Task

Adverse weather conditions are in forecast and farmers need advance warning about which parts of their field are already stressed. Which will help farmers take safety measures such they don't compromise on their yield. You will use satellite data to infer which parts of a region have healthy plants and which do not.

Plant health is calculated using **NDVI**. To read more about it [click here](#)

We will be needing a python workflow which would take:

- **Input**:
  - Polygon
  - Sentinel 2 Imagery for a specific date
- **Output**:
  - Imagery of NDVI in png format.
  - Perform Zonal Stats on the image array (mean,max,min)

Supporting information

Satellite Imagery

- Satellite imagery can be accessed from [AWS bucket Sentinel 2 imagery](#). This is a public S3 bucket you don't need a AWS account to access these files.
- Sentinel 2 imagery have 12 bands inside 1 imagery. Each bands are stored separate as .tif images.

- For this task please use the following path for sentinel 2 imagery:

  s3://sentinel-cogs/sentinel-s2-l2a-cogs/36/N/YF/2023/6/S2B_36NYF_20230605_0_L2A/

- The above imagery is for the date 05-06-2023 and Kenya region.
- We will be using bands file B08.tif(NIR band) and B04.tif(Red Band).
- We will calculate NDVI using the following standard formula NDVI = (B08 - B04) / (B08 + B04)
- Projection system of this particular imagery is **EPSG:32636**

Polygon

- Along with this file we are sharing a **sample_polygon.geojson** file which contains the Polygon geometric object.

- The polygon falls in Kenya region.
- Projection system of Polygon is **EPSG:4326**.

Steps to follow

- Open Sentinel 2 imagery from AWS servers using python rasterio module.
- Read Polygon in python using geopandas/shapely module whichever you find suitable.
- Read only subset of the imagery array which aligns to the polygon region.
- Remember Projection system of both polygon and imagery are different. To perform any action between the 2 objects(polygon and imagery) they need to be in the same projection system.
- After subset of the Imagery has been extracted perform the NDVI calculation.
- Create a PNG of the final array found.
- Stats like mean, min and max for the final image array.

Python packages to refer for help

- Rasterio
- Geopandas
- rasterstats
- rioxarray
- shapely

Things to deliver

- Create a git repo for this task and share it. In the collaborator setting add **rishabhBoomitra** as member.
- A Python function to perform NDVI calculation for new inputs.
- One sample output of NDVI as png.
- Stats calculated saved in .txt/.csv.
- Anything else which you feel needs to go along with deliverables.