Geodata Processing for ISRO-IIRS Using Python and Machine Learning

01

Introduction

Purpose

This project aims to leverage Python and Machine Learning (ML) techniques to process and analyze geospatial data provided by ISRO-IIRS (Indian Institute of Remote Sensing). The focus will be on extracting meaningful insights from satellite imagery, DEMs, and other geospatial datasets for applications like land cover classification, change detection, disaster management, and natural resource monitoring.

Scope

1. **Preprocess Geospatial Data**: Clean, normalize, and prepare satellite imagery and other geospatial datasets for analysis.
2. **Land Cover Classification**: Use ML algorithms to classify land cover types (e.g., forest, urban, water, agriculture).
3. **Change Detection**: Identify changes in land use/land cover over time using temporal satellite data.
4. **Disaster Management**: Develop models to assess flood-prone areas or monitor deforestation.
5. **Natural Resource Monitoring**: Analyze vegetation health using NDVI (Normalized Difference Vegetation Index) and other indices.
6. **Visualization**: Create interactive maps and dashboards to present results

Importance

This project aligns with ISRO-IIRS's mission to leverage geospatial technologies for sustainable development and disaster management. By combining Python and Machine Learning, it

provides a scalable and efficient solution for processing and analyzing geospatial data.

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Vision & objectives

Vision

This project focuses on leveraging **Python** and **Machine Learning** (ML) to process and analyze geospatial data for **sustainable development** and **disaster management**. By utilizing satellite imagery, DEMs, and other geospatial datasets, the project aims to provide actionable insights for:

1. **Sustainable Development**: Monitoring natural resources, urban growth, and environmental changes.
2. **Disaster Management**: Predicting and mitigating the impact of natural disasters like floods, landslides, and deforestation.

Long-term objectives

→ **Sustainable Development**:
- Land use/land cover (LULC) mapping.
- Monitoring vegetation health and deforestation.
- Urban sprawl analysis and infrastructure planning.
- Water resource management.

→ **Disaster Management**:
- Flood mapping and risk assessment.
- Landslide prediction and monitoring.
- Drought assessment and mitigation.
- Post-disaster damage assessment.

Roadmap alignment

Provides a comprehensive overview of a curriculum focused on Geospatial Technologies, encompassing Image Statistics, Remote Sensing, Photogrammetry, Digital Image Processing, Geographical Information Systems (GIS), Global Navigation Satellite Systems (GNSS), Customization of Geospatial Tools, and their Applications. Below is a breakdown of the key components