CE671A Lab 1

Aadya Umrao
210003
Civil Engineering
aadyau21@iitk.ac.in

---

1 Introduction

To complete the tasks, first, use Google Earth to save an image of the capital of your state and another image of Kanpur, with IIT Kanpur included. Select a historical site in Uttar Pradesh, create a polygon around it, and save it as a .kmz file. Determine the longitude, latitude, and elevation of Kanpur Central Railway Station, IIT Kanpur Gate, and IIT Kanpur Library. Examine the boundaries of joined images for anomalies, particularly focusing on images from November 2020. Analyze the features and color changes within AOI files 1, 2, 3, 4, 5, and 6, and identify any anomalies. Comment on AOI 7 and write the causes of any anomalies. Research five applications of Google Earth and come up with one innovative application. List other image servers similar to Google Earth and differentiate between 'kml' and 'kmz' file formats, noting the special attributes of 'kmz'. For QGIS tasks, install the software and the 'OpenLayers' plugin, import 'lab1file.kmz', overlay it on various maps, and open the attribute table to discuss its significance. Compare Google Earth and QGIS in terms of similarities and differences, taking snapshots of each task for the report.

2 Methodology

2.1 Procedure-

Save an Image of the Capital of Your State

- Open Google Earth.
- Search for your City capital in the search bar.
- Zoom in to get a clear view of the city center.
- Save the image.

Create a Polygon Around a Historical Place in Uttar Pradesh

- Search for a Historical place of your choice.
- Use the polygon tool to outline the boundaries of the Historical place.
- Save the polygon as a .kmz file by right-clicking the polygon in the "Places" panel and selecting "Save Place As..."
- Now Save the image as well

Save an Image of Kanpur with IIT Kanpur Included

- Search for "Kanpur, Uttar Pradesh."
- Outline the IIT Kanpur boundary using the path tool.
- Zoom in and save the image including both IIT Kanpur and Kanpur.

Determine the Longitude, Latitudes, and Elevation

- **Kanpur Central Railway Station:** Search and right-click to get the location's coordinates and elevation.
- **IIT Kanpur Gate:** Search for IIT Kanpur and locate the main gate to get the coordinates and elevation.
- **IIT Kanpur Library:** Search within the IIT Kanpur campus for the library to get the coordinates and elevation.

Anomalies in Image Boundaries

- Set the time to November 2020 by clicking the clock symbol in the lower left corner..
- Identify areas where image patches join.
- Examine these boundaries at low resolution.

AOI checks

- Click on the supplied AOI files in Google Earth.
- Examine AOI 1 and 5 for changes in color around boundaries.
- Examine the supplied AOI files for areas 2, 3, 4, and 6.
- Examine AOI 7 for anomalies.

Google Search

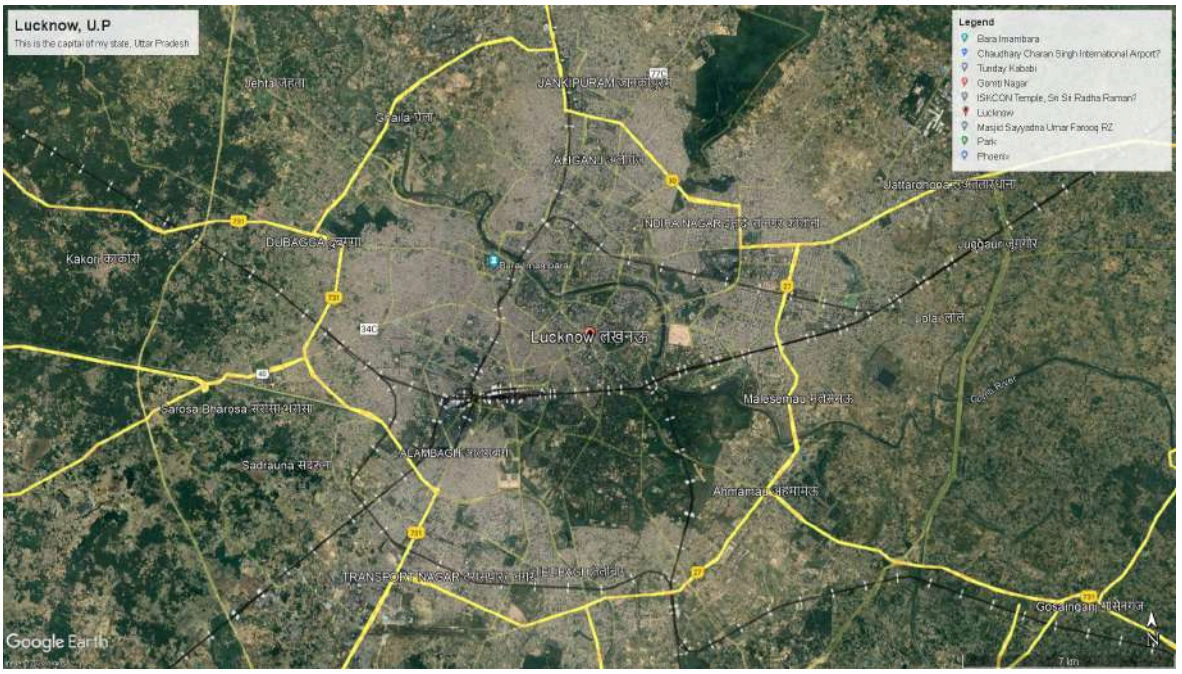
- Search the internet for various applications of Google Earth.
- Innovative Application of Google Earth
- Other Image Servers Similar to Google Earth
- Difference Between 'kml' and 'kmz' File
- Special About 'kmz' Format in Google Earth

QGIS Software Tasks

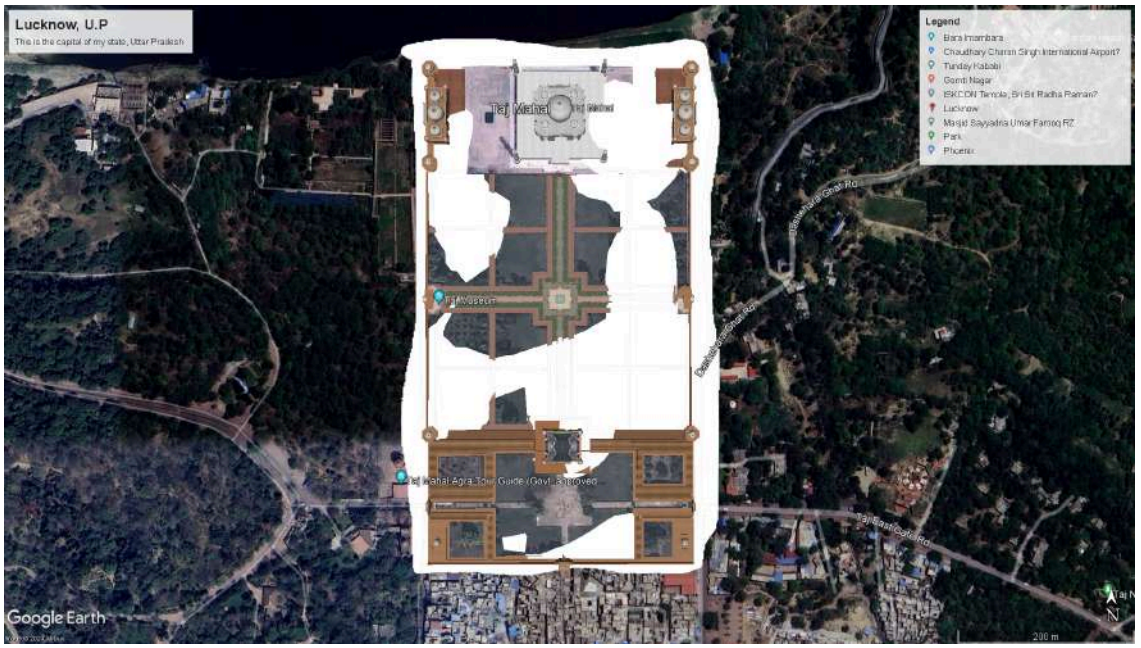
- Install 'OpenLayers' Plugin
- Import 'lab1file.kmz' File into QGIS
- Overlay Imported KMZ File on Various Maps
- Open Attribute Table and Zoom on Each AOI
- Snapshots of Each Task
- Comparison Between Google Earth and QGIS

2.2 Results-

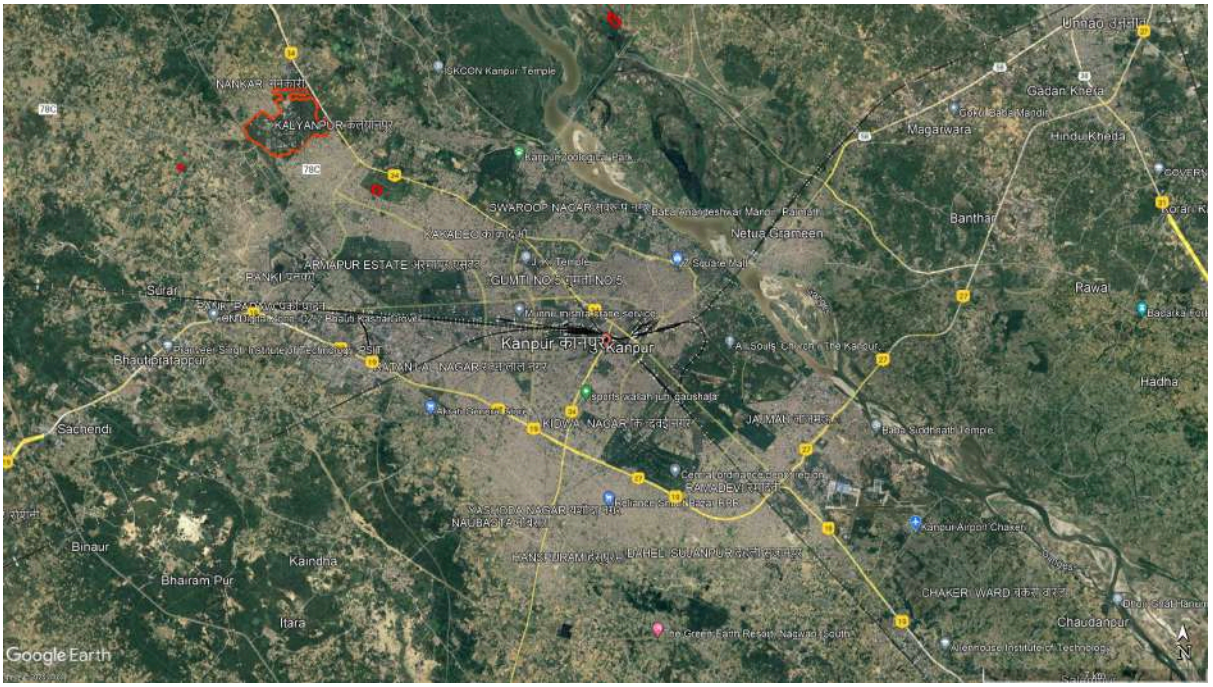
3.a) Lucknow- Capital City of UP



b) Taj Mahal, Agra, Uttar Pradesh



c) Kanpur with IIT Kanpur included



d)

Kanpur Central Railway Station
Latitude-26°27’18.21” N
Longitude-80° 21’01.64”E
Elevation-491 ft

IIT Kanpur Gate
Latitude-26°30’36.72” N
Longitude-80°14’48.20” E
Elevation-499 ft

IIT Kanpur Library
Latitude-26°30’44.55” N
Longitude-80°14’01.78” E
Elevation-506 ft

e)

In this image, anomaly can be seen clearly here. There appears to be a partition in between four regions since the images taken are on following different dates-

f)

In AOI1, we can see a division between two areas, one being brown in color and other being green in color since the part brown in color has been captured on 10/3/2020 while the green image has been taken on 11/13/2020 hence due to differences in weather and month, there appears a kind of line in between both of these regions.

In AOI5, we again notice a division between two areas, one being brown in color and other being green in color since the part brown in color has been captured on 10/3/2020 while the green image has been taken on 11/13/2020 hence due to differences in weather and month, there appears a kind of line in between both of these regions.

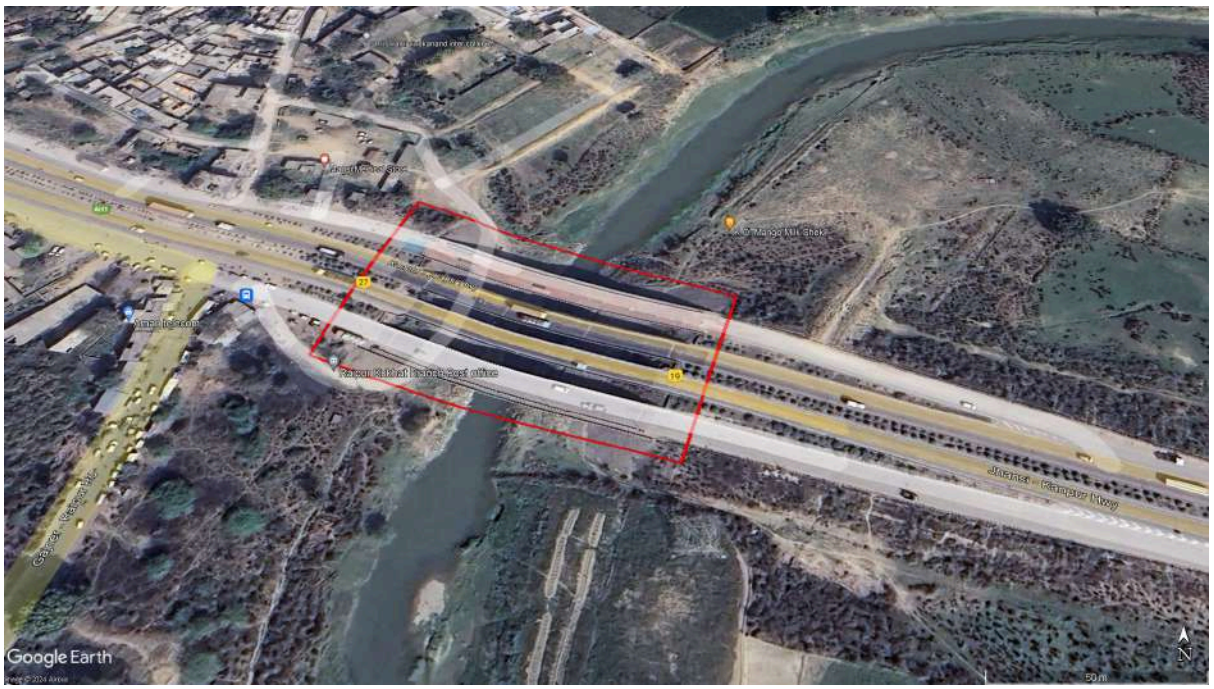
g)

In AOI2, it appears as if its a some type of pond covered with algae at either the village end or near the fields of village being used as supply for water for fields. The reason why it appears as a pond covered with algae is because it can be seen that distorted algae like green structure can be seen above the dark black/blue region which appears to be a water body.

In AOI3, it appears as if its a some type Brick kiln factory near some waterbody and outside crowded residential area surrounded with roads on all 4 sides. The reason why it appears as a Brick kiln is because it can be seen that a number of bricks in a number of stacks are surrounded around a tall structure which appears like a brick kiln.

In AOI4, it appears as if its a some type Brick kiln factory near some waterbody and outside crowded residential area surrounded with roads on all 4 sides. The reason why it appears as a Brick kiln is because it can be seen that a number of bricks in a number of stacks are surrounded around a tall structure which appears like a brick kiln.

In AOI6, it appears as if its a some bridge above waterbody with cars passing through it with one side of it appearing to be residential area and other side green area. The reason why it appears as a bridge because a water body can be seen flowing below it and cars passing through this road hence the only possible structure is bridge.



h)

In AOI7, it appears like an area at the side of a railway line. The most possible anomaly which appears here is parallax due to elevation differences since the elevation of white building is 152m while the surrounding area has an elevation of 151m.

i)Applications-

- 3D imagery-

Google Earth shows 3D building models in some cities, including photorealistic 3D imagery made using photogrammetry.

- Street View-

On April 15, 2008, with version 4.3, Google fully integrated Street View into Google Earth. Street View displays 360° panoramic street-level photos of select cities and their surroundings.

- Water and ocean-

Introduced in Google Earth 5.0 in 2009, the Google Ocean feature allows users to zoom below the surface of the ocean and view the 3D bathymetry.

- Google Sky-

Google Sky is a feature that was introduced in Google Earth 4.2 on August 22, 2007, in a browser-based application on March 13, 2008,and to Android smartphones, with augmented reality features.

- Google Mars-

Google Mars is an application within Google Earth that is a version of the program for imagery of the planet Mars. Google also operates a browser-based version, although the maps are of a much higher resolution within Google Earth, and include 3D terrain, as well as infrared imagery and elevation data.

REFERENCE-https://en.wikipedia.org/wiki/Google_Earth#:~:text=The%20program%20maps%20the%20Earth,using%20a%20keyboard%20or%20mouse.

j)One INNOVATIVE application that is possible with Google Earth and will be useful-

- Virtual Trips for School students using Google Earth to places which are not possible to travel for the time being and giving them a more realistic experience of what they are studying.

k)Image servers similar to Google Earth-

- Cesium Ion
- ArcGIS Earth
- NASA WorldWind
- Marble
- Zoom Earth
- MapQuest
- Here WeGo
- Street View
- Manifold
- QGIS

REFERENCE-https://www.geeksforgeeks.org/google-earth-alternatives/

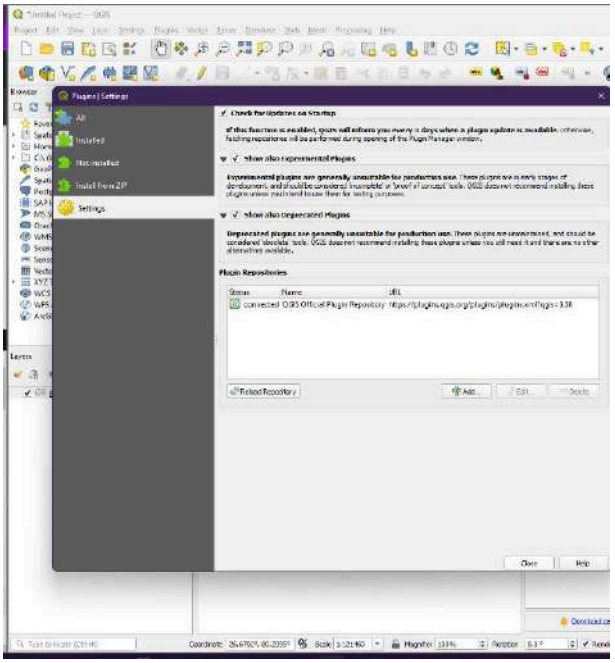
l) **KML** is an XML-based format with a three-letter file name extension of **.kml** originally used for annotations in Google Earth displays.
KMZ is exactly the same format compressed using "zip" compression with a three-letter file name extension of **.kmz**.

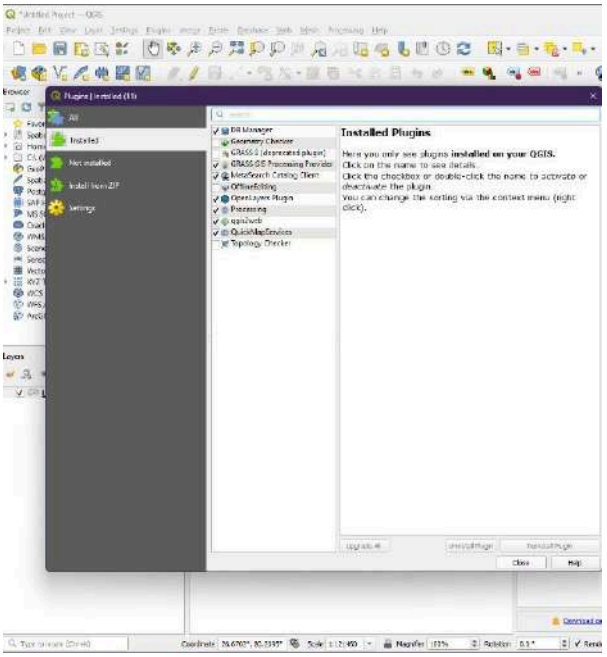
REFERENCE-https://manifold.net/doc/mfd9/kml,_kmz_google.htm#:~:text=KML%20is%20an%20XML%2Dbased,kmz.

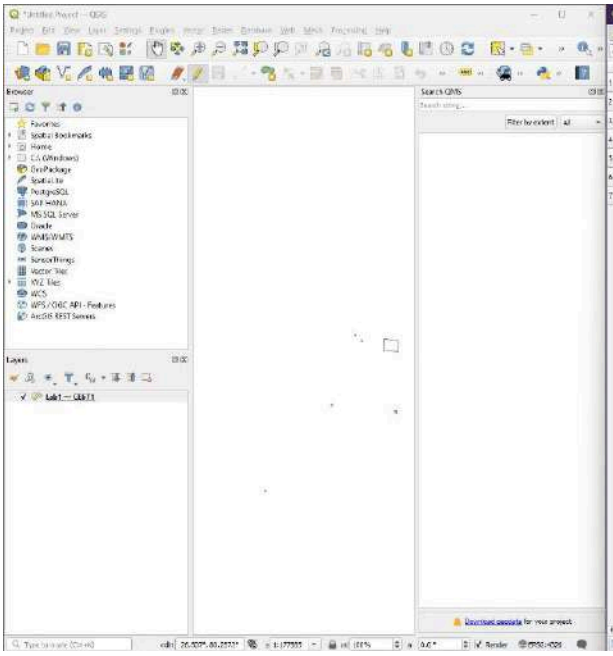
m) KMZ files are very similar to ZIP files. They allow you to package multiple files together, and they compress the contents to make downloading faster. This allows you to bundle images along with your KML file if you want.

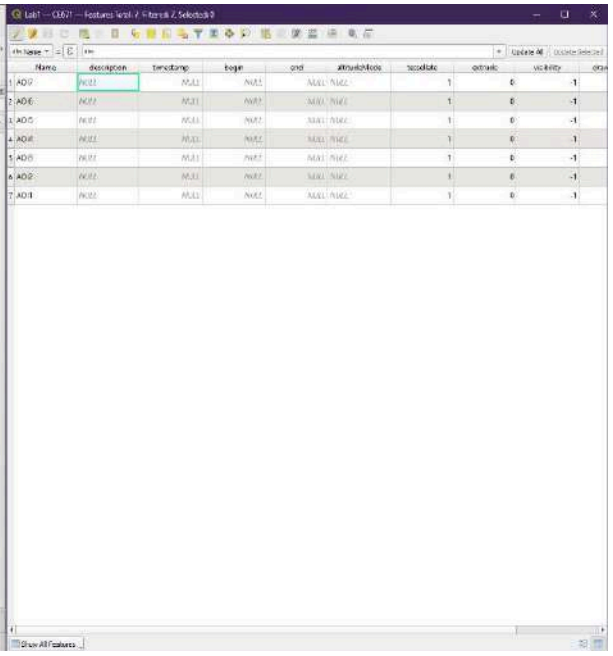
REFERENCE-https://www.google.com/earth/outreach/learn/packaging-content-in-a-kmz-file/#:~:text=KMZ%20files%20are%20very%20similar,KMZ%20files%20using%20Google%20Earth.

4) d)









Significance of Attribute Table-

f)Similarities-

- Free Version of both available
- Can be used by individuals and professionals in various industries.

Differences-

- Google Earth is primarily a user-friendly visualization tool for exploring geographic data and imagery, ideal for general public use and casual analysis.
- QGIS, on the other hand, is a more advanced Geographic Information System (GIS) software designed for detailed spatial analysis, data manipulation, and professional geospatial projects.

3 Discussion

The results for anomaly obtained as in AOI checks are mostly because of time differences of the image taken of the particular area. In other parts of the exercise as such in polygon making, we see that how google earth allows us to mark a region for references and also save it for later reference. Further in the exercise, we also realise the various applications of this software and how it can be utilised for various applications not just in scientific uses. Use of QGIS is also seen later in comparison with Google Earth

4 Conclusion

In conclusion, we learned how to operate and learned the various uses of Google Earth and QGIS. This laboratory assignment helped us to realize the importance of Google Earth and how it could be used to view and interpret various parts of the world without even visiting them.

5 References

https://www.google.com/earth/outreach/learn/packaging-content-in-a-kmz-file/#:~:text=KMZ%20files%20are%20very%20similar,KMZ%20files%20using%20Google%20Earth.

https://www.geeksforgeeks.org/google-earth-alternatives/

https://manifold.net/doc/mfd9/kml,_kmz_google.htm#:~:text=KML%20is%20an%20XML%2Dbased,kmz.

https://en.wikipedia.org/wiki/Google_Earth#:~:text=The%20program%20maps%20the%20Earth,using%20a%20keyboard%20or%20mouse.