Mapathon

Learnt from Spoken Tutorial

1. **Getting the datasets**

*What is GIS(Quantum Geographic Information System*)?

The process in which capturing, storing, querying, analyzing and displaying geospatial data is GIS.

Real-life examples:

* In tracking the location of a suspect.
* In locating the suitable location for setting up an industry
* Getting an overview how to use limited resources effectively
* Setting up of new hospitals for the needy
* For prediction of monsoon or weather for disaster management

When we add multiple layers in a QGIS project then it is called layering. When we are adding layers then the order in which we are adding them matters a lot.

ex- adding a polyline layer over point layer.

Spatial or Geospatial Data - Refers to the data of an area. It can be of two types - one is vector and another is raster data.

Vector data is extracted from longitude and latitude of a place. Ex- longitude and latitude are 18.9523804 and 72.8327112 for Mumbai region. We can add Vector layer with extension .shp. In spoken tutorial vector layer was downloaded from - <https://www.naturalearthdata.com/downloads/10m-cultural-vectors/> .

Raster data consists of the images taken by the satellites. Basic constituent of these images are very small square cells or pixels. Extension of raster layer is .tif. We can download Raster data from Bhuvan website.

We select the areas from raster data which shows the rivers, agriculture, land degradation, streams and many more. We can give them attributes or different color to them by creating new shape-file layer.

Non-spatial data includes location attributes such as the population density in an area, area covered by agricultural land, forest cover and so on. We attach non-spatial data with map to make it more informative.

Metadata is data associated with the image. Data consists of the band, rights, pixel size, width, height and many more.

1. **Coordinate Reference System**

https://spoken-tutorial.org/watch/QGIS/Coordinate+Reference+Systems/English/

It is of two types:- 1. Geographic Reference System 2. Projected Reference System

**Geographic Reference System**

1. Latitude & Longitude
2. Most widely used WGS 84 (Global)
3. Unit – degrees

**Projected Reference System**

1. Eastings and Northings
2. Most widely used UTM(Universal Transverse Mercator)
3. Unit – meters

**3. Digitizing the data**

**Setting up the CRS for an image**

First, I downloaded the Digitizing data code file from tutorial.

Add the image as Raster layer in qgis.

Currently the added layer has no coordinate reference system.

Right click on the current layer in the layer’s panel.

Click on Set CRS.

In the Geographic Coordinate System select WGS 84 and click ok.

Reference System has now been added to the current layer.

**Creating layers**

**Creating a Point Layer**

Open Layers menu in the toolbar

Hover the mouse to Create Layer option

A new menu appears. Click on New Shapefile layer.

New Shapefile layer dialog box appears. Give a suitable name to the file.

Choose Point option from Geometry Type menu.

Then click on ok button.

A new layer has been added.

Click on Toggle Editing. Then click on Add a new Feature.

Mouse cursor changes to scope sign. Click on the legends in map showing IT Establishments.

As you click on a legend Feature Attribute dialog box appears.

Enter suitable id and click ok.

Repeat the same steps for other legend.

To change the color of the points we can right click on the points layer in layer panel.

Hover the cursor the Styles and select suitable color.

To stop making points on the map- click on Toggle Editing

A dialog appears asking about to save the feature of points on the points layer or not. Click on save button.

**4. Importing Spreadsheet**

**Importing data of csv format file**

Open Layer menu.

Click on Add layer. Click on Add Delimited Text layer.

Delimited text dialog box appears. In the file name choose the csv format file.

In the File format choose CSV radio button.

Click on Add and then close button.

You will get a point layer added in the Layer’s Panel.

**Importing data of txt format file**

Open Layer menu.

Click on Add layer. Click on Add Delimited Text layer.

Delimited text dialog box appears. In the file name choose the txt format file.

Click on Add and then close button.

You will get a point layer added in the Layer’s Panel.

**Converting a Point Layer to Polyline Layer**

Click on Processing in the Menu Bar. Select Toolbox option from it.

Toolbox panel appears in the right side. Now, click on Vector Creation option.

In Vector Creation menu, click on Points to Path option.

Points to path dialog box appears. Choose Input point layer.

In the order field menu either choose longitude or latitude.

Longitude for getting polyline layer from West to East. For polyline layer from South to North choose Latitude option.

**WMS (Web Map Service) Layer**

WMS is open GIS standard specification for interactive mapping.

Requesting map images from the server over the Internet.

**Downloading WMS Layer from Bhuvan**

Open Bhuvan website. Select Thematic Services option.

Thematic Services tab opens in a new window.

Select Theme from the drop-down menu according to your choice and Geography also.

Click on Web Services Tab. Copy the URL from QGIS section and note the Layer name.

Open the QGIS interface. Click on Layer menu and choose add layer.

In the Add layer menu choose Add WMS/WMTS layer option.

WMS/WMTS dialog box appears. Click on New button.

Create a New WMS/WMTS dialog box appears. Give the appropriate name to the file.

Paste the copied URL in the URL text box. Then, click on ok button.

Now, click on Connect button in WMS/WMTS dialog box.

Choose the required layer. And click on Add button.

WMS layer gets added to the project.

**5. Vector Data Styling**

**Loading vector layer in QGIS**

Get the code files downloaded. After that open the world.shp as vector layer.

We can get the Attribute Table of the map by right click on the layer in the Layer’s Panel and click on Open Attribute Table. In the Attribute table POP\_EST column shows the population in each country.

**Represent the population on the world map by styling**

**Single Symbol Styling**

Right click on world layer and click onPropertiesoption. Layer Properties dialog box appears.

Open Symbology Tab. Now, you can choose the color to be filled in entire map and the color of outline you want(We can also change the outline width). Choose the color according to your choice and click on Apply button.

**Categorized Styling**

It is not suitable to map population on map using Single Symbol Styling**.**

Open the Properties dialog box.

From the Symbology Tab choose Categorized instead of Simple.

In the Value menu choose POP\_EST for mapping population on the layer.

Choose a color from Color ramp. (example- blue ramp)

Then click on Classify button.

Click on ok button.

Lighter shade represents lower population.

Dark shade represents higher population.

**Graduated Styling**

**(Graduated** symbology type allows you to break down the data in a column in unique classes.

Using this (Graduated) we can give different color to each class.)

Open the Properties dialog box.

From the Symbology Tab choose Graduated instead of Categorized.

To change the no. of classes use the class drop-down.

Then click on Classify button.

You will get Symbol, Values and range column updated.

(To change the color for a particular range double click on color box of that range and choose the color accordingly.)

(We can also change the mode of classification from Mode drop-down.)

(The data to be mapped should be numeric (real) for Graduated layer. ex- population, not country name)

Click on ok button. You will now get the updated map.

**Change the Legend name for various classes**

Open the Layer Properties dialog box.

Double click on the Legend name you want to change.

Change the name accordingly and click on ok button.

**Change the selected ranges**

Open the Layer Properties dialog box.

Double click on the Range you want to change.

Change the range accordingly and click on ok button.

**Adding the Label to the map**

Open Layer Properties dialog box.

Click on Label Tab. Choose Single Label option.

In the Values drop-down choose Admin to get the countries name labelled on to the map.

Choose one option from Buffer, Background and other. Check on Draw Text Buffer option(when you have choose Buffer option.).

Click on ok button.

Now, you will get the labels on your map.

**6. Geometric Properties of Vectors**

**Show selected features from the attribute table on the vector layer**

**Attribute Table is present only for a vector layer.**

Download the code file. Open Ind\_rail.shp.

Open the Attribute table of the layer.

You will see EXS\_DESCR column shows operational and unexamined railway track.

To show only operational railway track click on Select Features using Expression option.

A new dialog box appears. Click on triangle before features and values.

Double click on EXS\_DESCR and in the expression box type = ‘Operational’.

Then, click on Select Features and click on close button.

You will see the selected features on the map.

**Creating shapefile for selected features**

Right click on the current layer in the Layer’s Panel.

Click on Export option -> Select Features As.

Save Vector Layer As dialog box appears.

Give the suitable name to the file in the file name text box.

Check on Save Selected Features only.

Click on ok button.

You will see a new layer getting added in the Layer’s Panel.

**Adding a column in Attribute Table**

**7. Getting datasets from Google Earth Pro**

Download the Google Earth Pro from <https://www.google.com/intl/en_in/earth/versions/> for desktop.

**Note:** India Literacy Project (ILP) has collaborated with Google Earth. There aim is to get 100% literacy rate in India. Students are less interested in learning Social Studies. To increase their interest in it, teachers are using Google Earth Voyager which shows them pictures of the places.

Google Earth is a computer program that gives 3D representation of the Earth.

The program allows users to see the cities and landscapes from various angles.

**Create .kml point file (vector layer) in Google Earth Pro**

1. Open Google Earth Pro program.

2. Right click on Temporary places folder -> Add option -> Folder.

3. Create Folder dialog box appears.

4. Type the Name as H.P. District -> ok button.

5. In Search Tab type Mandi and click on Search button.

6. Click on Add Placemark Option. Placemark dialog box appears.

7. Give it the name as Mandi and click on Ok button. The point Mandi will get added to the point layer. Do the same process (step 5-7) for other districts.

7. Right click on the H.P. District Folder and click on Save File As option.

8. Give the file an appropriate name and save with extension .kml if the size of the file is considerable otherwise .kmz (zipped file) for bigger files.

**Create .kml polygon file (vector layer) in Google Earth Pro**

1. Create a new folder in H.P. District folder with name Boundary H.P.

2. Search for Himachal Pradesh in the Search Tab.

3. Then click on Add Polygon option in the Toolbar.

4. Polygon dialog box appears.

5. Select the area for polygon. Give the appropriate name to it.

6. Click on ok button.

7. Right click on the Boundary Folder and click on Save File As option.

8. Give the file an appropriate name and save with extension .kml if the size of the file is considerable otherwise .kmz (zipped file) for bigger files.

Open the created point and polygon vector layer in qgis.

Important points regarding Map submission and Documentation

For Map

1. Add north direction and
2. boundary data
3. legends
4. title of the map
5. personal details

For documentation

 One-page document:

* 1. Please add a paragraph on the methodology (which can include, but not limited to):
     1. Mention the ISRO data used
     2. Specific steps in GIS
     3. Complexities, if any involved
  2. Please add a paragraph on the application and use of these maps.

Evaluation Criteria

1. Methodology/ ISRO data/ GIS steps used (40 marks).
2. Complexity (20 marks).
3. Potential application of the map (40 marks).

Land Cover

Land acquired in different ways. It may be acquired by forests, humans, crop land or no one i.e., wasteland.

Land use

Refers the way we are utilizing the land such as urban area, villages, industrial area.

We need to manage the land use because per capita population is increasing day by day and need to the use available land effectively and efficiently. This point was learnt from Youtuber from Kurushetra University.

**Suggestions**

1. Make separate map to show the downfall in the coverage area of forests.

2. We can use conversion of point layer to poly-line layer for getting the road network.

3. Boundary of different cities can be useful.

4. Hover option on the map to get some meaning information out of it.

5. Play-book option to show the change in forest area over years.

6.