

Training Day 5 Daily Dairy

June 12, 2024

- ✚ Studied about Vectors and Rasters.
- ✚ Extraction of shapefile of punjab.
- ✚ Importing shapefile in GEE.
- ✚ Calculating NDVI of punjab using shapefile.

1. Introduction to Vectors and Rasters

1.1 Vectors

Vectors are a method of spatial data representation that uses geometric shapes like points, lines, and polygons to represent different features on the earth's surface. Each vector feature can have multiple attributes associated with it, which can be used for detailed analysis. For example, in a map of a city, points might represent locations of schools, lines could represent roads, and polygons might represent boundaries of parks or districts.

1.2 Rasters

Rasters are another method of spatial data representation, using a grid of cells (or pixels) to represent data. Each cell has a value that represents information, such as temperature, elevation, or land cover type. Raster data is often used in remote sensing and image analysis because it can efficiently represent continuous surfaces.

2. Extraction of Shapefile of Punjab

2.1 Understanding Shapefiles

A shapefile is a popular geospatial vector data format for geographic information system (GIS) software. It contains a set of geometric location and attribute information, and it typically consists of at least three main files:

- `.shp` (shape format): geometry data.
- `.shx` (shape index format): positional index of the geometry data.
- `.dbf` (attribute format): attribute data in tabular format.

2.2 Process of Extraction

To extract the shapefile of Punjab, the following steps were undertaken:

1. Source Identification: Identify a reliable source for the shapefile of Punjab. Common sources include government GIS databases, educational institutions, and open data platforms.
2. Download: Download the shapefile, which usually comes in a compressed file containing the `.shp`, `.shx`, and `.dbf` files.
3. Extraction: Extract the compressed file to obtain the necessary shapefile components.

3. Importing Shapefile in Google Earth Engine (GEE)

3.1 Setting up GEE

Google Earth Engine (GEE) is a powerful platform for planetary-scale environmental data analysis. To use GEE, one needs to sign up for an account at [Google Earth Engine](<https://earthengine.google.com/>).

3.2 Importing Shapefile

To import the Punjab shapefile into GEE, follow these steps:

1. Convert to Fusion Table: Convert the shapefile to a Google Fusion Table or KML file, as GEE supports these formats.
2. Upload to Google Drive: Upload the converted file to your Google Drive.
3. Import in GEE:

```
“javascript
// Load the shapefile (KML format) from Google Drive
var punjabShapefile = ee.FeatureCollection("users/your_username/punjab_kml_file");

// Display the shapefile
Map.addLayer(punjabShapefile, {}, 'Punjab Shapefile');
Map.centerObject(punjabShapefile);”
```

4. Calculating NDVI of Punjab Using Shapefile

4.1 Understanding NDVI

The Normalized Difference Vegetation Index (NDVI) is a measure of vegetation health and density. It is calculated using the formula:

$$NDVI = (NIR - Red) / (NIR + Red)$$

where NIR (Near Infrared) and Red are spectral reflectance measurements acquired in the red and near-infrared regions of the electromagnetic spectrum, respectively.

4.2 Steps to Calculate NDVI in GEE

1. Load the MODIS Data: MODIS data can be used to calculate NDVI.

```
“javascript
var modis = ee.ImageCollection('MODIS/006/MOD13A2')
    .filterDate('2020-01-01', '2020-12-31')
    .filterBounds(punjabShapefile);”
```

2. Select the NDVI Band: MODIS data comes with a pre-calculated NDVI band.

```
“javascript
var ndvi = modis.select('NDVI');”
```

3. Clip to Punjab Shapefile: Clip the NDVI data to the Punjab boundary.

```
“javascript
```

```
var ndviPunjab = ndvi.mean().clip(punjabShapefile);”
```

4. Display the NDVI:

```
“javascript
```

```
var ndviParams = {min: 0, max: 9000, palette: ['white', 'green']};
```

```
Map.addLayer(ndviPunjab, ndviParams, 'NDVI of Punjab');”
```

4.3 Analysis

The NDVI values range from -1 to +1, where higher values indicate healthier and denser vegetation. By analyzing the NDVI values for Punjab, one can assess the state of vegetation and monitor changes over time.