Outline

❖ What is Remote Sensing?
❖ Electromagnetic Radiations (Energy) (EMR)
❖ Resolution
❖ Types of Remote Sensing & Sensors

Remote Sensing

Remote Sensing:

- The art and science of obtaining information about an object without physically contact between the object and sensor

- The processes of collecting information about Earth surfaces and phenomena using sensors not in physical contact with the surfaces and phenomena of interest.

- There is a medium of transmission involved i.e. Earth’s Atmosphere.
Some Remote Sensors

History of Remote Sensing
❖ Balloon photography (1858)
❖ Pigeon cameras (1903)
❖ Kite photography (1890)
❖ Aircraft (WWI and WWII)
❖ Space (1947)

Remote Sensing Process Components

Energy Source or Illumination (A)
Radiation and the Atmosphere (B)
Interaction with the Target (C)
Recording of Energy by the Sensor (D)
Transmission, Reception, and Processing (E)
Interpretation and Analysis (F)
Application (G)
Fundamental term

Resolution

❖ All remote sensing systems have four types of resolution:
  – Spatial
  – Spectral
  – Temporal
  – Radiometric

Spatial Resolution

❖ The earth surface area covered by a pixel of an image is known as spatial resolution
❖ Large area covered by a pixel means low spatial resolution and vice versa

Spectral Resolution

❖ Is the ability to resolve spectral features and bands into their separate components
❖ More number of bands in a specified bandwidth means higher spectral resolution and vice versa
Three spectra recorded at low, medium and high spectral resolution, illustrating how the high resolution mode yields sharper peaks, and separates close lying peaks, which are merged together at low resolution.

Temporal Resolution
- Frequency at which images are recorded/captured in a specific place on the earth.
- The more frequently it is captured, the better or finer the temporal resolution.
- For example, a sensor that captures an image of an agriculture land twice a day has better temporal resolution than a sensor that only captures that same image once a week.

Radiometric Resolution
- Sensitivity of the sensor to the magnitude of the received electromagnetic energy determines the radiometric resolution.
- Finer the radiometric resolution of a sensor, if it is more sensitive in detecting small differences in reflected or emitted energy.

- 2-bit range
- 6-bit range
- 8-bit range
- 10-bit range

2-bit range
6-bit range
8-bit range
10-bit range

0
255
1023
Types of Remote Sensing

❖ Aerial Photography
❖ Multispectral
❖ Active and Passive Microwave and LIDAR

Some known satellites

❖ NOAA-AVHRR (1100 m)
❖ GOES (700 m)
❖ MODIS (250, 500, 1000 m)
❖ Landsat TM and ETM (30 – 60 m)
❖ SPOT (10 – 20 m)
❖ IKONOS (4, 1 m)
❖ Quickbird (0.6 m)

MODIS (250 m)
LIDAR
(Light Detection and Ranging)

Application Domain

Credit

❖ Anees Ahmed, Remote Sensing & GIS Applications Directorate, SUPARCO.
GIS @ Texas state

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