

Accurate Prediction and Mapping of Historical Land Use and Land Cover Categories Using Advanced Deep Learning Techniques on Current Satellite Imagery

Introduction

Our agency seeks an innovative solution to update our Land Use and Land Cover (LULC) maps using machine learning algorithms trained on historical, ground-truthed datasets from 2011 and 2016. The challenge lies in accurately identifying and categorizing all legends from the earlier datasets in the latest satellite imagery, thereby ensuring continuity and reliability in the updated maps.

Primary Objective

The core objective of this project is to develop a high-precision model that will accurately reflect all existing LULC categories ("legends") in the 2023 mapping, ensuring that these categories are consistent with the legends defined and validated in the 2011 and 2016 datasets.

Detailed Scope of Work

The successful startup will be required to:

- Analyze historical LULC datasets to understand the detailed classification system and legends used previously.
- Design and train a deep learning model that can precisely identify and classify each of these legends in the 2023 satellite imagery.
- Achieve and demonstrate high accuracy in the classification of these legends, as validated by rigorous ground truthing using the latest mobile technology and geofencing techniques.
- Ensure that the model is robust enough to handle various landscapes and environmental conditions that may affect the satellite imagery interpretation.

Key Deliverables

- A deep learning model with a demonstrated accuracy rate above a specified threshold for all LULC legends from the historical datasets.
- An updated LULC map for 2023 with all legends accurately represented, alongside a confidence score for each classification.
- A mobile application for efficient ground truthing, enabling real-time validation and data collection.

- A comprehensive final report detailing the classification process, accuracy metrics, and a comparison with historical maps.

Evaluation Criteria for Proposals

Proposals will be evaluated on their ability to meet the following criteria:

- The accuracy of legend classification as evidenced by preliminary tests and outlined methodologies.
- The sophistication of the machine learning approach in dealing with complex LULC scenarios.
- The ability to integrate the solution into existing GIS platforms seamlessly.
- Cost-effectiveness, considering both initial development and potential scalability.