SENTINEL-2 BASED MAPPING AND CLASSIFICATION OF MAIZE CULTIVATION IN AMPARA DISTRICT, SRI LANKA

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Abstract

Reliable information on crop distribution is essential for agricultural planning and food security. In Sri Lanka, traditional surveys are costly and often lack spatial detail, making remote sensing a practical alternative. While rice mapping has been widely studied, maize an increasingly important crop in Ampara District has received little attention. This study uses Sentinel-2 satellite imagery combined with geospatial analysis to map maize cultivation and provide area estimates with strong accuracy. Sentinel-2 data from the maize growing season were processed in Google Earth Engine to remove clouds, create composites, and calculate vegetation indices such as NDVI (plant greenness), EVI (enhanced vegetation detail), NDRE (chlorophyll sensitivity), and NDWI (water content). Terrain features, including slope and elevation derived from the Shuttle Radar Topography Mission (SRTM) digital elevation model, were added to improve classification. Training samples were collected through drone surveys and field observations, and a Random Forest classifier was applied in Python. Validation was carried out using a train-test split and confusion matrix. The results show that maize fields can be mapped with consistently high accuracy, and the total cultivation area in Ampara District is estimated at around 10k hectares. Vegetation indices, especially NDVI and NDRE, proved effective in separating maize from other crops, while terrain data reduced errors in hilly areas. Although cloud cover and spectral similarity with other crops posed challenges, the workflow produced reliable spatial estimates. This study highlights the value of combining Sentinel-2 spectral data, vegetation indices, and terrain variables with machine learning for crop mapping. The approach offers a practical tool for monitoring maize cultivation and can be adapted to other crops and regions. With larger and more diverse training datasets, future work could explore deep learning methods to further improve scalability and generalization.

Keywords: KeySentinel-2, Random Forest, vegetation indices, maize mapping, geospatial analysis.