



Forest cover prediction using U-Net convolutional neural network

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Abstract: Forests play a major role in the ecosystem and capturing the forest cover dynamics from the remote sensing imagery has been presented with significant accuracy. This study aims to assess the forest cover dynamics in the Anuradhapura district between 2000 to 2015, with the usage of satellite images for applying the U-Net architecture, a modern deep learning algorithm, and to analyze the relationship between the weather parameters (temperature and rainfall) and the population with the forest cover. The main idea of the implementation of U-Net is to predict the forest area by constituting a matrix the same as the input image loaded with predictions corresponding to the two classes: background and the forested area along with the dataset of high-resolution image patches. The predicted forest areas obtained by the U-Net have been analyzed with the impact of the other parameters, and finally, the future forest cover has been projected by using time-series forecasting. Results revealed a reduction in the forest cover of the Anuradhapura district impacted by the population and rainfall. However, the relationship between the temperature and the forest cover is sparse. Prediction for 2025 suggests a precisely 0.92% reduction in Anuradhapura district's forest area compared to 2015. This study demonstrates the workflow of deep learning for forest cover.

Keywords: CNN, Deep learning algorithms, Satellite image segmentation