

EYES IN THE SKY AND DATA ANALYSIS SS2-6

What is Remote Sensing?

- Method of collecting information about an object, place or phenomenon without actual physical contact is known as remote sensing.
- Devices used for data collection in remote sensing are called sensors.
- Cameras and scanners are examples of sensors.
- The sensors record the electromagnetic radiations reflected by objects.

Classification of Remote Sensing Based on Source of energy

- Passive Remote Sensing
- Active Remote Sensing

Passive Remote Sensing

- Remote Sensing is carried out with the help of solar energy is known as passive remote sensing.
- Here the sensors do not emit energy by itself.

Active Remote Sensing

- Remote Sensing made with the aid of artificial source of energy radiating from the sensor is known as active remote sensing.
- Here the sensors emit energy by itself.

What is the platform in remote sensing?

- The carrier on which sensors are fixed is called a platform.
- Sensors can be installed on balloons, air crafts and satellites.

Classification of Remote Sensing based on the platform

- The remote sensing can be divided into three types based on the platform.
- Terrestrial Photography
- Aerial Remote Sensing
- Satellite Remote Sensing

What is terrestrial photography?

- The method of obtaining the earth's topography using cameras from the ground is known as terrestrial photography.
- The images we take using cameras are examples of terrestrial photography.

Aerial Remote Sensing

- Aerial remote sensing is a continuous process of taking pictures from the sky with the help of a camera mounted on balloons or aeroplanes.
- Aerial remote sensing is generally used to gather information about comparatively smaller areas.
- The advantage of aerial remote sensing is that information of any region can be gathered in accordance with our requirements.
- Another merit of this method is that contiguous pictures of the areas along the path of the air crafts are made available.
- The photographs obtained through this method are called aerial photographs.

What is overlap in aerial photographs

- In each aerial photograph, nearly 60% of the places depicted in the adjacent photo is included.
- This is done for ensuring contiguity and to obtain three dimensional vision with the help of stereoscope.
- This is called overlap in aerial photographs.

What is Stereo Pair in aerial photographs?

- Two photographs of adjoining areas with overlap are called a stereo pair.
- The instrument which is used to obtain three dimensional view from the stereo pairs is called stereoscope
- When viewed through a stereo scope, we get a three dimensional view of the area depicted in the stereo pair.
- Such a three dimensional view obtained is called Stereoscopic vision.

Limitations of aerial photographs

- The shaking of air crafts affects the quality of photos
- The air crafts require open space for take off and landing.
- It is not practical to take photographs of regions that are vast and extensive.
- Landing the air crafts frequently for refuelling increases the cost.

Satellite Remote Sensing

- The process of collecting information using sensors fixed on artificial satellites is called satellite remote sensing.
- The artificial satellites are mainly divided into two types.
- Geostationary satellites
- Sun synchronous satellites

Features of Geostationary satellites?

- They orbit the earth at an elevation of about 36000m kilometres above the earth.
- One third of the earth comes under its field of view.
- As the movement of these satellites corresponds to the speed of rotation of the earth, it stays constantly above a specific place on the earth.
- This helps in continuous data collection of an area.
- It is used in telecommunication and for weather studies.
- India's INSAT satellites are examples of geostationary satellites.

Features of Sun synchronous satellites

- The orbit of these satellites is about 900 km in altitude.
- The surveillance area is less than that of the geostationary satellites.
- The repetitive collection of information of a region at regular interval is possible.
- Used for the collection of data on natural resources, land use, ground water etc.
- These satellites are mainly used for remote sensing purposes.
- Satellites in IRS, Land sat series are examples of sun synchronous satellites.

What is Spectral Signature in Satellite Remote Sensing?

- Each object on the surface of the earth reflects electromagnetic radiation in different measures.
- The amount of reflected energy by each object is called the spectral signature of that object.
- Sensors record the electromagnetic radiation either reflected or emitted by the objects.

What is Satellite Imageries.?

- The sensors on artificial satellites distinguish objects on the earth's surface based on their spectral signature and transmit the information in digital format to the terrestrial stations.
- This is interpreted with the help of computers and converted in to picture formats.
- These are called satellite imageries.

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What is Spatial Resolution in Satellite Remote Sensing?

- The size of the smallest object on the earth's surface that a satellite sensor can distinguish is called the spatial resolution of the sensor.

-The clarity of satellite images decreases as the spatial resolution decreases.

Uses of remote sensing technology

- For the assessment of weather and its observations
- For ocean explorations
- To understand the land use of an area.
- For the monitoring of flood and drought
- For identifying forest fires in deep forests and to adopt controlling measures
- To collect data regarding the extent of crops and spread of pest attack
- For oil explorations
- To locate ground water potential places

What is Geographic Information System - GIS

-Geographic Information System is a computer based information management system by which the data collected from the sources of information like maps, aerial photographs, satellite imageries, tables, surveys etc. are incorporated in to the computer using software, which are retrieved, analyzed and displayed in the form of maps, tables and graphs.

-All data analysis with GIS are done based on two kinds of data.

1. Spatial data
2. Attributes

What is Spatial data?

- Each feature on the surface of the earth has a latitude and longitude location of its own.
- Such features of the earth's surface having a specific location is known as spatial data.
- When a map of a region is prepared in the Geographic Information System, it must also include its latitude and longitude.

What is Attributes in Geographic Information System?

-The additional information about the characteristics of each spatial data on the earth's surface are called attributes.

-If the well is a spatial data on a Geographic Information System,

-Is there a platform,

-Who owns the well,

-How deep it is etc. are the Attributes of that well.

Layers of Geographic Information System?

-The thematic maps prepared and stored in Geographic Information System for analytical purpose are called layers.

-Example: the stream, road, paddy field and forest are provided separately.

-The spatial relationship among the features on the surface of the earth can easily be understood by analysing the appropriate layers.

Analytical Capabilities of GIS?

- Overlay Analysis
- Buffer Analysis
- Network analysis

are the major analytical possibilities of the geographical information system.

Overlay analysis

- Overlay analysis is used for understanding the mutual relationship among the various features on the earth's surface and the periodic changes undergone by them
- Overlay analysis is helpful in understanding the changes in the area of crops, the changes in land use etc.

Buffer Analysis

- Buffer Analysis is a technique used to analyse circular operations around a point, and for linear features at fixed distances.
- Suppose if we want to find out the number of houses located within three kilo metres radius of your school, the possibility of buffer analysis can be used effectively.
- Buffer analysis helps to identify the number of houses to be acquired when the existing road is widening from 5 m to 8 m as per the government decision.
- A circular zone created around a point feature or a parallel zone created aside a linear feature in buffer analysis is called buffer zone.

Network analysis

- The network analysis deals only with linear features include roads, railways lines and rivers etc. on a map
- The possibilities of network analysis can be used to find out the easiest and less congested roads from one place to another.
- The possibilities of this analysis can also be used by tourists to plan the maximum number of attractive destinations in the available time.
- This may also help to bring an accident victim to a suitable hospital through less congested roads

Uses of Geographical Information System.

- Compile data from different sources.
- Update and incorporate data easily.
- Conduct thematic studies

- Represent geographic features spatially.
- Generate visual models of future phenomena and processes based on the data collected.
- Prepare maps, tables, and graphs

What is the United States satellite-based navigation system?

Global Positioning System (GPS)

Global Positioning System (GPS)

- The Global Positioning System helps sensing the latitudinal and longitudinal location and elevation of objects on the earth's surface along with the corresponding time.
- In this system a series of 24 satellites placed at six different orbits between the altitudes 20000 and 20200 km above the earth's surface locate objects.
- We can locate places with the help of the signals received from the satellites in our Hand held device.
- The GPS requires signals from at least four satellites to display information like the latitude, longitude, elevation, time, etc. in it.
- Though started initially for the U.S. defence. This facility is now open to the public since 1980

Which is a satellite-based navigation system developed by India?

-Indian Regional Navigation Satellite System