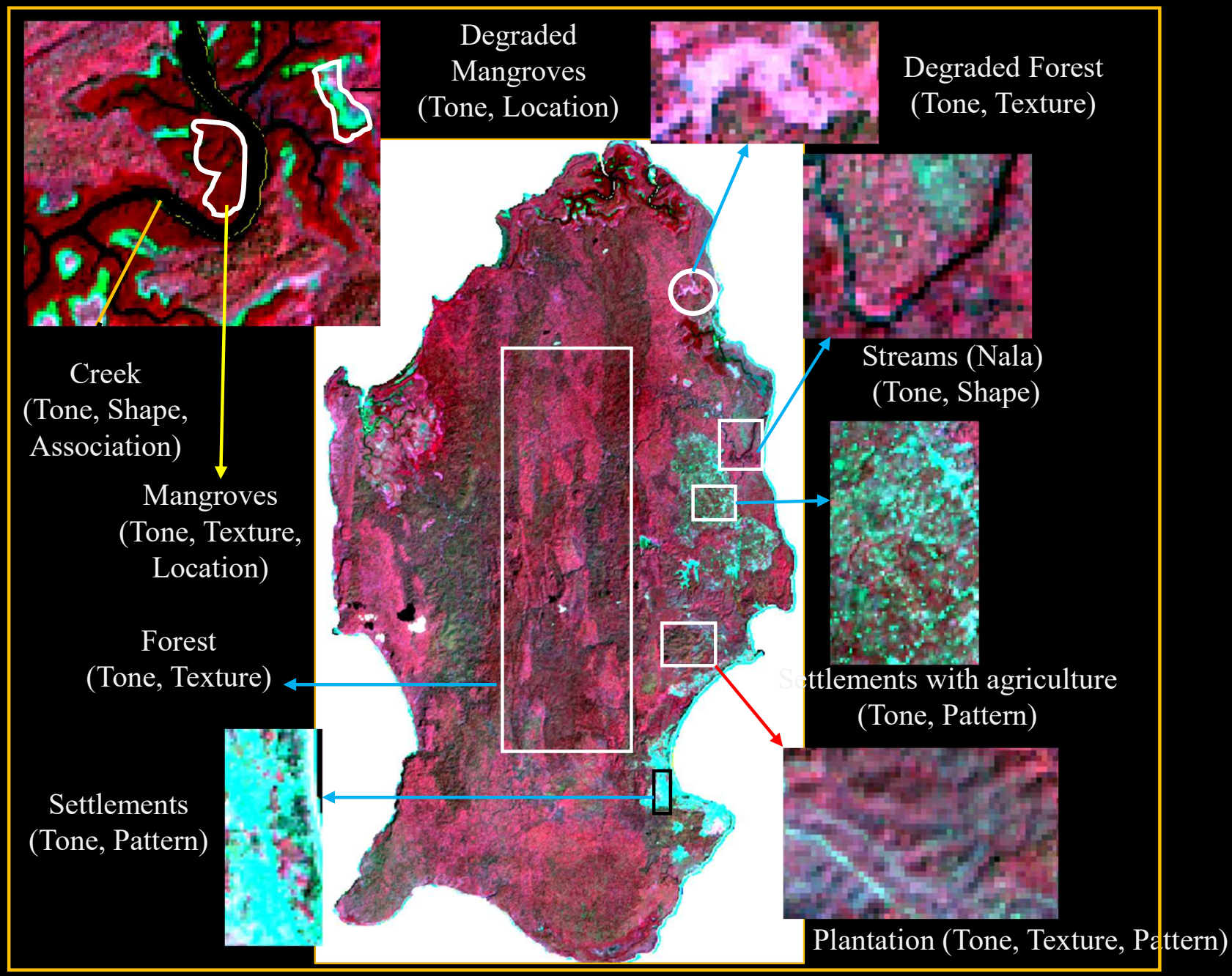
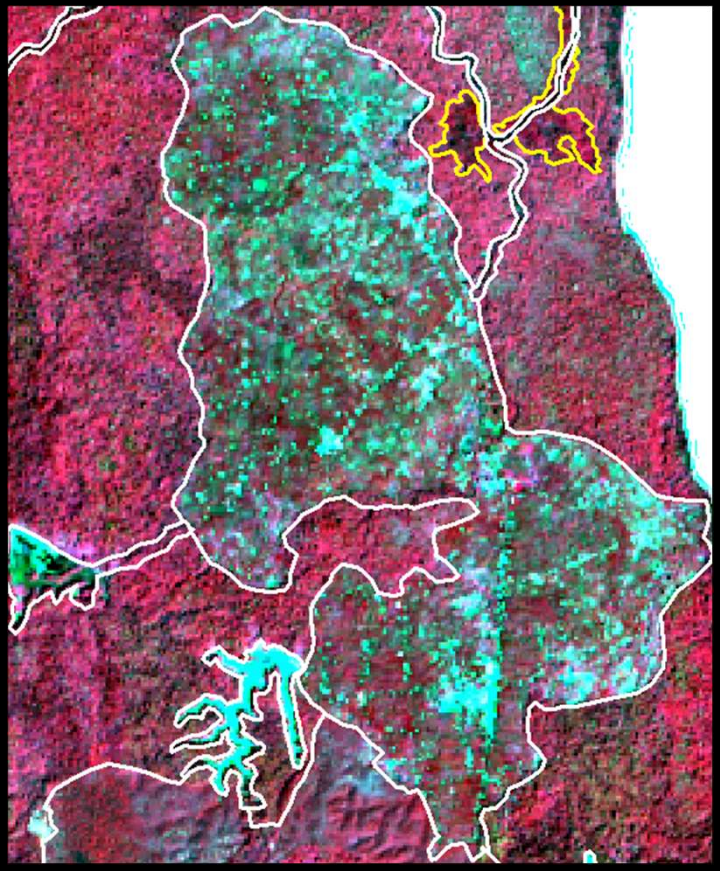
CLASS -4

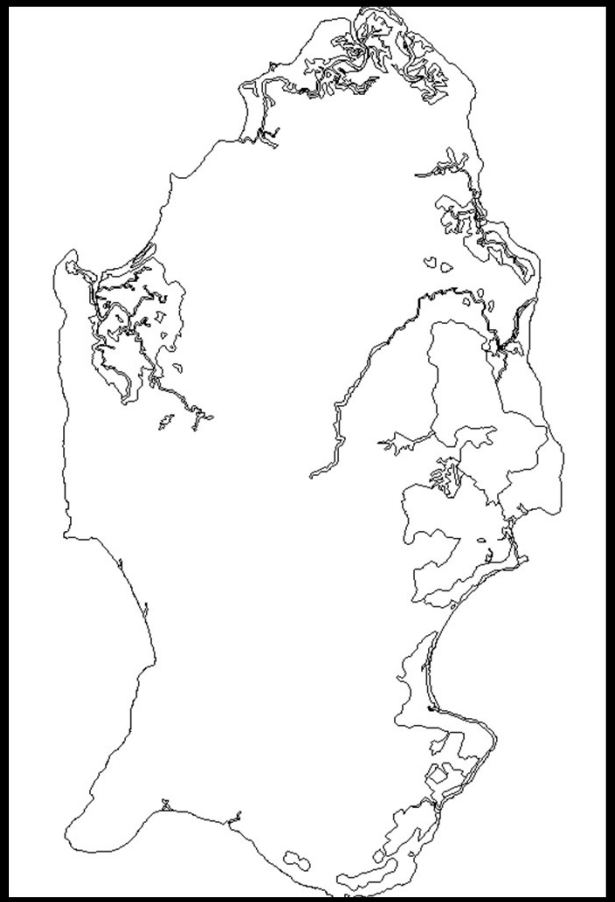
Image Classification

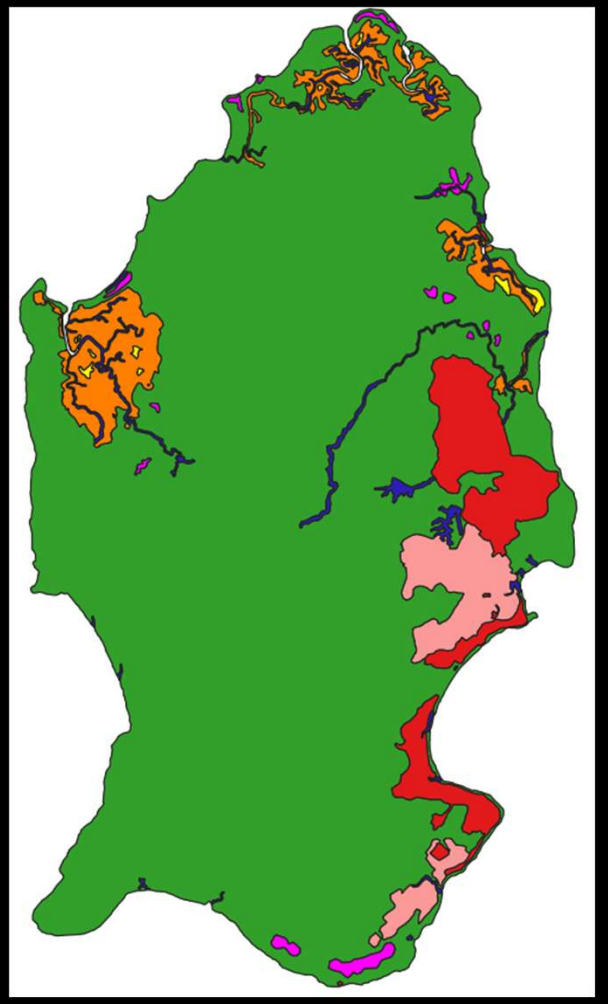
Dr. P. Rama Chandra Prasad
Lab for Spatial Informatics

Visual Interpretation



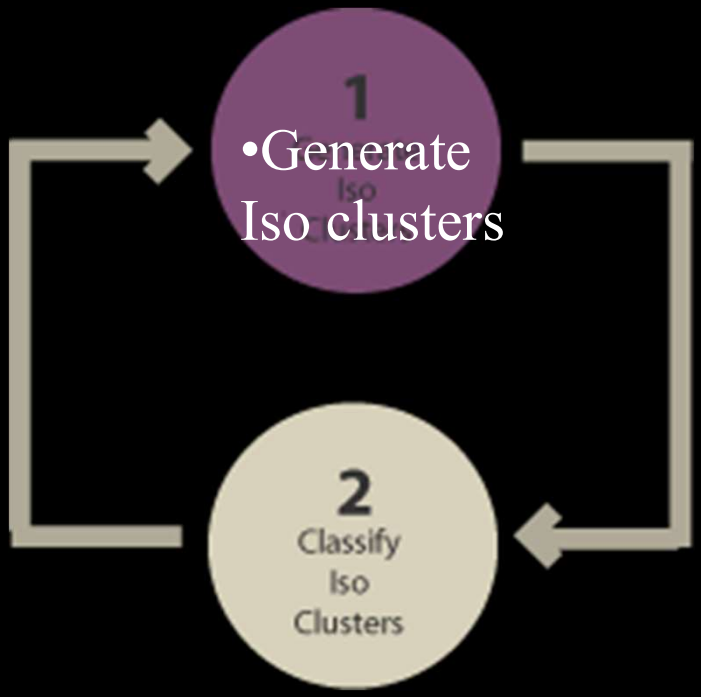






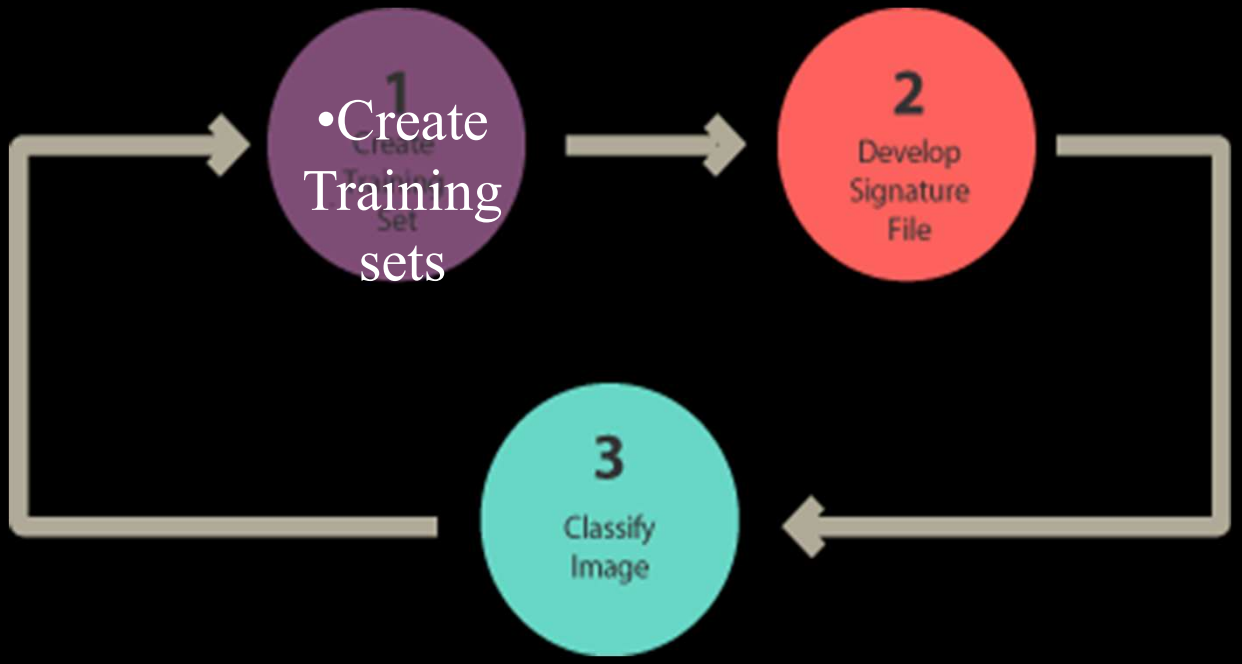
Digital Image Classification

•Unsupervised image classification



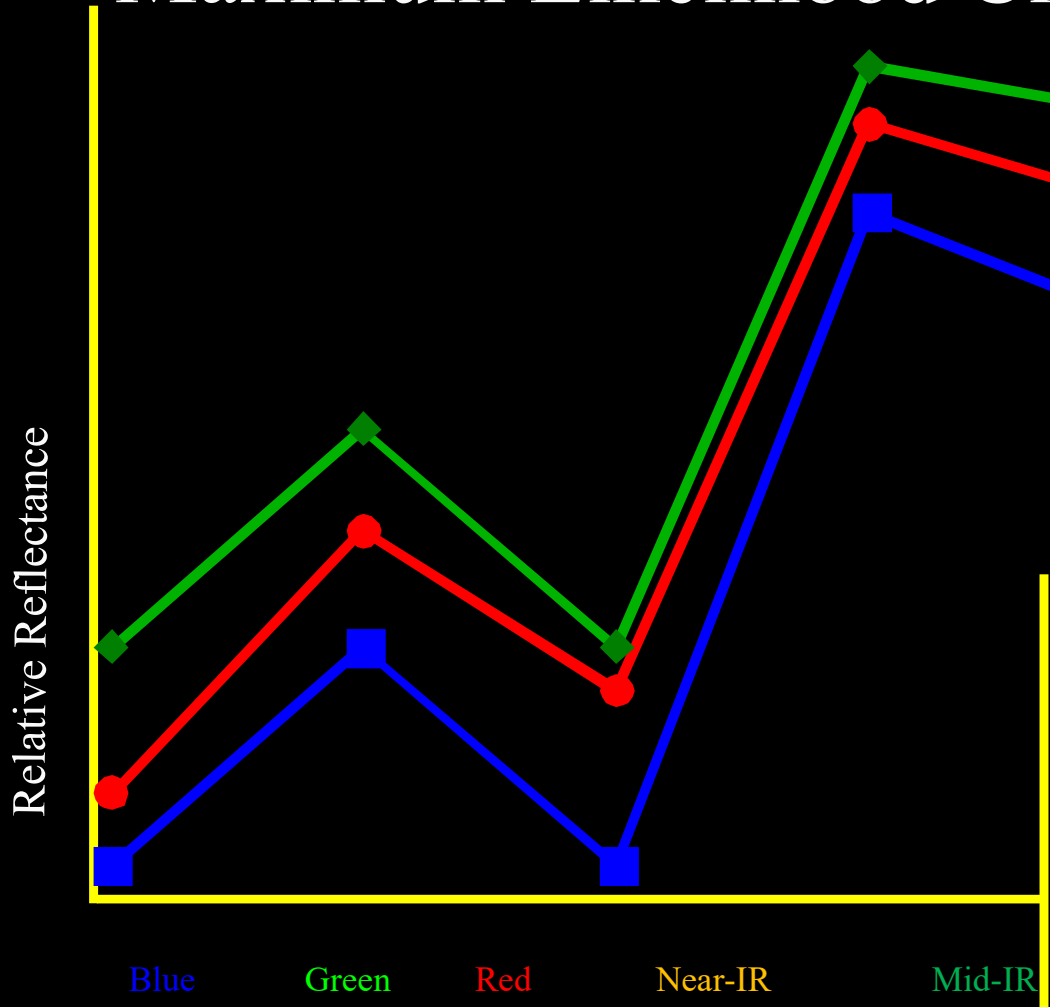
•K-means
•ISODATA

•Supervised image classification

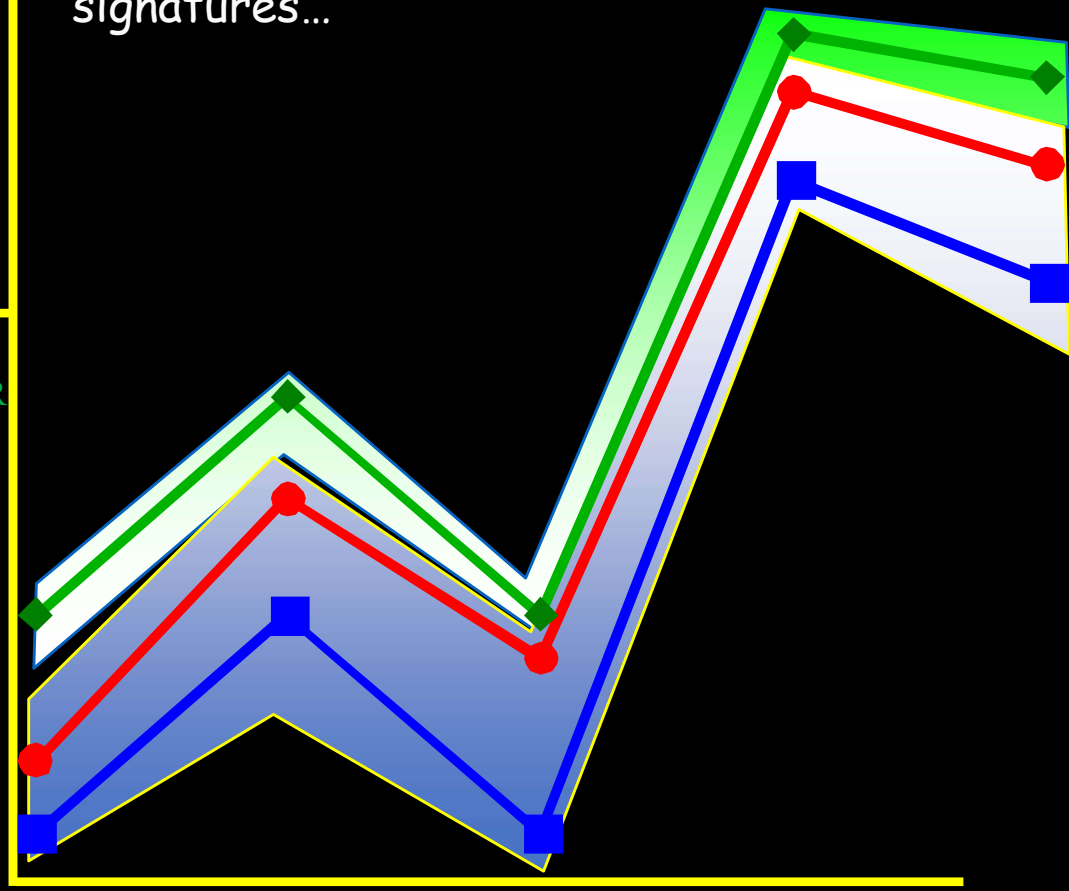


•Maximum likelihood
•Minimum-distance

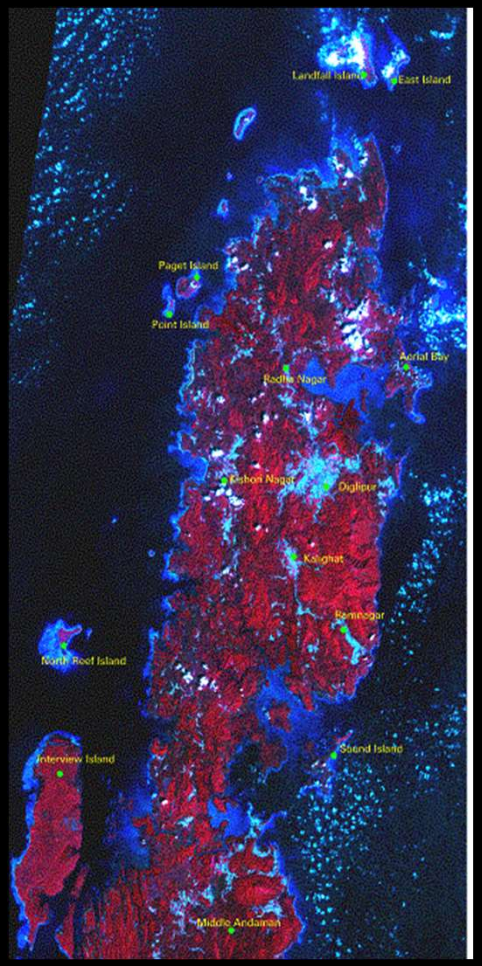
Maximum Likelihood Classifier



It appears that the candidate pixel is closest to Signature 1. However, when we consider the variance around the signatures…

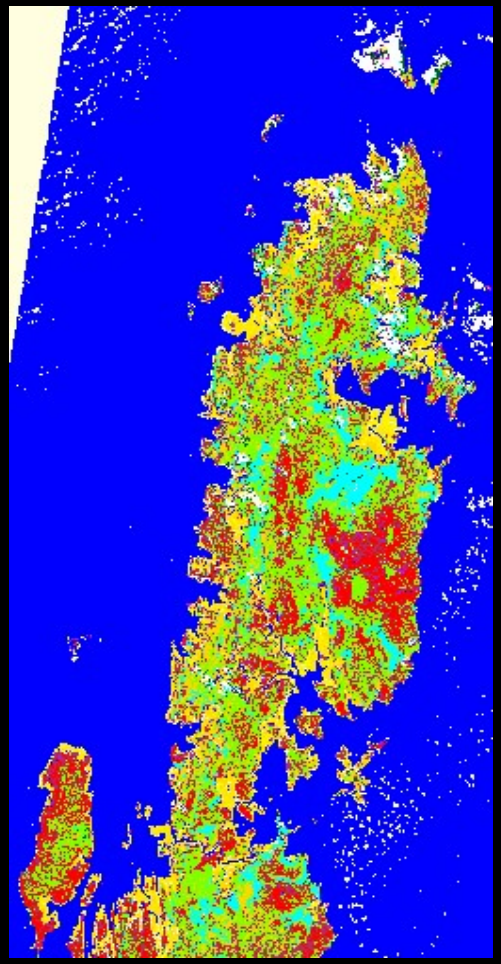


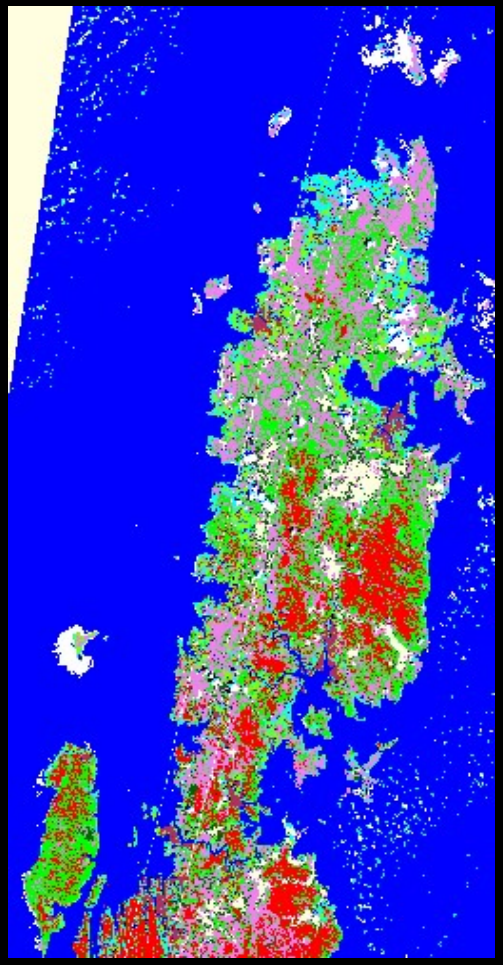
The candidate pixel clearly belongs to the signature 2 group.



FCC

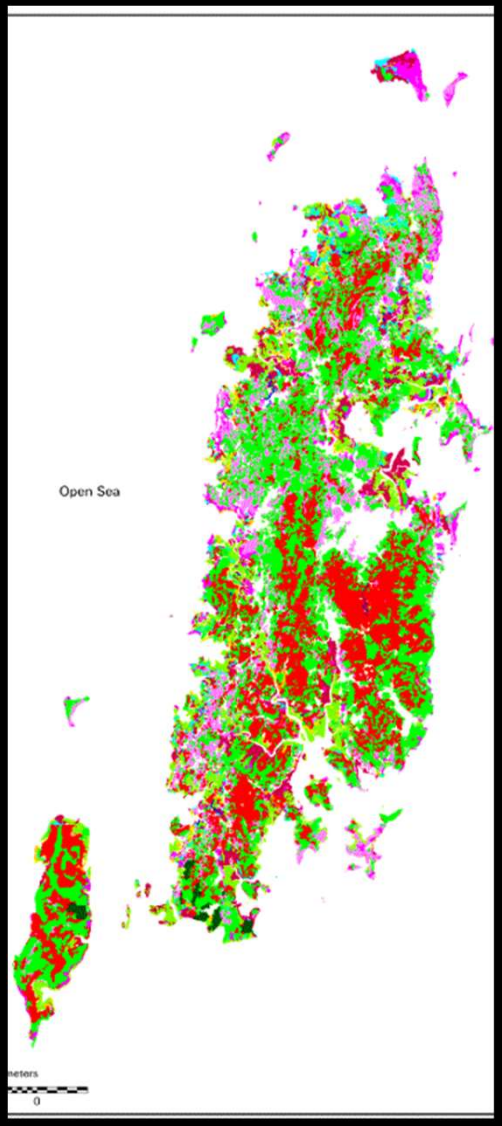
•Unsupervised image classification





•Supervised image classification

Visual Interpretation



Accuracy Assessment

- "contingency table," "confusion matrix or error matrix"

		Ground truth classes			No. classified
		A	B	C	pixels
Thematic map classes	A	**35**	2	2	39
	B	10	**37**	3	50
	C	5	1	**41**	47
No. ground truth pixels		50	40	46	136

The diagonal elements tally the number of pixels classified correctly in each class.

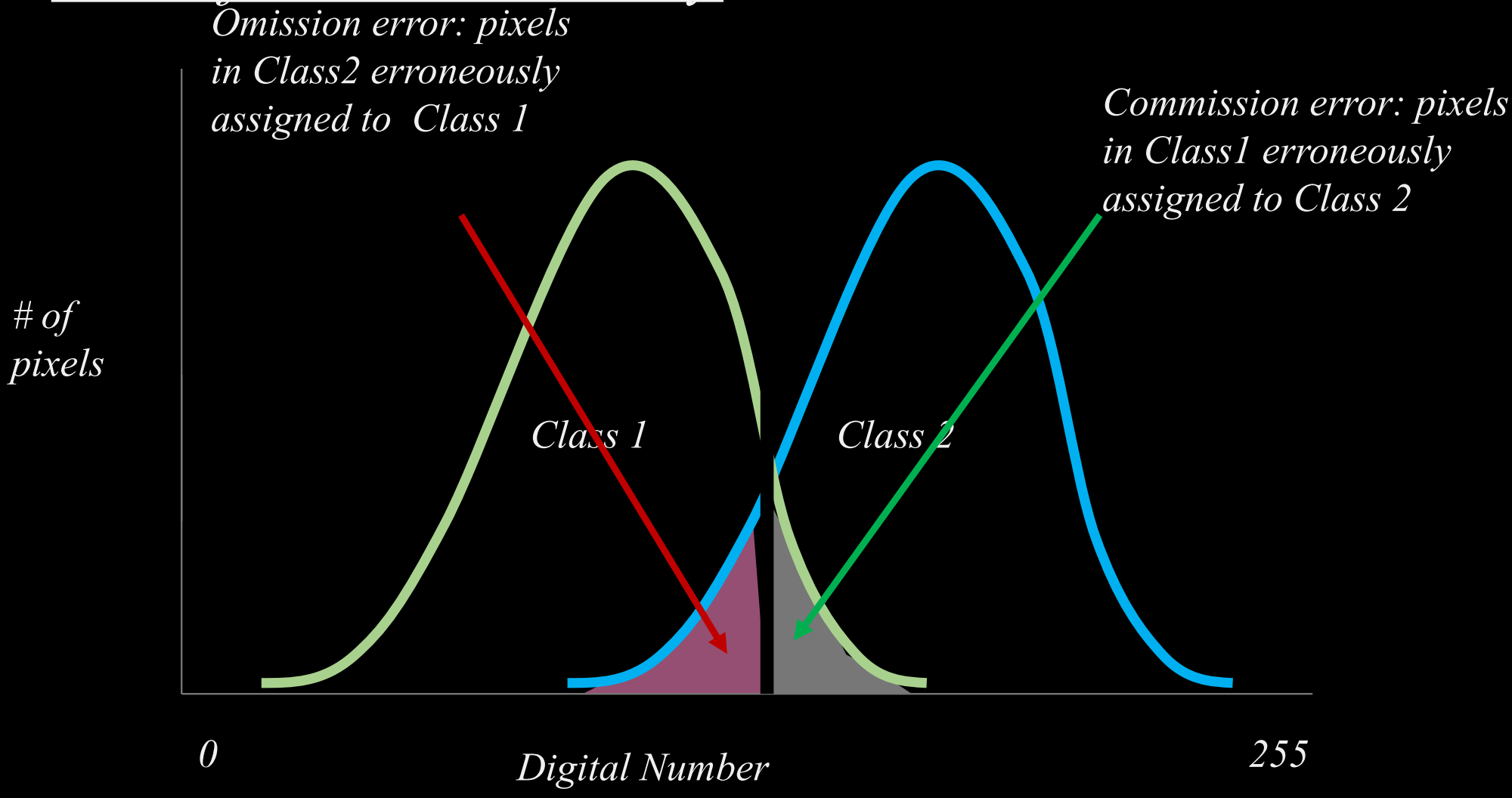
An overall measure of classification accuracy is

$$\frac{total\ number\ of\ correct\ classifications}{total\ number\ of\ classifications}$$

which in this example amounts to $\frac{35+37+41}{136}$, or 83%.

But just because 83% classifications were accurate overall, does not mean that each category was successfully classified at that rate.

Classification accuracy



Producer's accuracy: *measure of omission error; total number of correctly classified pixels in a category divided by the total # in that category as derived from the reference data; (column total) measure of underestimation (35/50)*

User's accuracy: *measure of commission error; total number of correctly classified pixels in a category divided by the total # that were classified in that category ;(row total) measure of overestimation (35/39)*

KAPPA COEFFICENT

- Is a measure of the proportional (or percentage) improvement by the classifier over a purely random assignment to classes.

A = the sum of **r** diagonal elements, which is the numerator in the computation of overall accuracy

B = sum of the r products (row total x column total).

- Then $$\hat{\kappa} = \frac{NA - B}{N^2 - B}$$

where N is the number of pixels in the error matrix (the sum of all r individual cell values).

For the previous error matrix,

– A = 35 + 37 + 41 = 113

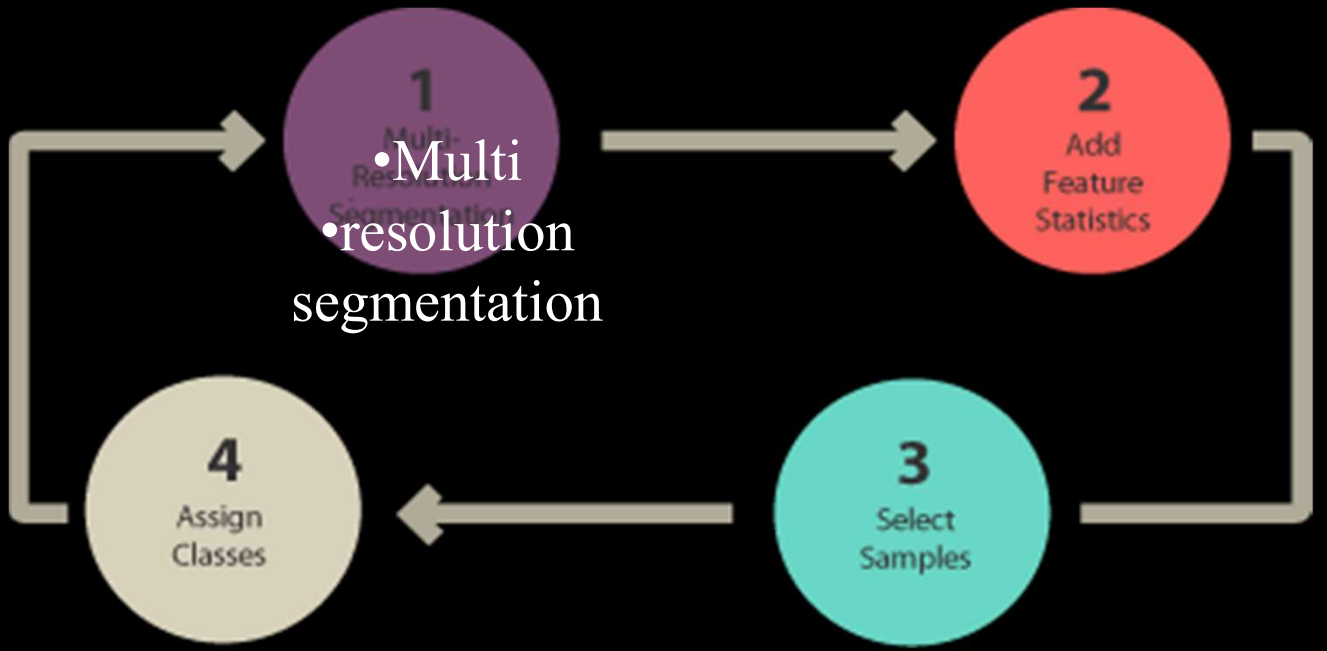
– B = (39 * 50) + (50 * 40) + (47 * 46) = 6112

– N = 136

$$\hat{\kappa} = \frac{NA - B}{N^2 - B} = \frac{136 \times 113 - 6112}{136^2 - 6112} = .75$$

K < 0.4: poor 0.4 < K < 0.75: good K > 0.75: excellent

•Object-based image analysis



•Multi
•resolution
segmentation