





Training Day 4 Daily Dairy

11 June 2024

1. Studied about different resolutions:

-  **Spatial**
-  **Temporal**
-  **Spectral**
-  **Radiometric**

2. Different Indices:

-  **NDVI**
-  **NDWI**
-  **>NDBI**
-  **>EVI**

1. Different Resolutions

Spatial Resolution:

Description: The size of the smallest possible feature that can be detected by a sensor. It determines the detail in an image.

Applications: High spatial resolution is crucial for urban planning, detailed vegetation analysis, and infrastructure monitoring. Examples include identifying individual buildings or small vegetation patches.

Temporal Resolution:

Description: The frequency at which a sensor acquires data over a specific location. It determines how often images of the same area are captured.

Applications: High temporal resolution is important for monitoring dynamic phenomena such as crop growth, forest fires, and daily changes in water bodies. For instance, MODIS provides daily global coverage, enabling frequent monitoring.

Spectral Resolution:

Description: The ability of a sensor to distinguish between different wavelengths of the electromagnetic spectrum. It refers to the number and width of spectral bands.

Applications: Essential for differentiating between various materials and vegetation types. High spectral resolution is used in applications like mineral exploration, vegetation health assessment, and water quality monitoring.

Radiometric Resolution:

Description: The sensitivity of a sensor to detect slight differences in energy (reflected or emitted radiation). It refers to the number of levels of brightness (gray levels) the sensor can record.

Applications: Higher radiometric resolution allows for more precise detection of subtle differences in the observed area. It is critical in applications like detecting slight variations in vegetation health, soil moisture levels, and surface temperatures.

Different Indices

NDVI (Normalized Difference Vegetation Index):

Formula: $((\text{NIR} - \text{Red}) / (\text{NIR} + \text{Red}))$

Description: NDVI is a widely used index to assess vegetation health and density. It uses the red and near infrared (NIR) bands to determine the presence and condition of vegetation.

Applications: Used in agriculture for monitoring crop health, in forestry for assessing forest cover and biomass, and in environmental studies for tracking vegetation changes over time.

NDWI (Normalized Difference Water Index):

Formula: $((\text{NIR} - \text{SWIR}) / (\text{NIR} + \text{SWIR}))$

Description: NDWI is used to identify and monitor water bodies. It uses the near infrared (NIR) and shortwave infrared (SWIR) bands to enhance the water features.

Applications: Employed in hydrology for monitoring water extent, in disaster management for assessing flood areas, and in environmental monitoring for tracking changes in water bodies.

 NDBI (Normalized Difference Builtup Index):

Formula: $((\text{SWIR} - \text{NIR}) / (\text{SWIR} + \text{NIR}))$

Description: NDBI is designed to map urban areas and builtup surfaces. It uses the shortwave infrared (SWIR) and near infrared (NIR) bands.

Applications: Used in urban planning for mapping builtup areas, in environmental studies for analysing urban sprawl, and in infrastructure management.

 EVI (Enhanced Vegetation Index):

Formula: $2.5 \times (\text{NIR} - \text{Red}) / (\text{NIR} + 6 \times \text{Red} - 7.5 \times \text{Blue} + 1)$

Description: EVI is an optimized index for vegetation monitoring that improves sensitivity in high biomass regions and reduces atmospheric influences. It uses the blue band in addition to the red and NIR bands.

Applications: Used in agriculture for precise monitoring of crop conditions, in forestry for detailed forest health assessments, and in environmental studies for long term vegetation analysis.

Summary:

Today's study covered different types of resolutions crucial for satellite imaging and remote sensing applications, including spatial, temporal, spectral, and radiometric resolutions. Additionally, I learned about various vegetation and surface indices such as NDVI, NDWI, NDBI, and EVI, which are essential for analysing and monitoring vegetation health, water bodies, builtup areas, and environmental changes.