SAMSUNG

AI Course

Capstone Project
Final Code

For students (instructor review required)

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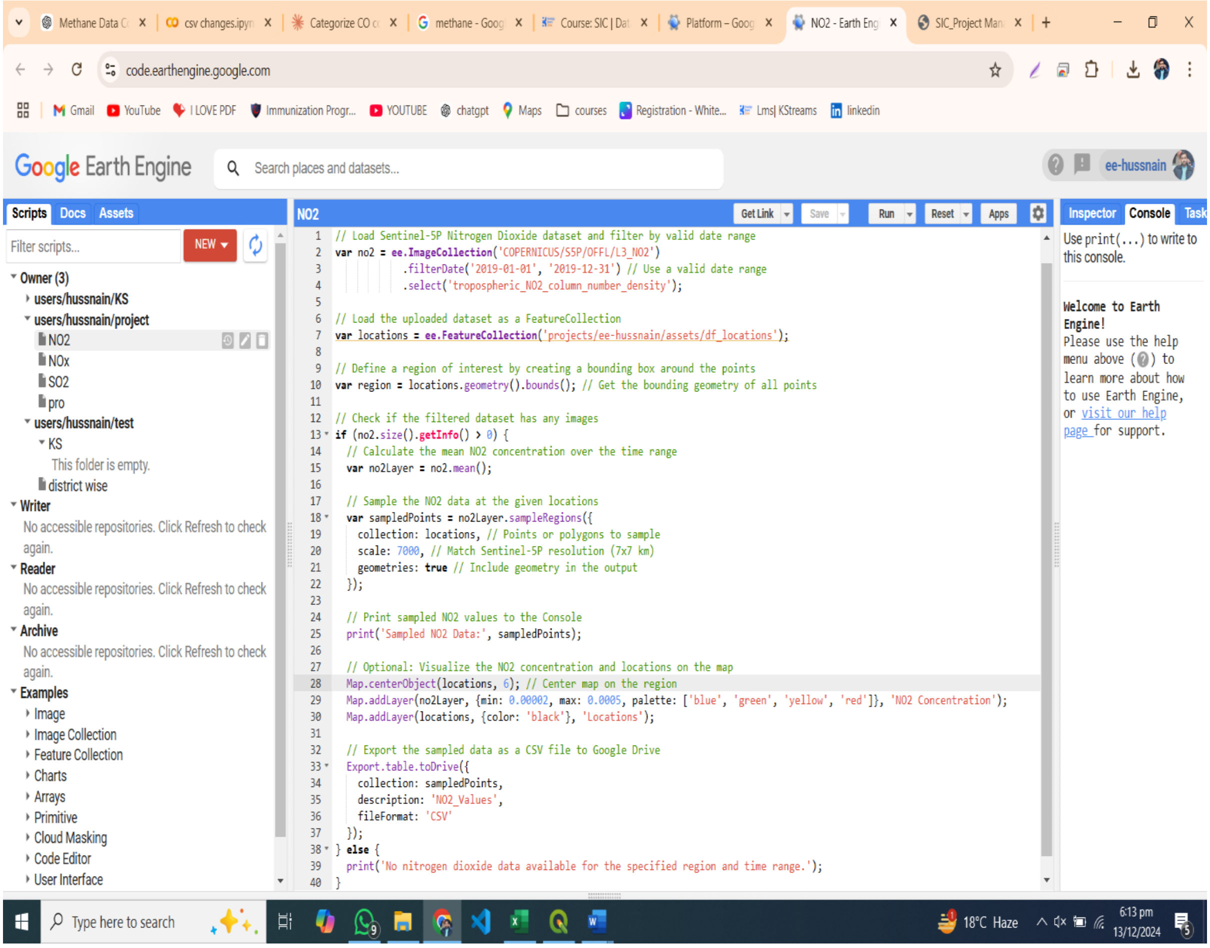
Education for Future Generations

NO2 Gas is Detected by Google Earth Engine.



```
// Load Sentinel-5P Nitrogen Dioxide dataset and filter by valid date range
var no2 = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_NO2')
            .filterDate('2019-01-01', '2019-12-31') // Use a valid date range
            .select('tropospheric_NO2_column_number_density');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-hussnain/assets/df_locations');

// Define a region of interest by creating a bounding box around the points
var region = locations.geometry().bounds(); // Get the bounding geometry of all points

// Check if the filtered dataset has any images
if (no2.size().getInfo() > 0) {
  // Calculate the mean NO2 concentration over the time range
  var no2Layer = no2.mean();

  // Sample the NO2 data at the given locations
  var sampledPoints = no2Layer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled NO2 values to the Console
  print('Sampled NO2 Data:', sampledPoints);

  // Optional: Visualize the NO2 concentration and locations on the map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(no2Layer, {min: 0.00002, max: 0.0005, palette: ['blue', 'green', 'yellow', 'red']}, 'NO2 Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'NO2_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No nitrogen dioxide data available for the specified region and time range.');
}
```

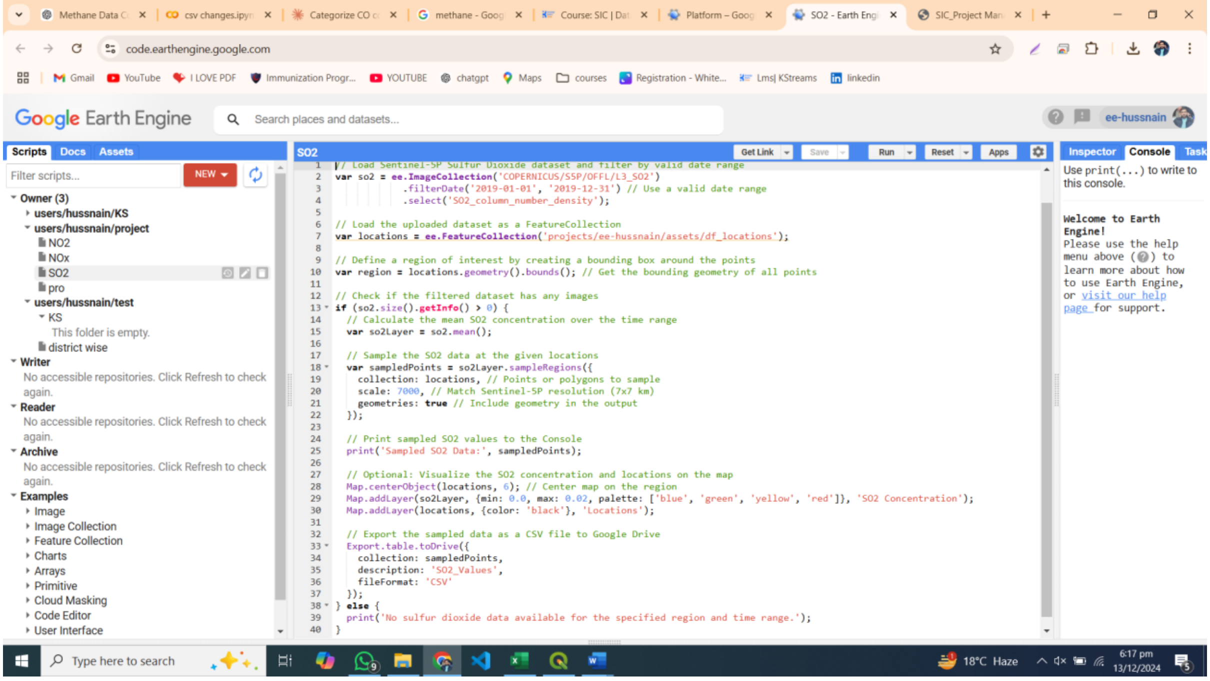
Use print(...) to write to this console.

Welcome to Earth Engine! Please use the help menu above (?) to learn more about how to use Earth Engine, or visit our help page for support.

Code of NO2 Gas:

```
// Load Sentinel-5P Nitrogen Dioxide dataset and filter by valid date range
var no2 = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_NO2')
            .filterDate('2019-01-01', '2019-12-31') // Use a valid date range
            .select('tropospheric_NO2_column_number_density');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-hussnain/assets/df_locations');

// Define a region of interest by creating a bounding box around the points
var region = locations.geometry().bounds(); // Get the bounding geometry of all
points

// Check if the filtered dataset has any images
if (no2.size().getInfo() > 0) {
  // Calculate the mean NO2 concentration over the time range
  var no2Layer = no2.mean();

  // Sample the NO2 data at the given locations
  var sampledPoints = no2Layer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled NO2 values to the Console
  print('Sampled NO2 Data:', sampledPoints);

  // Optional: Visualize the NO2 concentration and locations on the map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(no2Layer, {min: 0.00002, max: 0.0005, palette: ['blue', 'green',
'yellow', 'red']}, 'NO2 Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'NO2_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No nitrogen dioxide data available for the specified region and time
range.');
}
```

SO2 Gas is Detected by Google Earth Engine.



```
// Load Sentinel-5P Sulfur Dioxide dataset and filter by valid date range
var so2 = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_SO2')
            .filterDate('2019-01-01', '2019-12-31') // Use a valid date range
            .select('SO2_column_number_density');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-hussnain/assets/df_locations');

// Define a region of interest by creating a bounding box around the points
var region = locations.geometry().bounds(); // Get the bounding geometry of all points

// Check if the filtered dataset has any images
if (so2.size().getInfo() > 0) {
  // Calculate the mean SO2 concentration over the time range
  var so2Layer = so2.mean();

  // Sample the SO2 data at the given locations
  var sampledPoints = so2Layer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled SO2 values to the Console
  print('Sampled SO2 Data:', sampledPoints);

  // Optional: Visualize the SO2 concentration and locations on the map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(so2Layer, {min: 0.0, max: 0.02, palette: ['blue', 'green', 'yellow', 'red']}, 'SO2 Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'SO2_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No sulfur dioxide data available for the specified region and time range.');
}
```

Use print(...) to write to this console.

```
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```

CODE:

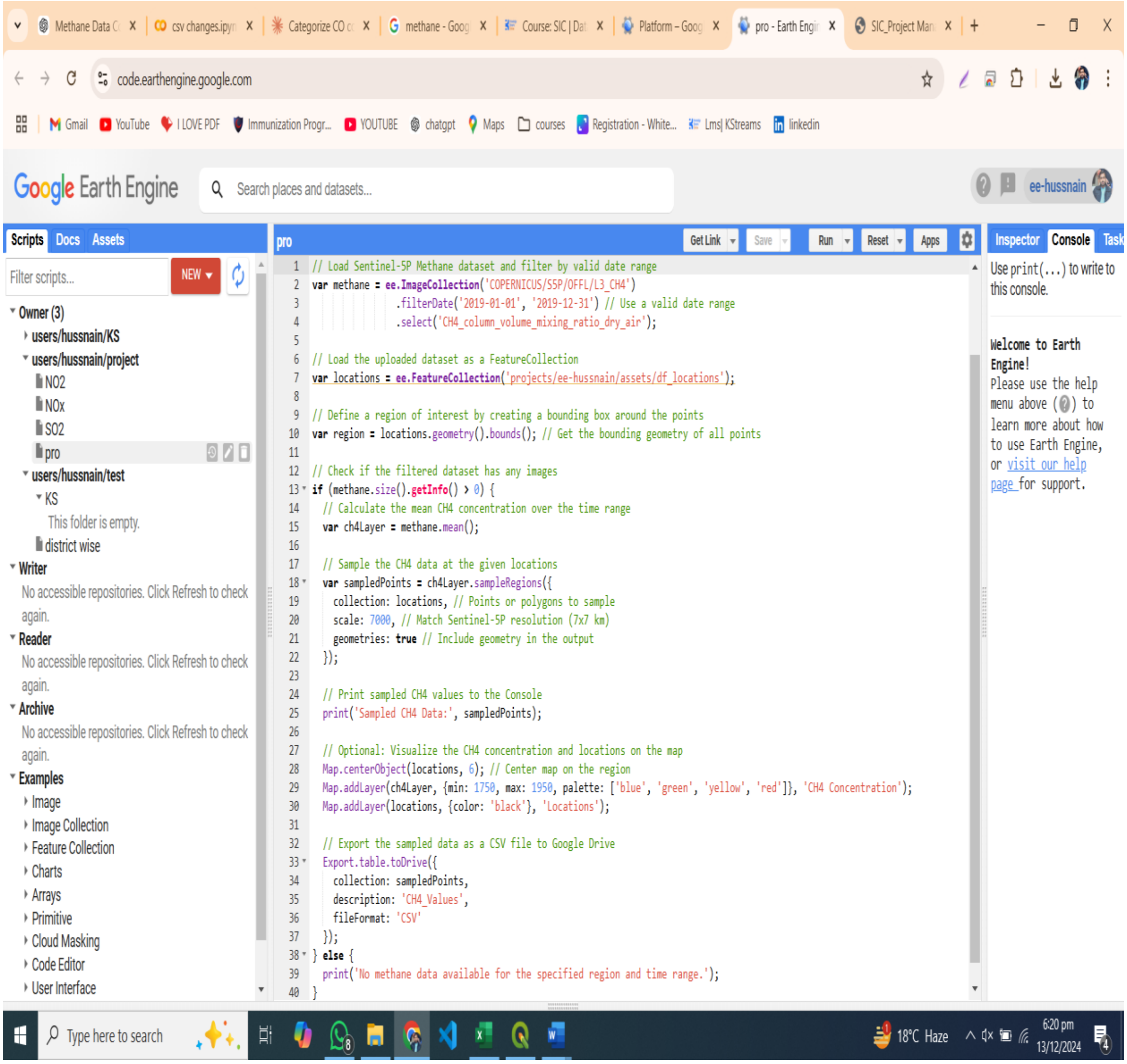
```
// Load Sentinel-5P Sulfur Dioxide dataset and filter by valid date range
var so2 = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_SO2')
            .filterDate('2019-01-01', '2019-12-31') // Use a valid date range
            .select('SO2_column_number_density');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-hussnain/assets/df_locations');

// Define a region of interest by creating a bounding box around the points
var region = locations.geometry().bounds(); // Get the bounding geometry of all
points

// Check if the filtered dataset has any images
if (so2.size().getInfo() > 0) {
  // Calculate the mean SO2 concentration over the time range
  var so2Layer = so2.mean();

  // Sample the SO2 data at the given locations
  var sampledPoints = so2Layer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled SO2 values to the Console
  print('Sampled SO2 Data:', sampledPoints);

  // Optional: Visualize the SO2 concentration and locations on the map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(so2Layer, {min: 0.0, max: 0.02, palette: ['blue', 'green', 'yellow',
'red']}, 'SO2 Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'SO2_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No sulfur dioxide data available for the specified region and time
range.');
}
```

CO Gas is Detected by Google Earth Engine.

CODE:

```
// Load Sentinel-5P Carbon Monoxide dataset and filter by valid date
range
var carbonMonoxide = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_CO')
                       .filterDate('2019-01-01', '2019-12-31') //
Use a valid date range
                       .select('CO_column_number_density');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-
ghayurabbas13/assets/df2');

// Define a region of interest by creating a bounding box around the
points
var region = locations.geometry().bounds(); // Get the bounding
geometry of all points

// Check if the filtered dataset has any images
if (carbonMonoxide.size().getInfo() > 0) {
  // Calculate the mean CO concentration over the time range
  var coLayer = carbonMonoxide.mean();

  // Sample the CO data at the given locations
  var sampledPoints = coLayer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled CO values to the Console
  print('Sampled CO Data:', sampledPoints);

  // Optional: Visualize the CO concentration and locations on the
map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(coLayer, {min: 0.03, max: 0.05, palette: ['blue',
'green', 'yellow', 'red']}, 'CO Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'Sampled_CO_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No carbon monoxide data available for the specified region
and time range.');
}
```

CH4 Gas is Detected by Google Earth Engine.



```
// Load Sentinel-5P Methane dataset and filter by valid date range
var methane = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_CH4')
                .filterDate('2019-01-01', '2019-12-31') // Use a valid date range
                .select('CH4_column_volume_mixing_ratio_dry_air');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-hussnain/assets/df_locations');

// Define a region of interest by creating a bounding box around the points
var region = locations.geometry().bounds(); // Get the bounding geometry of all points

// Check if the filtered dataset has any images
if (methane.size().getInfo() > 0) {
  // Calculate the mean CH4 concentration over the time range
  var ch4Layer = methane.mean();

  // Sample the CH4 data at the given locations
  var sampledPoints = ch4Layer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled CH4 values to the Console
  print('Sampled CH4 Data:', sampledPoints);

  // Optional: Visualize the CH4 concentration and locations on the map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(ch4Layer, {min: 1750, max: 1950, palette: ['blue', 'green', 'yellow', 'red']}, 'CH4 Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'CH4_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No methane data available for the specified region and time range.');
}
```

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CODE:

```
// Load Sentinel-5P Methane dataset and filter by valid date range
var methane = ee.ImageCollection('COPERNICUS/S5P/OFFL/L3_CH4')
                .filterDate('2019-01-01', '2019-12-31') // Use a valid date range
                .select('CH4_column_volume_mixing_ratio_dry_air');

// Load the uploaded dataset as a FeatureCollection
var locations = ee.FeatureCollection('projects/ee-hussnain/assets/df_locations');

// Define a region of interest by creating a bounding box around the points
var region = locations.geometry().bounds(); // Get the bounding geometry of all
points

// Check if the filtered dataset has any images
if (methane.size().getInfo() > 0) {
  // Calculate the mean CH4 concentration over the time range
  var ch4Layer = methane.mean();

  // Sample the CH4 data at the given locations
  var sampledPoints = ch4Layer.sampleRegions({
    collection: locations, // Points or polygons to sample
    scale: 7000, // Match Sentinel-5P resolution (7x7 km)
    geometries: true // Include geometry in the output
  });

  // Print sampled CH4 values to the Console
  print('Sampled CH4 Data:', sampledPoints);

  // Optional: Visualize the CH4 concentration and locations on the map
  Map.centerObject(locations, 6); // Center map on the region
  Map.addLayer(ch4Layer, {min: 1750, max: 1950, palette: ['blue', 'green',
'yellow', 'red']}, 'CH4 Concentration');
  Map.addLayer(locations, {color: 'black'}, 'Locations');

  // Export the sampled data as a CSV file to Google Drive
  Export.table.toDrive({
    collection: sampledPoints,
    description: 'CH4_Values',
    fileFormat: 'CSV'
  });
} else {
  print('No methane data available for the specified region and time range.');
}
```