SNS COLLEGE OF TECHNOLOGY

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Coimbatore – 35

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DEPARTMENT OF AGRICULTURE ENGINEERING

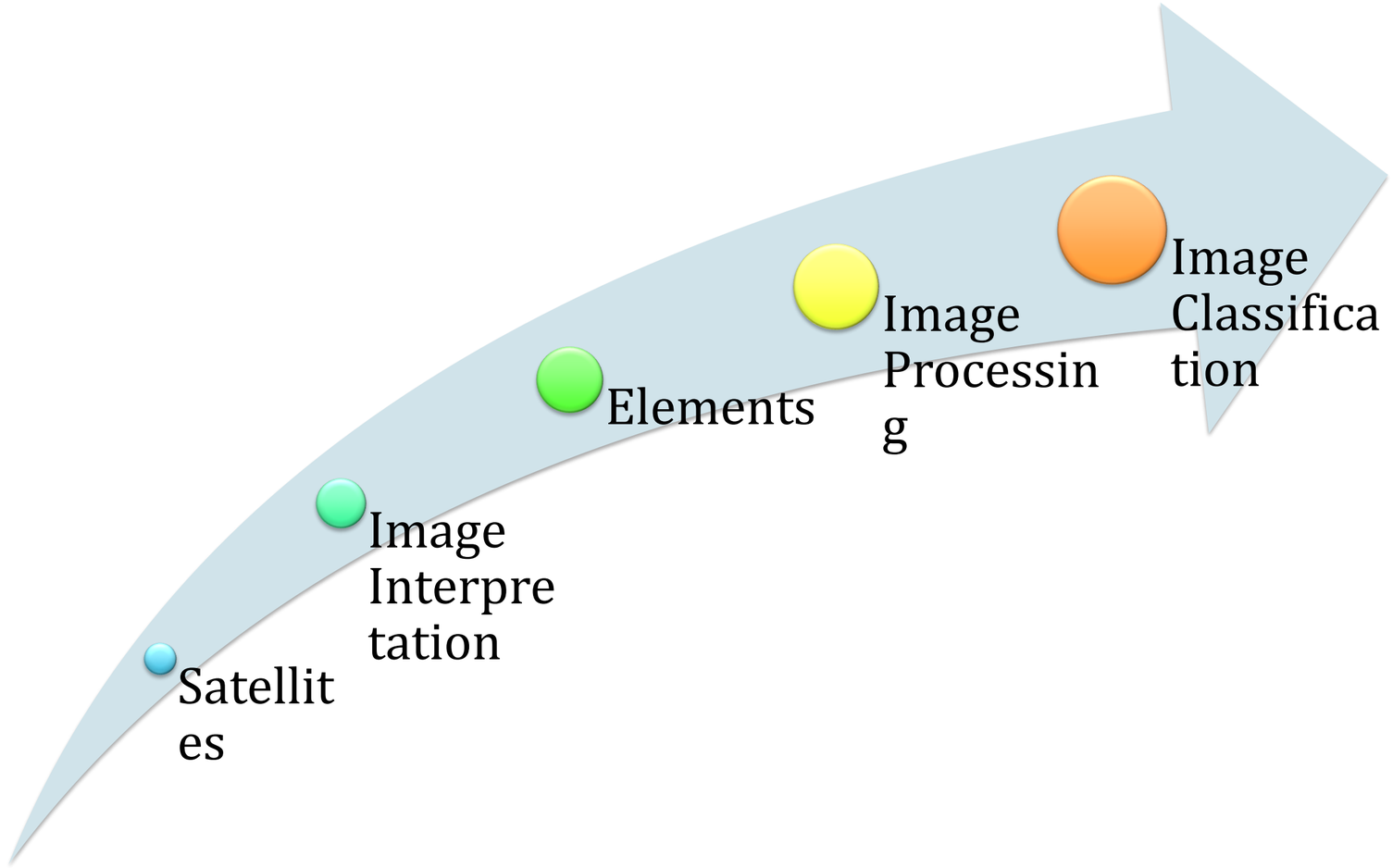
19AGT302 – GIS AND REMOTE SENSING

III – YEAR V SEMESTER

UNIT 3 – DIGITAL IMAGE INTERPRETATION AND PROCESSING

TOPIC 5 – MAXIMUM LIKELIHOOD ANALYSIS

Last Class Review



Maximum Likelihood

- Maximum likelihood classification assumes that the statistics for each class in each band are normally distributed and calculates the probability that a given pixel belongs to a specific class.
- Unless you select a probability threshold, all pixels are classified.
- Each pixel is assigned to the class that has the highest probability (that is, the maximum likelihood).
- If the highest probability is smaller than a threshold you specify, the pixel remains unclassified.

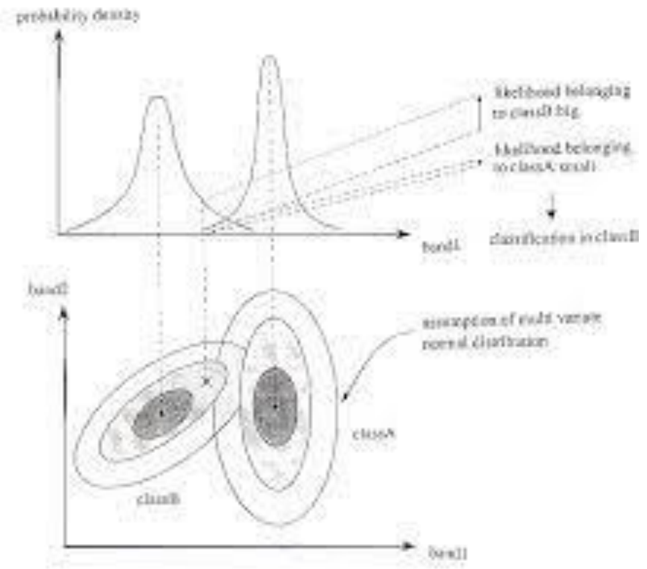


Figure 11.7.1 Concept of Maximum Likelihood Method

Maximum Likelihood Analysis

ENVI implements maximum likelihood classification by calculating the following discriminant functions for each pixel in the image (Richards, 1999):

$$g_i(x) = \ln p(\omega_i) - {}^1/_2 \ln |\Sigma_i| - {}^1/_2 (x - m_i)^T \Sigma_i^{-1} (x - m_i)$$

Where:

i = class

x = n-dimensional data (where n is the number of bands)

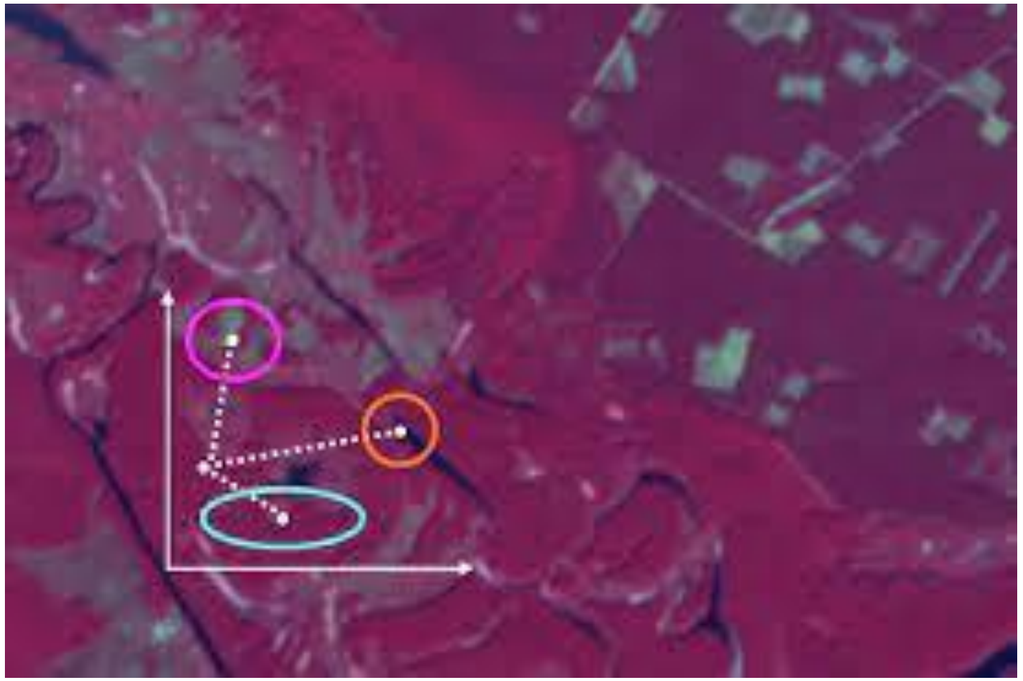
$p(\omega_i)$ = probability that class ω_i occurs in the image and is assumed the same for all classes

$|\Sigma_i|$ = determinant of the covariance matrix of the data in class ω_i

Σ_i^{-1} = its inverse matrix

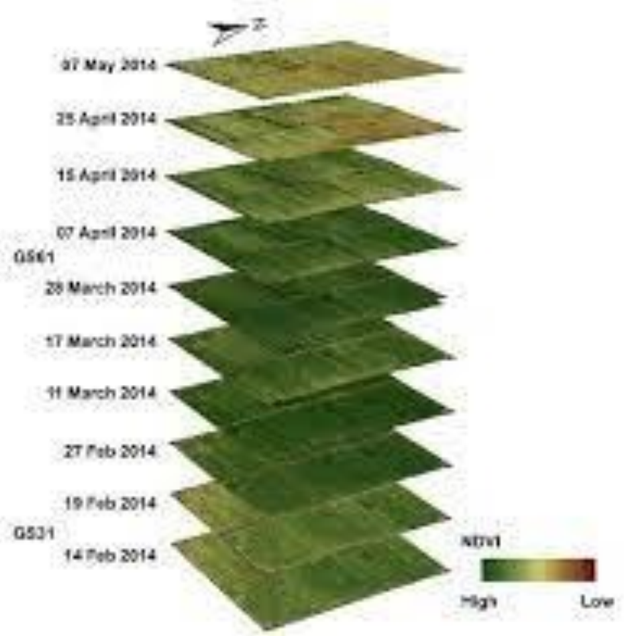
m_i = mean vector

Minimum Distance



- Uses the mean vectors of each end member and calculates the Euclidean distance from each unknown pixel to the mean vector for each class
- All pixels are classified to the nearest class unless a standard deviation or distance threshold is specified, in which case some pixels may be unclassified if they do not meet the selected criteria

Vegetation Index



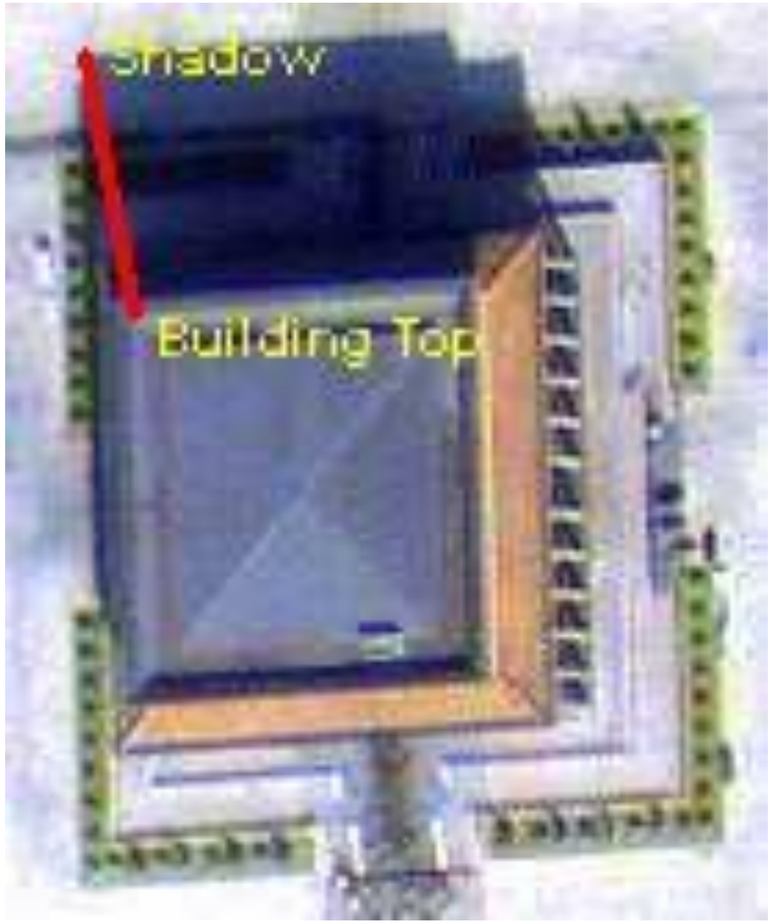
- A vegetation index (also called a vegetative index) is a single number that quantifies vegetation biomass and/or plant vigor for each pixel in a remote sensing image.
- The index is computed using several spectral bands that are sensitive to plant biomass and vigor.
- he most common vegetation index is the normalized difference vegetation index (NDVI)

Types

Multispectral Vegetation Indices

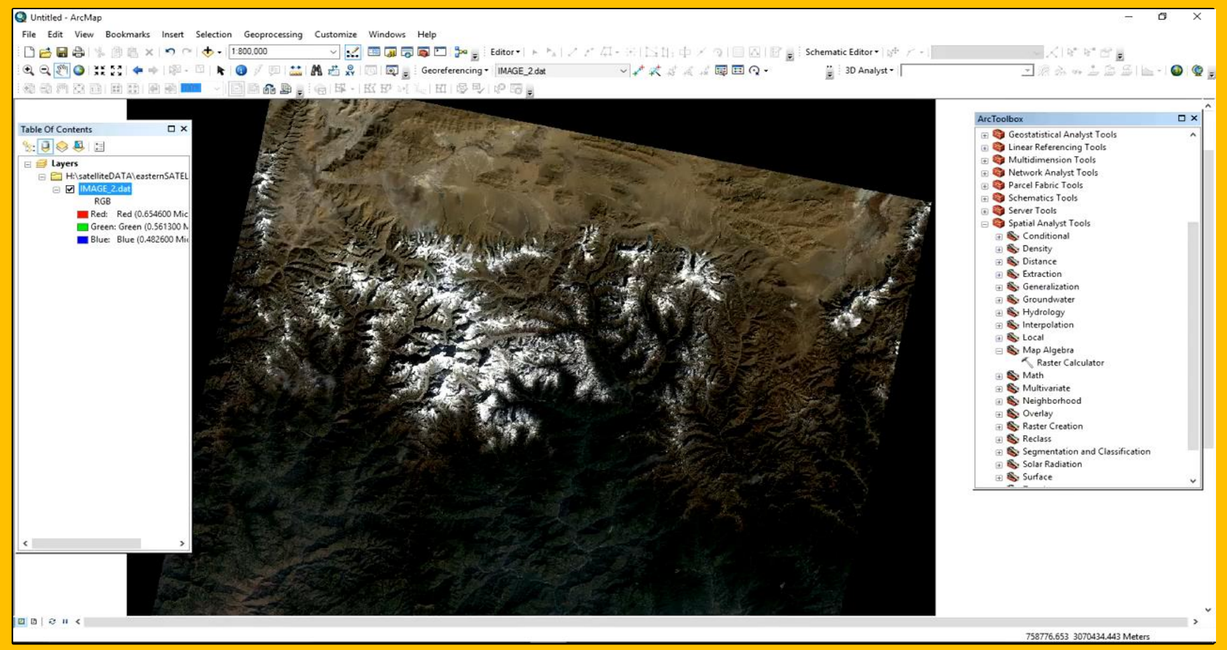
Hyperspectral Vegetation Indices

Multispectral Vegetation Indices



- Building height can be derived from a single image using a simple geometric method if shadows of the buildings can be located in the image. For example, the building height of the building shown here can be determined by measuring the distance between a point on the top of the building and the corresponding point of the shadow on the ground, using a simple geometric relation. In this case, the solar illumination direction the satellite sensor viewing direction need to be known.

Reference Videos



See You at Next Class!!!!