Aman_GIS_LiveEO_Task

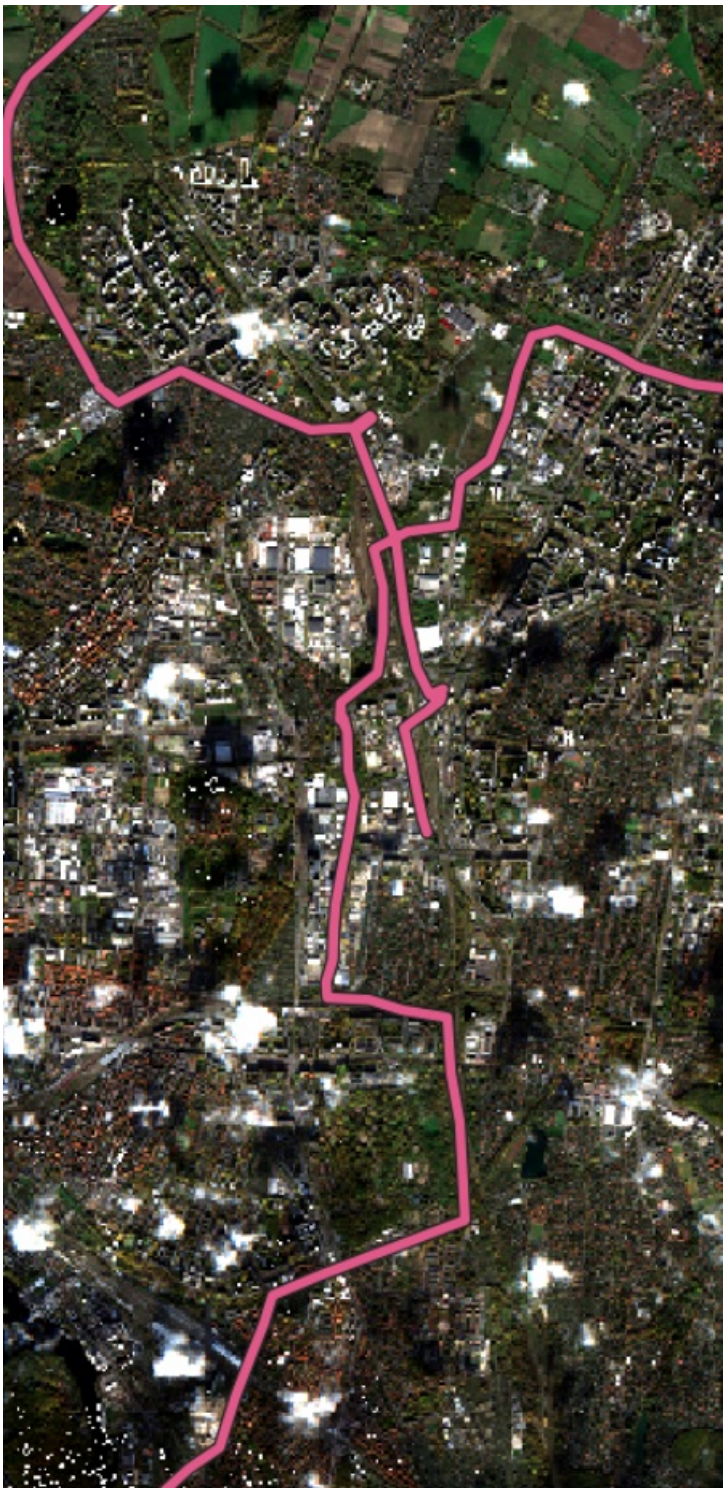
Contents :

Tools Used and Data

- **Jupter Notebook** - GIS Virtual Env was already ready with me.
- **QGIS** - For viewing the Data
- **GitHub** - Version Control
- **Data** - Area of Interest Data was downloaded from the Google Driver [1] in GeoJSON format

Steps Executed Data Preprocessing

1. I processed the GeoJSON data in Jupyter Notebook.
2. Using Kepler GL, I found the AreaofInterest is North Eastern Part of Berlin, Germany. Picture can be found here or from `images\Task1_KeplerGLLocationDetection.png`
3. I was downloading the data from USGS Gov Website [2], but the partnership between ESA and the USGS allows only for the distribution of Level-1C. As per the Task we need Level 2-A Data.
4. Finally, I downloaded the data from Copernicus Open Access Hub [3] with the following properties :
    - Selected the Berlin Location
    - In the advanced search I selected Mission - Sentinel 2
    - Product Type as S2MSI2A
    - Year 2020
    - (Through this I was able to download the correct data with the requirement - `Sentinel-2 level 2A tile from any practical TOI (2019 or 2020)`
5. I selected the 12 (Total 13, but removed 10 - cirrus band which gives no ground information) specific bands which are needed, I refered this information from Wikipedia [4]
6. I selected the SCL Layer (20m), and opened it in SQIS to make the `NO_DATA`, `SATURATED_OR_DEFECTIVE`, `CLOUD_HIGH_PROBABILITY` as NOVALUE, and saved the new file as `data\13bands\scllayer_nodata_band.tif` . The label for each classification I found from the Sentinel Website [5]
7. I opened those 13 Bands (12 + 1 SCL) in the QGIS and created a Virtual Layer and eventually merged all of the bands in the TGIF format (which can be found in `data\mergedBandswithSCL.tif` .
8. There was a color mismatch so I edited the virtual layer and set the BGR (Bands 2,3,4 respectively), and I was able to see an observable satellite map of Berlin (And its surroundings). I got the information of the bands from SatimagingCorp website. [6]
9. I could see the Satellite images have an EPSG of 32633, hence I created a new AOI with EPSG 32633 with the name as `data\remote_sensing_challenge_AOI32633.geojson`
10. Just to validate the Correct data has been downloaded, I verified by adding the AOI on top of the layer, and the image can be seen here or from `images\Task1_satellite_aoi_validate.png`
11. All the bands (12 + SCL with NOVALUE for 3 parameter) were merged into a GeoTIFF. (`data\mergedBandswithSCL.tif`), which will serve as the input for the clipping in the jupyer notebook.
12. The Final Output can be seen below or in the file `images\task1_clipped_output.png` and the final clipped GeoTIFF will be found in `data\clippedGeoTIFF.tif`



References

- [1] https://drive.google.com/file/d/1cYulst52qOsx1VOOtVQo5sRdUugYqEpl/view
- [2] https://www.usgs.gov/centers/eros/science/usgs-eros-archive-sentinel-2?qt-science_center_objects=0#qt-science_center_objects
- [3] https://scihub.copernicus.eu/dhus/#/home
- [4] https://en.wikipedia.org/wiki/Sentinel-2
- [5] https://sentinel.esa.int/web/sentinel/technical-guides/sentinel-2-msi/level-2a/algorithm
- [6] https://www.satimagingcorp.com/satellite-sensors/other-satellite-sensors/sentinel-2a/