**1. Project Title**

Land Type Classification Using Sentinel-2 Satellite Images

**2. Introduction**

Land type classification is a critical task in environmental monitoring, urban planning, agriculture, and disaster management. Accurate and up-to-date land cover maps are essential for sustainable development and resource management. Sentinel-2 satellite imagery, with its high spatial and spectral resolution, provides a valuable data source for land type classification. This project aims to develop a robust methodology for classifying land types using Sentinel-2 data, leveraging machine learning and deep learning techniques.

**3. Objectives**

The primary objectives of this project are:

1. To preprocess Sentinel-2 satellite images for land type classification.

2. To develop and implement a classification model (e.g., Random Forest, Convolutional Neural Networks) for identifying different land types (e.g., forest, urban areas, water bodies, agricultural land).

3. To evaluate the accuracy of the classification model using ground truth data.

**4. Problem Statement**

Accurate land type classification is challenging due to the complexity of landscapes, spectral similarities between different land types, and the need for large-scale, high-resolution data. Traditional methods are often time-consuming and less accurate. This project seeks to address these challenges by utilizing Sentinel-2 imagery and advanced machine learning techniques to automate and improve the accuracy of land type classification.

**5. Scope**

**Data Scope:** Sentinel-2 multispectral imagery will be used, along with ground truth data for validation.

**Technical Scope:** The project will involve image preprocessing, feature extraction, model training, and accuracy assessment.

**6. Methodology**

The project will follow these steps:

**1. Data Collection:**

- Search for Sentinel-2 satellite images.

- Explore the dataset (its structure and content).

**2. Preprocessing:**

- Normalization

- Resizing

- Data Augmentation

**3. Feature Extraction:**

- Extract spectral bands, vegetation indices (e.g., NDVI, NDWI), and texture features.

**4. Model Development:**

- Train a machine learning model (e.g., Random Forest, Support Vector Machine) or a deep learning model (e.g., U-Net, ResNet) for classification.

**5. Validation:**

- Evaluate the model's accuracy using metrics like overall accuracy, kappa coefficient, and confusion matrix.

**6. Land Cover Map Generation:**

- Apply the trained model to classify the entire study area and generate a land cover map.

**7. Timeline**

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| --- | --- | --- |
| Task | Duration | Status |
| Data Collection | 3 weeks | Done |
| Preprocessing | 1 week |  |
| Feature Extraction | 1 week |  |
| Model Development & Training | 2 weeks |  |
| Validation | 1 week |  |
| Final Report & Presentation | 1 week |  |

**8. Expected Outcomes**

- A trained machine learning and deep learning models for land type classification.

- A high-resolution land cover map for the study area.

- A detailed accuracy assessment report.

- Insights into the effectiveness of Sentinel-2 imagery for land type classification.

**9. Team**

- Ahmed Sayed Mohamed

- Sarah Khaled Mohamed

- Mahmoud Alaaeldin Mohammed

- Marwa Mansour Ali Hadhoud

- Mohamed Hassan Naseh

**10. Conclusion**

This project aims to leverage Sentinel-2 satellite imagery and advanced machine learning techniques to improve land type classification accuracy. The outcomes will contribute to better land management and decision-making processes. By automating the classification process, this project has the potential to save time and resources while providing reliable and up-to-date land cover information.