**Title: State Railway Stations and Railway Network Map of Gujarat, India**

Data Source:

* Mapathon 2020\_Data that includes India State and District Boundaries.
* Bhuvan portal for Water Reservoir Data, Administrative Boundary Layers, Major Transportation Data
* Google Earth, Open Street Maps

Software Used:

QGIS, Google Earth Pro, Microsoft Word, Microsoft Powerpoint

Steps in GIS:

1. Load The required data in QGIS
2. Set the Datum and perform Georeferencing Operations.
3. Perform clean up operations such as Clip operation to obtain only Gujarat’s State and District boundaries and other features specific to the area of interest.
4. Load the Open Street Map/ Satellite in QGIS.
5. Create new point Shapefile.
6. Locate the Latitude & Longitude values obtained from mobile data collection or satellite image and place points at each location of the Railway Station.
7. Create new line shapefile.
8. Digitise the Railway Network for the area of interest taking OSM as reference.
9. Edit the Attribute Table or Import csv/txt file to update the Attribute Table.
10. Organise the layers.
11. Assign Color and transparency to each layer so that every layer is cleary visible.
12. Then, Label the features accordingly by using Single Labelling/ Categorised labelling / Graduated Labelling.
13. Then using Print Layout Option add legend, title, north arrow, scale bar, etc. Finally, export the map in the required desired format(jpg/pdf).

Complexities:

* Performing Clip Operations requires atmost care.
* Using “add WMS/WMTS layer” to import few required features from Bhuvan Portal as base layers.
* Accurate Railway Station Data either from Mobile app/ from satellite images.
* Digitizing of Railway Networks at curves and bends, thus by providing sufficient nodes at each change in direction.
* Checking and editing entered data in the Attribute Table.
* Importing Data from txt file to Attribute Table.
* Merging Data Layers of Two States.
* Assigning color and adjusting Transparency for each feature to be visible.
* Placement of labels which are placed slantly.
* Adjusting Scale of the Map for the final Print Layout

Applications of the Map:

1. Facilities for Quick and Easy Transportation Routes.
2. Information about the Surrounding area of the Railway Network can be obtained easily.
3. Provides insights on further expansion of the rail network.
4. Helps in designing new railway lines for areas that lack connectivity and commutation is more.
5. To help passengers to get information about the nearest railway station.
6. To calculate incurring cost for new railway lines or railway line re-development as GIS provides length of the rail network.
7. For controlling of train movements
8. To employ personnel and staff for each railway station depending on the population of the area.
9. Facilitates information that enable the trains on a single line track to cross from opposite directions.
10. For detaching or attaching of compartments / wagons and place unused/faulty wagons so as not to obstruct the rail transportation.
11. For sorting of bogies to form new trains, housing of locomotive in loco sheds.
12. In case of emergencies such as dislocation of track due to rains, accidents, etc to find alternative routes.
13. For repairing engines and changing their direction.
14. To connect spatial data with its non-spatial data such as the attributes to obtain instant information about any particular railway station or railway network.