Title: Anomaly Detection across Multiple Farms Using Remote Sensing

Description:

An anomaly across multiple farms can be defined as a farm whose growth is not the same as its neighbouring farms, with nearby sowing dates. Anomaly detection across multiple farms can help detect early signs of crop diseases, enabling corrective actions before the disease spreads leading to improved crop yields. Remote sensing technologies, such as satellites and drones, can capture images and data on crops and the surrounding environment from a distance, providing farmers with real-time information on crop growth. By making more informed decisions based on anomaly detection through satellite images, farmers can achieve better crop yields, increased profits, and more sustainable agriculture. A clustering algorithm, such as DBSCAN, can detect anomalies. After proper hyper-parameter tuning, DBSCAN was able to detect the anomalous NDVI value for the respective crop age. Our model first takes input from user the satellite image of current farm that user wants to analyse, we then calculate NDVI of that farm. Now using Wheat_farms_NDVI_data.csv which has data about NDVI values of over 13 farms is used to train DBSCAN. Here we take into consideration the day as age. Day 0 is the day on which sowing was done. Now we do plotting like heat map and others to know the patterns and outliers. We then take from users the input: NDVI value and Age of farms and our output tells which farm is anomalous and which is not. This decsison is done keeping in account the fluctuation in NDVI can be from 0.1-0.3. We also have trained ARIMA model just to view future prospects of using for prediction.

How to Install and Run the Project:

Firstly, download the zip file and extract it. Open the code in collab/jupyter and upload all files.

1. Include the .tif and .xml file

2.Run the block below it to get rgb plot

3. Run the block below to get NIR and RED values

4. Run the block below to get NDVI value

Analysing NDVI time series dataset

5. Include the Wheat_farms_NDVI_data.csv which contains NDVI values corresponding to dates.

6. Now run the block below to get heatmap.

7.In the DBSCAN block we first visualize the distribution of data through a plot.

8. Use min-max scaling

9. Perform the clustering, which results in 3 clusters.

10. Take input of 5 farms: NDVI, age and predict whether anomalous or not.

11.In the end we have displayed ARIMA model and Decision tree model to study its accuracy

Note: If you want to run the code in jupyter notebook then you need to create virtual environment, install jupyter notebook there and run the code in it.

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