SRI SHANMUGHA COLLEGE OF ENGINEERING AND TECHNOLOGY

(Approved By AICTE, Accredited by NAAC, Affiliated to Anna University)

Tiruchengode – Sankari Mani Rd, Pullipalayam, Morur (PO), Sankari (Tk), Salem 637304.

AI8711-GIS LABORATORY FOR AGRICULTURAL ENGINEERS

DEPARTMENT OF AGRICULTURE ENGINEERING

Anna University - Regulation: 2017

B.E AGRICULTURE ENGINEERING – VII SEMESTER

AI8711-GIS LABORATORY FOR AGRICULTURAL ENGINEERS

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RECORD NOTE BOOK

REGNO. ______________________

Certified that this is a bonafide observation of Practical work done by Mr/Ms/Mrs……………………………………of the…………………………………… Semester………………………………………………. Branch during the Academic year……………in the………………………………laboratory.

Staff–in–Charge **Head of the Department**

INTERNAL EXAMINER **EXTERNAL EXAMINER**

GENERAL INSTRUCTIONS

- All the students are instructed to wear protective uniform and shoes before entering into the laboratory.
- Before starting the exercise, students should have a clear idea about the principles of that exercise
- All the students are advised to come with completed recorded and corrected observation book of previous experiments, defaulters will not allowed to do their experiment.
- Don’t operate any instrument without getting concerned staff member’s prior permission.
- All the instruments are costly. Hence handle them carefully, to avoid fine for any breakage.
- Almost care must be taken to avert any possible injury while on laboratory work. In case, anything occurs immediately report to the staff members.
- One student from each batch should put his/her signature during receiving the instrument in instrument issue register.

LIST OF EXPERIMENTS

S.No	Date	Name of the Experiments	Page No	Mark Obtained	Faculty Signature

AI8711 GIS Laboratory for Agriculture Engineers

List of Experiments

1. Measurement of Relief Displacement using Parallax Bar
2. Stereoscopic Vision Test
3. Aerial Photo Interpretation - Visual
4. Satellite Images Interpretation – Visual
5. Introduction to QGIS
6. Geo-referencing of Images
7. Image Enhancement practice
8. Supervised Classification Practice
9. Unsupervised Classification Practice
10. Database Management Systems
11. Spatial Data Input and Editing - Digitizing
12. Raster Analysis Problems – Database Query
13. GIS Applications in DEM and its Analysis
14. GIS Application in watershed Analysis
15. GIS Application in Rainfall-Runoff Modelling
16. GIS Application in Soil Erosion Modelling

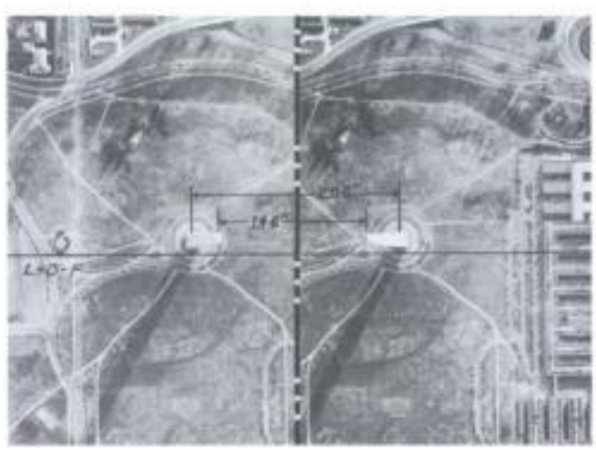
Ex.No:01

Date:

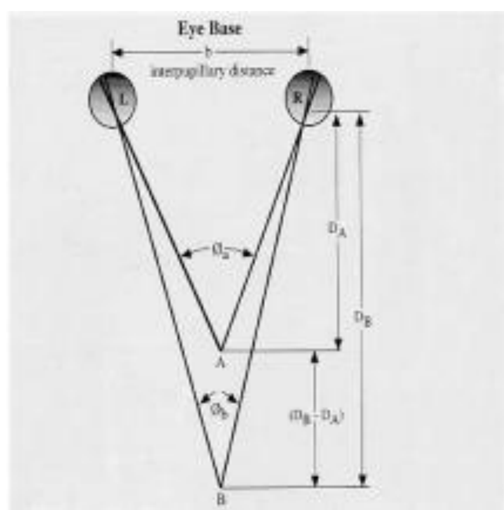
Measurement of Relief Displacement using Parallax Bar

Parallax Height Measurement

Parallax is the apparent displacement in the position of an object, with respect to a frame of reference, caused by a shift in the position of observation. The differences in the parallax of various objects of interest (called differential parallax) can be used to measure the heights of objects and to extract topographic information.



Fundamentals of Human Stereoscopy



Stereoscopy is the science of perceiving depth using two eyes. When a human being's two eyes (binocular vision) are focused on a certain point, the optical axes of the eyes converge on that point, forming parallactic angle (φ). The near the object, the greater the parallactic angle. The brain has learned to associate distance with corresponding parallactic angles and give the viewer the visual and mental impression which object is closer. This is the basis of depth perception.

If both objects were exactly the same distance from the viewer, then the parallactic angles will be the same and the viewer would perceive them at as being the same distance away. The maximum distance at which distinct stereoscopic depth perception is possible is approximately 1000 meters for the average adult.

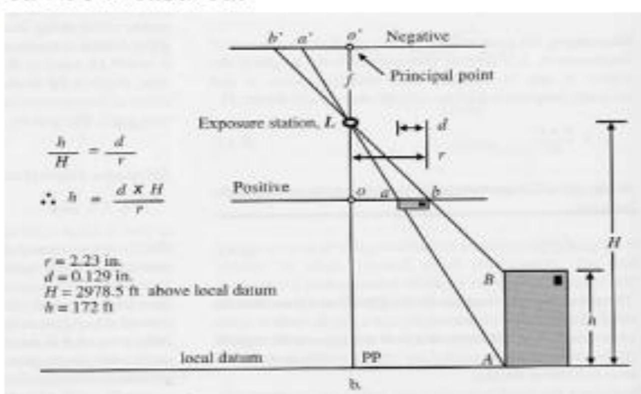
Parallactic angles are formed when our eyes focus on objects in the real world. The mind associates differences in parallactic angles with differences in distance to the various objects. This allows us to have very sensitive depth perception.

Viewing Stereoscopic Aerial Photographs

- Principal Point and Conjugate Principal Point are located on each photograph. Drawn a line through them on each photograph can identify the flight line.
- Slides one of the photographs left or right so that a portion of the stereoscopic overlap area is visible.
- The stereoscope is placed above the overlap area and stereoscopic viewing takes place. The common overlap area of a pair of 9x9 in aerial photographs taken 60 percent overlap is about 5.4 in. that can be viewed in stereo.

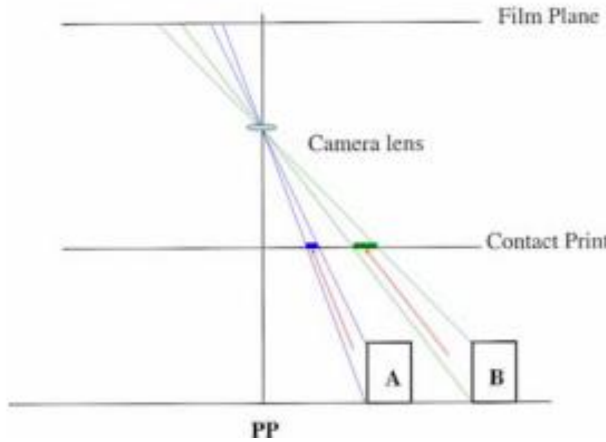
II. Height Measurement Based on Relief Displacement:

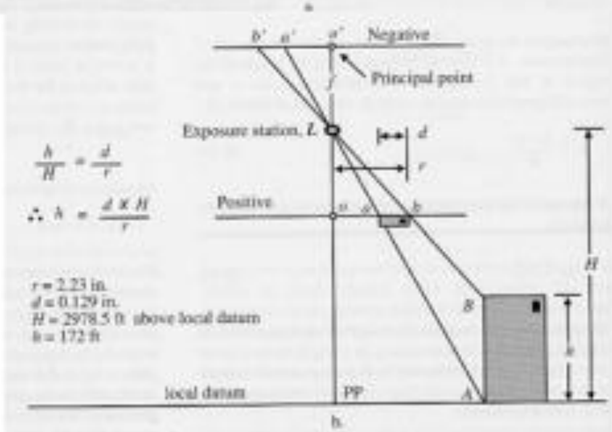
The amount of relief displacement, ***d***, is *directly proportional* to the difference in elevation, ***h***, between the top of the object whose image is displaced and the local datum. Therefore the height can be measured.



The greater the height of the object above the local datum, the greater its displacement.

The farther the object is from the principal point, the greater the displacement.





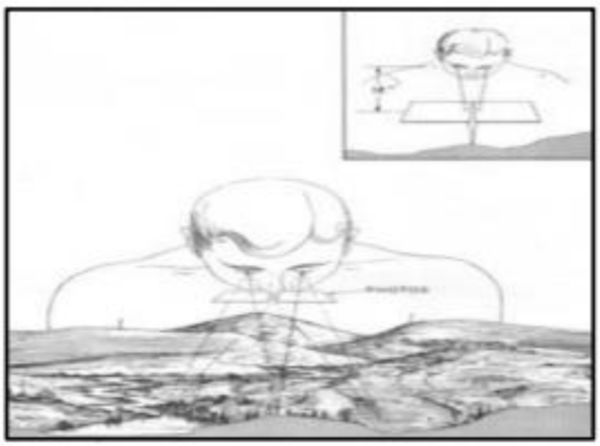
Ex.No:02

Date:

Stereoscopic Vision Test

Description

One of the limitations of the vertical aerial photograph is the lack of apparent relief. Stereoscopic vision (or as it is more commonly known, stereovision or depth perception) is the ability to see three-dimensionally or to see length, width, and depth (distance) at the same time. This requires two views of a single object from two slightly different positions. Most people have the ability to see three-dimensionally. Whenever an object is viewed, it is seen twice--once with the left eye and once with the right eye. The fusion or blending together of these two images in the brain permits the judgment of depth or distance.



(a) In taking aerial photographsit is rare for only a single picture to be taken. Generally, the aircraft flies over the area to be photographed taking a series of pictures, each of which overlaps the photograph preceding it and the photograph following it so that an unbroken coverage of the area is obtained (Figure-1.21). The amount of overlap is usually 56 percent, which means that 56 percent of the ground detail appearing on one photo also appears on the next photograph.

When a single flight does not give the necessary coverage of an area, additional flights must be made. These additional flights are parallel to the first and must have an overlap between them. This overlap between flights is known as side lap and usually is between 15 and 20 percent (Figure1.22).

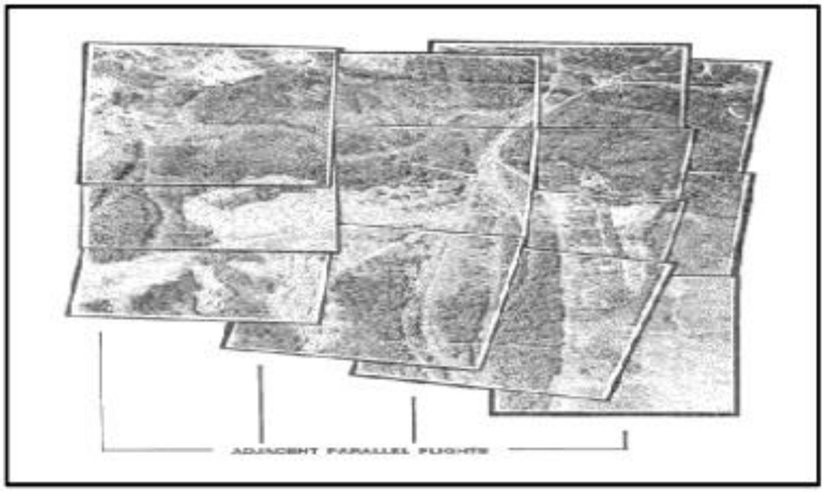


Figure -1.21 Photographic overlap

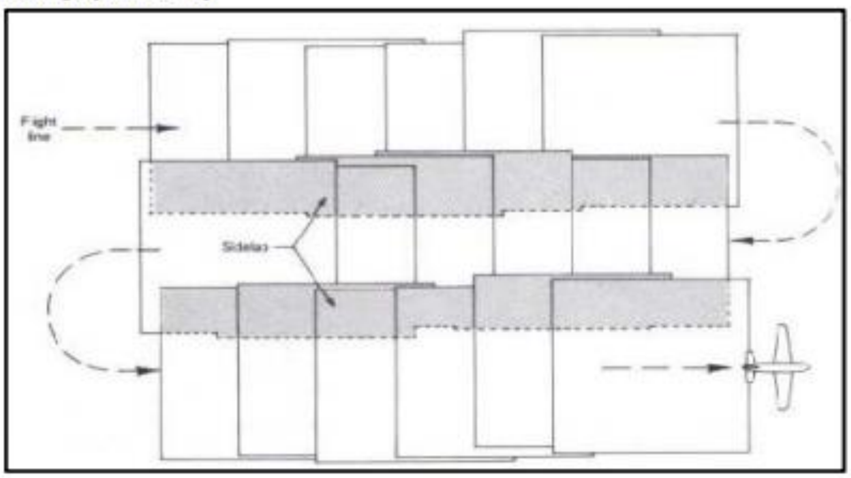
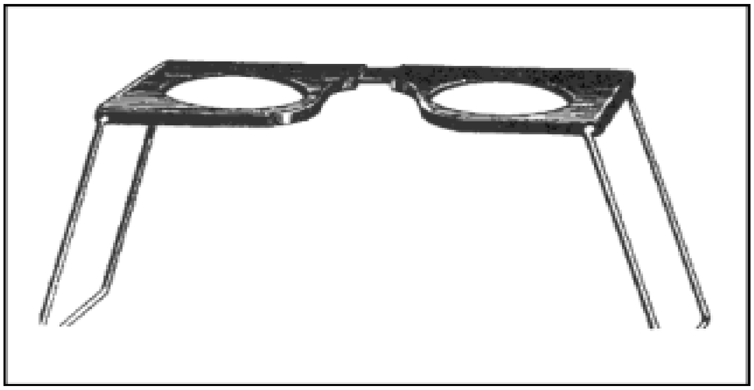


Figure-1.22 Side lap

(b). The requirement for stereovision can be satisfied by overlapping photographs if one eye sees the object on one photograph and the other eye sees the same object on another photograph. While this can be done after practice with the eyes alone, it is much easier if an optical aid is used. These optical aids are known as stereoscopes. There are many types of stereoscopes, but only the two most commonly used are discussed.

Pocket Stereoscope

The pocket stereoscope (Figure-1.23), sometimes known as a lens stereoscope consists of two magnifying lenses mounted in a metal frame. Because of its simplicity and ease of carrying, it is the type used most frequently by military personnel.



Mirror Stereoscope

The mirror stereoscope (Figure-1.24) is larger, heavier, and more subject to damage than the pocket stereoscope. It consists of four mirrors mounted in a metal frame.

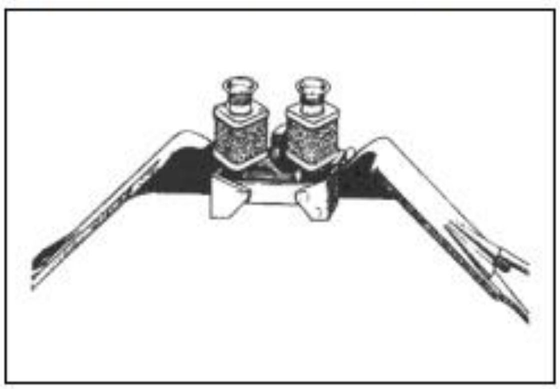


Figure -1.24 Mirror Stereoscopes

A method to orient a pair of aerial photographs for best three-dimensional viewing is outlined below:

(1) Arrange the selected pair of photos in such a way that the shadows on them generally appear to fall toward the viewer. It is also desirable that the light source enters the side away from the observer during the study of the photographs (Figure -1.25).

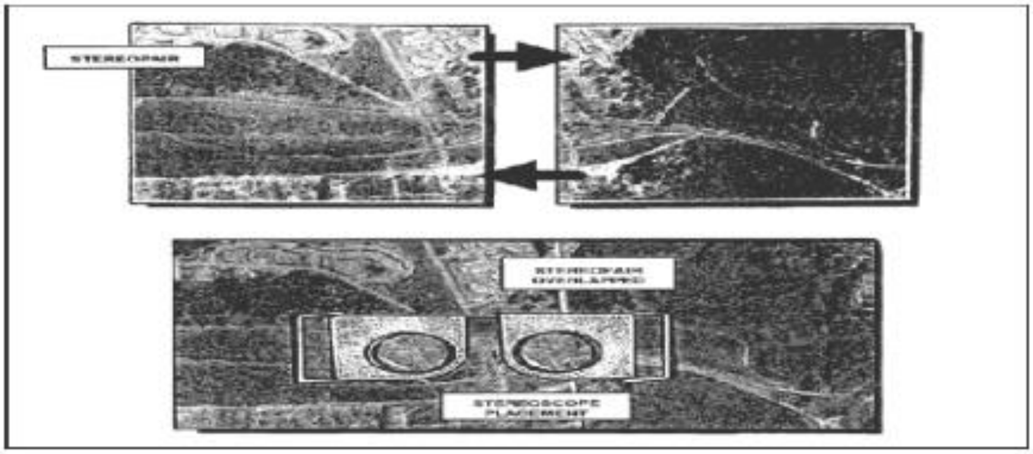


Figure -1.25Placement of stereoscope over stereo pair

(2) Place the pair of photographs on a flat surface so that the detail on one photograph is directly over the same detail on the other photograph

(3) Place the stereoscope over the photographs so that the left lens is over the left photograph and the right lens is over the right photograph

(4) Separate the photographs along the line of flight until a piece of detail appearing in the overlap area of the left photograph is directly under the left lens and the same piece of detail on the right photo is directly under the right lens.

(5) With the photograph and stereoscope in this position, a three-dimensional image should be seen. A few minor adjustments may be necessary, such as adjusting the aerial photographs of the stereoscope to obtain the correct position for your eyes. The hills appear to rise and the valleys sink so that there is the impression of being in an aircraft looking down at the ground.

(6) The identification of features on photographs is much easier and more accurate with this three-dimensional view (Figure-1.26). The same five factors of recognition (size, shape, shadow,

tone, and surrounding objects) must still be applied; but now, with the addition of relief, a more natural view is seen.

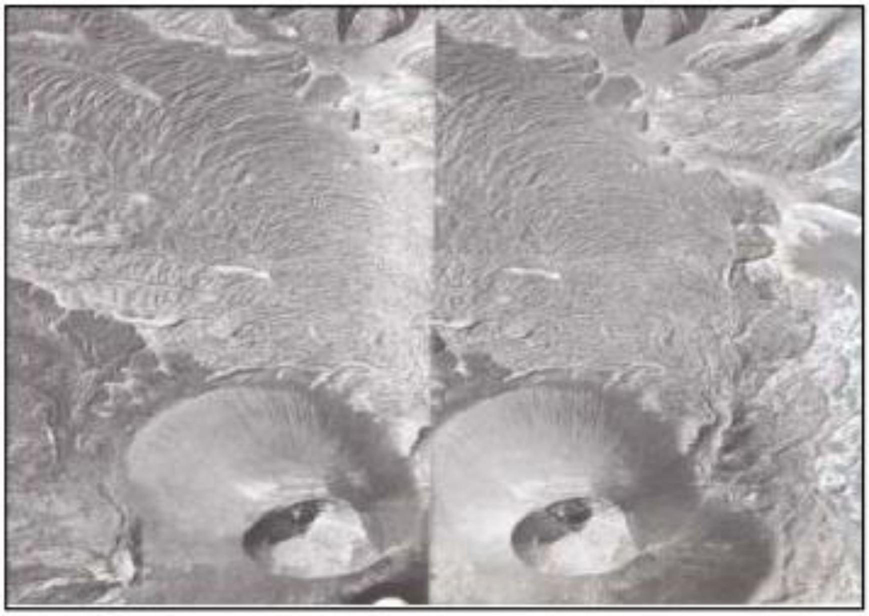


Figure-1.26Stereoscopic view

Ex.No:03

Date

Aerial photo interpretation – visual

Aim

To identify earth objects and judge their significance for given aerial photograph.

Description

- Image interpretation is the process of extraction of information both qualitative and quantitative from aerial photographs and satellite images in the form of a map. This technique is used to collect information for a variety of purposes.
- Image interpretation is carried out either manually or with the help of computer software and is known as visual and digital interpretation, respectively.
- Visual interpretation is a process of identifying features seen on photographs/images and communication of information obtained from them to others for evaluating their significance.
- The information extraction from aerial data (i.e. photo interpretation) is based on the characteristics of photograph features, such as size, shape, tone, texture, shadow, pattern, and association.
- The criteria for identification of an object with interpretation elements are called an interpretation keys.

Procedure

- Open QGIS.
- Click on Add data tool and add the given aerial photograph.
- Identify the earth objects with the help of elements of image interpretation.
- Show the identified feature with label.

Result

The earth objects were identified with reference of image elements for given aerial photograph.

Ex.No:04

Date:

Satellite Image Interpretation – Visual

Aim

To identify earth objects and judge their significance for given satellite image.

Description

- Image interpretation is the process of extraction of information both qualitative and quantitative from aerial photographs and satellite images in the form of a map. This technique is used to collect information for a variety of purposes.
- Image interpretation is carried out either manually or with the help of computer software and is known as visual and digital interpretation, respectively.
- Visual interpretation is a process of identifying features seen on photographs/images and communication of information obtained from them to others for evaluating their significance.
- The information extraction from satellite images (i.e. image interpretation) is based on the characteristics of photograph features, such as size, shape, tone, texture, shadow, pattern, and association. The basic elements of visual image interpretation are similar to those used in aerial photo interpretation.
- The criteria for identification of an object with interpretation elements are called an interpretation keys.

Procedure

- Open QGIS.
- Click on Add data tool and add the given satellite image.
- Identify the earth objects with the help of elements of image interpretation.
- Show the identified feature with label.

Result

The earth objects were identified with reference of image elements for given satellite image.

Ex.No:05

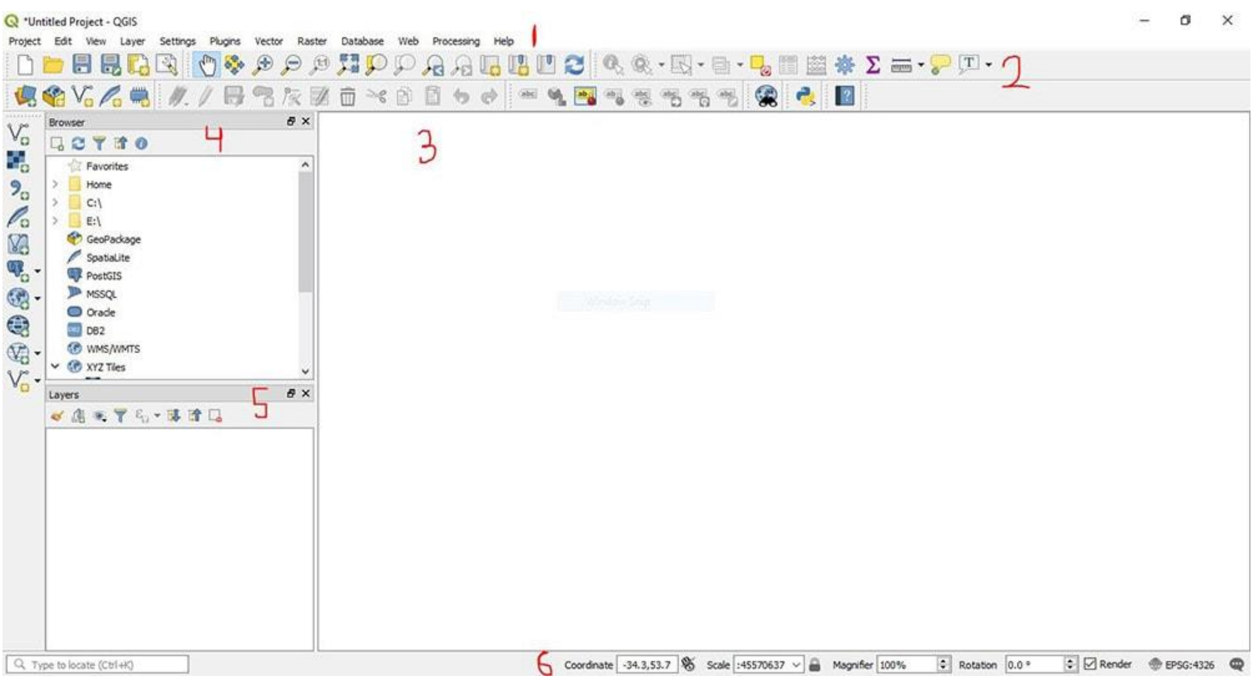
Date

Introduction to QGIS

Quantum GIS (QGIS) is a free and open source software used for viewing, editing, and analysis of geospatial data.

QGIS supports most of the geospatial vector and raster file types and database formats. The program offers standard GIS functionality, with a variety of mapping features and data editing. QGIS also has support for plugins that expands its functionality further by providing additional tools namely: GPS data support, geo referencing, and additional mapping components.

QGIS is one of the most popular software for working with spatial data. It has flexibility to scale with user requirements: from a simple data viewer, to data collection, editing and analysis, to serving data on the web – on as numerous machines as required and without any licensing concerns.



1. Menu Bar

In the above image 1 number is showing main menu bar. You can access almost everything of QGIS from main menu. You can use various features and functions of the QGIS menu style. The Main Menu cannot be moved unlike the toolbars and panels.

2. Toolbar

Toolbars have buttons that provide a one click access (i.e. shortcuts) to many of the features and functions found in the Main Menu. Toolbars are movable and free floating.

3. Canvas or Map Display Panel

It shows geographic display of GIS layer or panel layers. It covers maximum area off course because of its function. Create a Basic Map on canvas

4. Browser Panel

It provides a list of files on your computer. You can drag and drop GIS files into the Layers Panels to view them. This panel is movable and can be hidden/shown on the GUI. We can display it by right click at tool bar and choose the panels you want to use.

5. Layer Panel

This panel shows map layers that are in your current project. Layers can be turned on/off, clubbed, change drawing order, etc. Extract or Select features in Layer.

6. Status Bar

It display all the relevant information about the current project. It shows the current scale of the map display, coordinates of the current mouse cursor position, and the coordinate reference system (CRS) of the project.

Ex.No:06

Date:

Geo-Referencing of Images

Aim

To apply the co-ordinates system for given toposheet or satellite image.

Description

Geo-referencing is the process of assigning real-world coordinates to each pixel of the raster. Many times these coordinates are obtained by doing field surveys - collecting coordinates with a GPS device for few easily identifiable features in the image or map. In some cases, where you are looking to digitize scanned maps, you can obtain the coordinates from the markings on the map image itself. Using these sample coordinates or GCPs (Ground Control Points), the image is warped and made to fit within the chosen coordinate system.

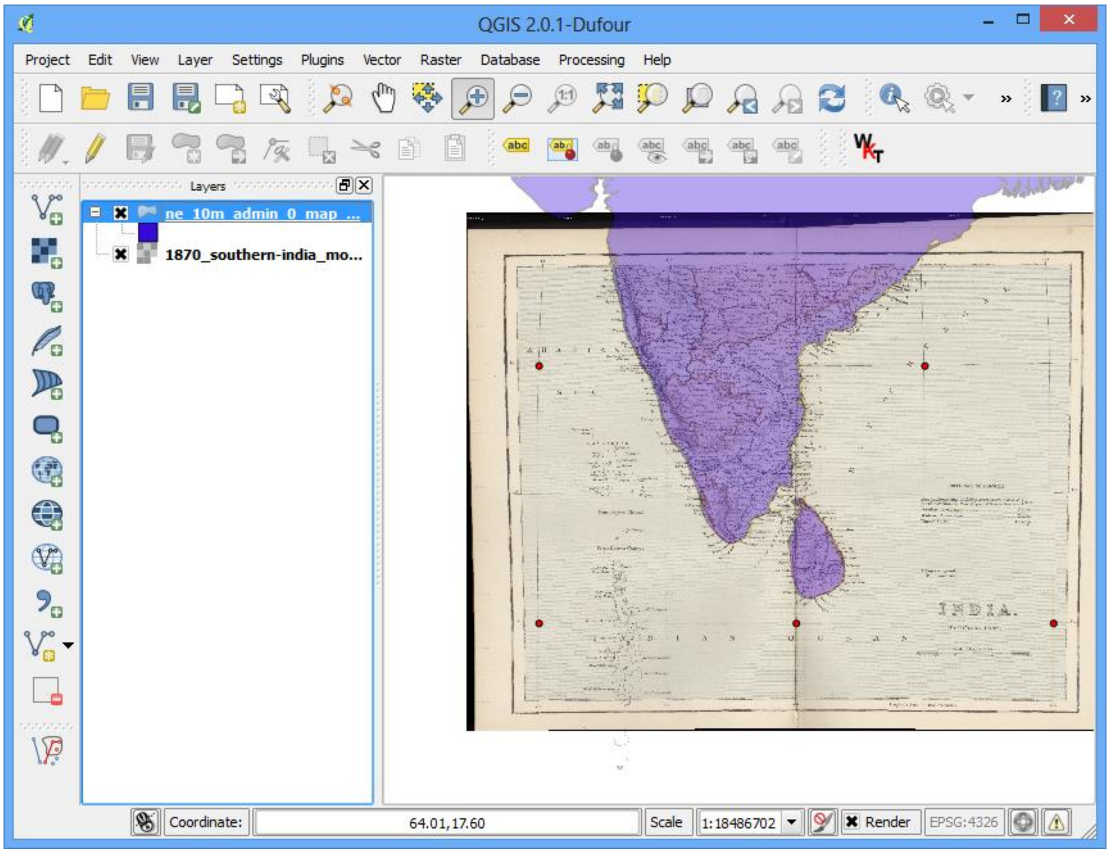
Procedure

1. Georeferencing in QGIS is done via the 'Georeferencer GDAL' plugin. This is a core plugin - meaning it is already part of your QGIS installation. You just need to enable it. Go to Plugins ‣ Manage and Install Plugins and enable the Georeferencer GDAL plugin in the Installed tab.
2. The plugin is installed in the Raster menu. Click on Raster ‣ Georeferencer ‣ Georeferencer to open the plugin.
3. Now we will open our JPG image. Go to File ‣ Open Raster. Browse to the downloaded image of the scanned map and click Open.
4. In the next screen, you will asked to choose the raster's coordinate reference system (CRS). This is to specify the projection and datum of your control points. If you have collected the ground control points using a GPS device,

you would have the **WGS84 CRS**. If you are geo-referencing a scanned map like this, you can obtain the CRS information from the map itself. Looking at our map image, the coordinates are in Lat/Long.

5. The image will be loaded on the top section.
6. Use the zoom/pan controls in the toolbar to learn more about the map.
7. Now we need to assign coordinates to some points on this map. If you look closely, you will see coordinate grid with markings. Using this grid, you can determine the X and Y coordinates of the points where the grids intersect. Click on Add Point in the toolbar.
8. In the pop-up window, enter the coordinates. Remember that X=longitude and Y=latitude. Click OK.
9. You will notice the GCP table now has a row with details of your first GCP.
10. Similarly, add other 3 GCPs covering the entire image. The more points you have, the more accurate your image is registered to the target coordinates.
11. Once you have enough points, go to Settings -> Transformation settings.
12. In the Transformation settings dialog, choose the Transformation type as default. Name your output raster as Name_referenced.tif. Choose **WGS84** as the target SRS so the resulting image is in a widely compatible datum. Make sure the Load in QGIS when done option is checked. Click OK.
13. Back in the Georeferencer window, go to File ‣ Start Georeferencing. This will start the process of warping the image using the GCPs and creating the target raster.
14. Once the process finishes, you will see the georeferenced layer loaded in QGIS.
15. The Georeferencing is now complete. But as always, it’s a good practice to verify your work. How do we check if our Georeferencing is accurate? In this

case, load the country boundaries shape file from a trusted source like the Natural Earth dataset and compare them. You will notice they match up pretty nicely. There is some error and it can be further improved by taking more control points, changing transformation parameters and trying a different datum.



Result

The given topomap/satellite image were georeferenced.

Ex.No: 07

Date:

Image Enhancement Practice

Aim

To improve the visibility of any portion or feature of the given satellite image.

Description

Enhancing the appearance of the raster data – Adjusting the brightness, contrast and transparency. The Image Analysis window (and the Effects toolbar) allows you to interactively adjust the brightness, contrast, or gamma of a raster layer or display the raster layer transparently. These enhancements are applied to the rendered screen display, not to the original raster dataset values. Brightness increases the overall lightness of the image. For example, making dark color lighter and light color white, while contrast adjusts the difference between the darkest and lightest colors.

Procedure

1. Open QGIS.
2. Click on Add data tool and add the given satellite image.
3. Right click on the layer and open the properties dialog box.
4. Select symbology and RGB composite, click on display background value then apply.
5. Select the stretched tool and switch on the display background value for all selected bands.
6. Select the stretch type as Stretch to MiniMax and click on Apply.
7. Then go for histogram analysis and apply stretch with the help of graph values.

Result

The visibility of the given imagery was enhanced using contrast stretching techniques.

Ex.No:08

Date:

Supervised Classification Practice

Aim

To classify the earth feature using supervised classification (training sites) for given satellite image.

Description

Image classification is one of the most important tasks in image processing and analysis. It is used to analyze land use and land cover classes. With the help of remote sensing we get satellite images such as landsat satellite images. But these images are not enough to analyze, we need to do some processing on them. So to use these images for analysis we need image classification.

There are many software tools available for **image classification such as ArcGIS, ERDAS IMAGIN,** but these are not open source software. **QGIS (Quantum GIS)** is very powerful and useful open source software for image classification.

The basic requirement for image classification is image itself but the other important thing is knowledge of the region for which we are going to classify the image. For this either you need to do manual survey or else you can use Google earth. Definitely Manual survey leads to better result.

Procedure

- Open QGIS.
- Install SEMI AUTOMATIC CLASSIFICATION plug-in from the plugin option. After installation of the plugin if toolbox on the screen of the same is

not showing by default then, then click view and click panels. And Check both the panels SCP: ROI creation and SCP: classification.

- Click on Add data tool and add the given satellite image.
- Open classification tool and select image classification.
- Select training sample manager window.
- Select draw polygon tool and draw on the feature (Ex: Water body, Open land, Vegetation, Buildings, etc.) of image.
- Give the name and color for selected feature or objects.
- Save the file as signature type.
- Then go to classification tool and select maximum likelihood classification.
- Then open signature file.
- The classification image will be formed.
- Right click on file in content of table. Select Layer property window and give the name for classified feature or objects.
- View and Open Layout and create output save as export map in QGIS.

Result

The supervised classification process has been processed for given image.

Ex.No:09

Date:

Unsupervised Classification Practice

Aim

To classify the earth feature using supervised classification (training sites) for given satellite image.

Description

Unsupervised classification is based on software analysis. It uses computer techniques for determining the pixels which are related and sort them into classes.

Procedure

- Open QGIS.
- Add a raster layer in a project **Layer >> Add Layer >> Add Raster Layer**.
- Go to the search box of Processing Toolbox, search **KMeans** and select the **KMeans Classification.**
- Select the input image. Type the Number of classes to 20 (default classes are 5) . Fill training size to 10000.
- Type the name of output image save to file.
- And in the last tap on **Run**
- Output image directly display on canvas.
- In the layer panel, right click on the output layer and select **Properties >> Symbology.** Change Render Type **Single band Psuedocolor.** Select the **Color Ramp** (we selected spectral)
- Choose Mode **Equal Interval** (default selection is continuous)
- Change the number of **classes** from 5 to **20.**

- In the last click on **OK.** Output image is provided below. You can also classify according to discrete interpolation if desired.

Result

The Unsupervised Classification process has been processed for given image.

Ex.No:10

Date:

Database Management Systems

Aim

To study about Database Management Systems.

Description

A database consists of an organized collection of data for one or more uses, typically in digital form. A database management system (DBMS) consists of software that operates databases, providing storage, access, security, backup and other facilities. QGIS Cloud stores all your geodata in PostgreSQL/PostGIS databases, so it is necessary to create at least one database for your data before uploading any layers and publishing the map.

To create a new database, perform the following steps:

1. Start QGIS and activate the QGIS Cloud plugin, if it is not yet activated.
2. Switch to the **Account** tab in the **QGIS Cloud** panel and log in using your username and password.
3. Click on the **Create database** button at the bottom of the **Account** tab and wait until the operation completes.

Database creation is a time-consuming operation, so be patient. When it's done, you will see a new database with a random name in the list of available databases. Also, the plugin registered this database in QGIS, so it can be used like any other PostGIS database, for example, for loading and editing layers from it in QGIS.

Ex.No:11

Date:

Spatial Data Input and Editing - Digitizing

Aim

To create vector layer/ features by editing and digitizing.

Description

Digitizing is one of the most common tasks that a GIS Specialist has to do. In most instances, vector features are captured from a base data which can be a geo-referenced map or a satellite imagery. Often a large amount of *GIS time* is spent in digitizing raster data to create vector layers that you use in your analysis. QGIS has powerful on-screen digitizing and editing capabilities.

Digitizing is the process of interpreting and converting paper map or image data to vector digital data. In manual digitizing you trace the lines or points from the source media. You control a cursor, usually with a mouse or digitizing puck, and sample vertices to define the point, line, or polygonal features you wish to capture. The source media may be hardcopy, e.g., maps taped to a digitizing table, or softcopy, e.g., a digital image or scanned map. QGIS software allows us to digitize using either hardcopy or softcopy sources.

Procedure

1. Open QGIS.
2. Click on Add image tool and add Open Street Map.
3. Create New Shape files for Point, Line and Polygon features by giving Geometry type as Point, Line and Polygon respectively.
4. Set Projections for the created shape files as WGS 84 and add new fields.

5. Click Point.Shp and Click Toggle Editing. Give Unique Point number for each point.
6. Similary Repeat Point Number 6 for Line.Shp and Polygon.Shp
7. Save the output as a layout format (with Legends, Scale, North arrow, etc.)

Result

New Vector layers/ Features were created for given map editing and digitizing techniques.

Ex.No:12

Date:

Raster Analysis Problems – Database Query

Aim

To create a raster of a constant value within the extent and cell size of the analysis window.

Description

The basic GIS function includes Querying, Integrating and Manipulating Spatial data. The core functionality of GIS is that it combines computer mapping function that handles and displays the spatial data, with DBMS function to handle attribute data.

Procedure

- The "create constant raster tool" assigns the specified value to every cell in the output raster.
- The constant value must be a numeric value scientific notation is acceptable (For example, 3.048e-4 for 0.003048).
- Select constant value – The constant value with which to populate all the cells in the output raster.
- Select data type.
- Select cell size – The cell size for the output raster dataset – Analysis Cell Size.
- Extent – The extent for the output raster dataset – The extent is a Python class.
- The output raster for which each cell will have the specified constant value.

Result

The Raster analysis was performed for given data with python program.

Ex.No:13

Date:

GIS Applications in DEM and its Analysis

Aim

To create the DEM (3D View) for given data.

Description

DEM is the simplest form of digital representation of topography. DEMs are used to determine terrain attributes such as elevation at any point, slope and aspect. Today, GIS applications **depend** mainly on DEMs respect to any reference datum.

There is no universal usage of the terms digital elevation model (DEM), digital terrain model (DTM) and digital surface model (DSM) in scientific literature. In most cases, the term digital surface model represents the earth's surface and includes all objects on it. In contrast to a DSM, the digital terrain model (DTM) represents the bare ground surface without any objects like plants and buildings.

DEM is often used as generic term for DSM and DTM, only representing height information without any further definition about the surface.

Procedure

- Open QGIS
- Click on Add data tool and add the given spatial data (Toposheet)
- Create Point Shape file and add new point features.
- Mark the elevation value and enter the value in point's attribute table.
- Select Spatial Analyst tool and apply interpolation techniques and create the layers spline, contour, slope, aspect, hillshade, view shed.
- Select 3D Analyst tool and create the 3D view.
- Save the output as a layout format (with legends, scale, north arrow, etc)

Result

The three dimensional view of surface were created for given toposheet.

Ex.No:14

Date:

GIS Application in Watershed Analysis

Aim

To find out Watershed Basin, Streams, Flow direction, etc.

Description

A watershed is the area of land where all of the water that falls in it and drains off of it goes into the same place or common outlet. A watershed is also defined by topographic divides between two or more adjacent catchment basins, such as a ridge or a crest. Watershed analysis refers to the process of using DEM and raster data operations to delineate watersheds and to derive features such as streams, stream network, catchment areas, basin, etc.

Procedure

- Open QGIS.
- Click on Add data tool and add the given spatial data (toposheet).
- Choose Spatial Analyst tool and Open Hydrology tool.
- Then create the following layers: Fill, Flow direction, Flow Accumulation, Basin.
- After creating basin, open conversion tool toolbox and select raster to polygon tool.
- Convert the basin raster layer to polygon.
- Then open geoprocessing tool and clip the basin.
- After clip the feature, go to arc toolbox and select the map algebra tool.
- Then open raster calculator tool and create flow accumulation layers.

- Then once again open conversion tool for raster to polygon.
- Once again clip the basin feature.
- Then go to data management tools, select raster and open raster processing to clip the feature.
- Open and show the final clip (Flow direction and Catchment region) feature and save the output.
- Save the output as a layout format (with legends, Scale, North Arrow, etc.).

Result

Watershed basin and Flow direction were processed.

Ex.No:15

Date:

GIS Application in Rainfall-Runoff Modelling

Aim

To create a rainfall modelling for given rainfall data.

Description

Rainfall-runoff modelling is one of the important tools in engineering hydrology. The rainfall-runoff process describes the water changes from rainfall to runoff during a storm event. It is necessary for hydrologists to investigate the rainfall-runoff processes because it identifies the hydrological characteristics of a watershed. The rainfall-runoff relationship is strongly dependent on soil, the types and diversity of vegetation, and topographic characteristics of the watershed. Since these characteristics are highly dynamic in the spatial domain, GIS can play a very important role in rainfall – runoff modelling. Recent developments in GIS techniques have enhanced the capabilities to even handle large dataset describing the heterogeneities in land surface characteristics.

Procedure

- Open QGIS.
- Click on Add data tool and add the given spatial data (toposheet).
- After adding data, choose spatial analyst tool.
- Select interpolation tool and Open IDW tool.
- Create a spline using interpolation tool.
- Then open surface tool and create contour, drainage, etc.
- Use hydrology tool for stream, stream order, flow direction, basin, etc.

- Create and show the rainfall map.
- Save the output as a layout format (with legends, scale, north arrow, etc).

Result

The rainfall map was created for given data.

Ex.No:16

Date:

GIS Application in Soil Erosion Modelling

Aim

To create Soil Erosion modelling for given data.

Description

Soil erosion assessment is a capital-intensive and time-consuming exercise. A number of parametric models have been developed to predict soil erosion at drainage basins, yet universal soil loss equation (USLE) is most widely used empirical equation for estimating annual loss from agricultural basins. While conventional methods, yield point-based information, Remote Sensing (RS) technique makes it possible to measure hydrologic parameters on spatial scales while GIS integrates the spatial analytical functionality for spatially distributed data. Some of the inputs of the model such as cover factor and to a lesser extent supporting conservation practice factor and soil erodibility factor can also be successfully derived from remotely sensed data. Maps covering each parameter (R, K, LS, C and P) were integrated to generate a composite map of erosion intensity based on advanced GIS functionality. This intensity map was classified into different priority classes. Each area was analyzed individually in terms of soil type, average slope, drainage length, drainage density, drainage order, height difference, land use/land cover and average NDVI with soil erosion to find out the dominant factor leads to higher erosion.

Procedure

- Open QGIS.
- Click on Add data tool and add the given spatial data (toposheet).
- After adding data, choose spatial analyst tool.
- Select Zone tool and open zone statistics, zone fill, zone, etc.
- Show the soil erosion zone using above tools.
- Save the output as a layout format (with legends, scale, north arrow, etc.).

Result

The soil Erosion Map was created for given data.