Integration of object-based image analysis with machine learning algorithm for forest type classification in Nepal.

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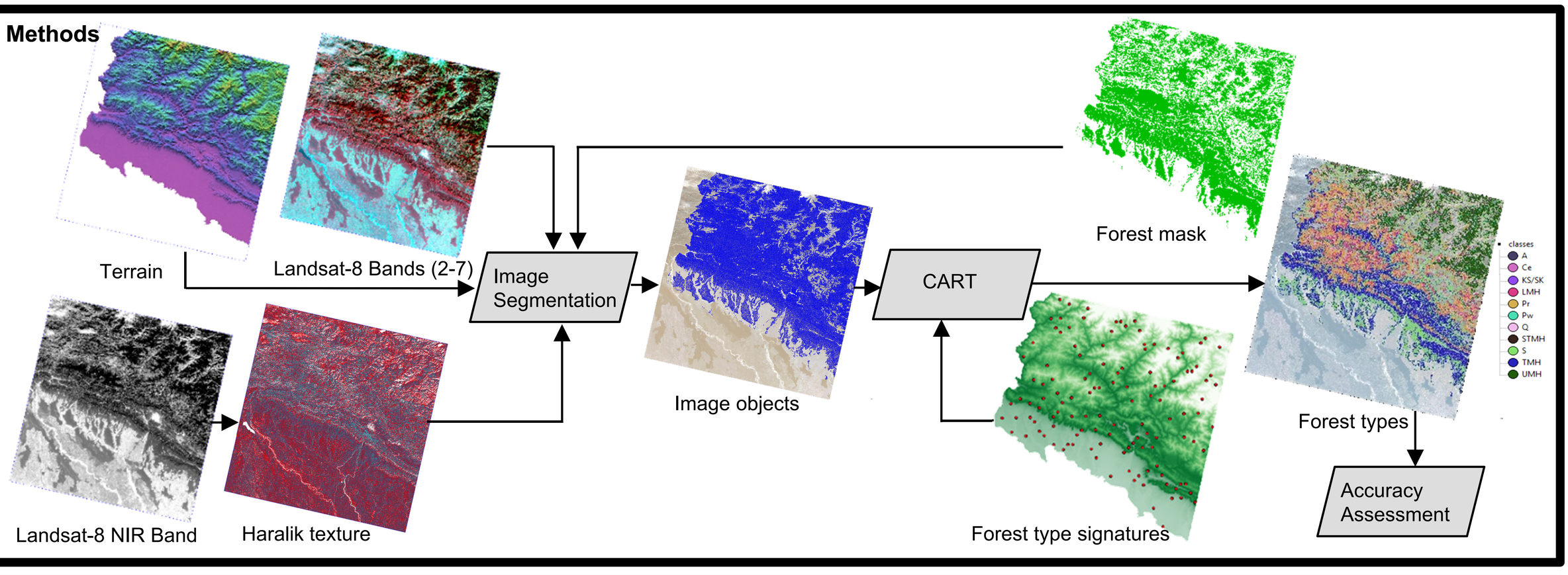
Introduction

Forest resources in Nepal are significant because of their contribution to people's livelihood, biodiversity conservation and other ecosystem services. Forests are also important carbon sink and forest conservation has been the focus of international efforts in global climate change mitigation. A key requirement for initiative on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD) is a credible Measurement, Reporting and Verification (MRV) framework. Though timely MRV of deforestation and forest degradation is crucial, the mechanism is not yet well established. Thus, sound and replicable method is required for monitoring forest condition such as forest area change by forest types and carbon stock up to (sub)national scale. Different machine learning algorithms have been proposed for land cover (DeFries and Chan 2000), forest carbon mapping (Mascaro et al. 2014) as well as type classification (Li et al. 2013). This poster presents a method to classify forest type by integrating Landsat 8 images (year 2013/14) segmentation and classification and regression tree (CART) method.

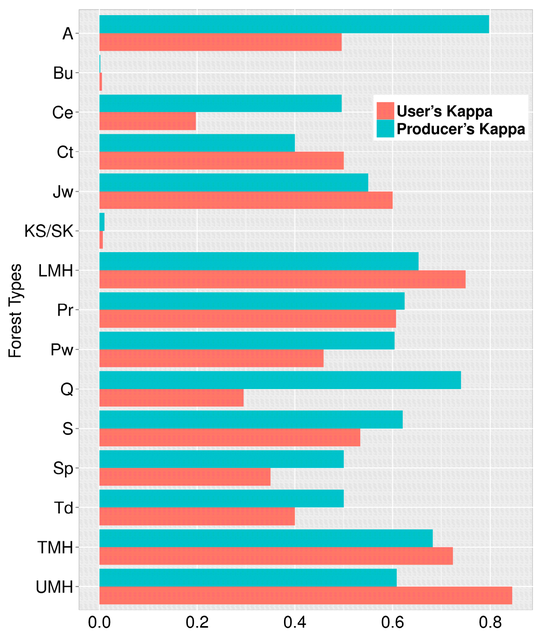
Methods

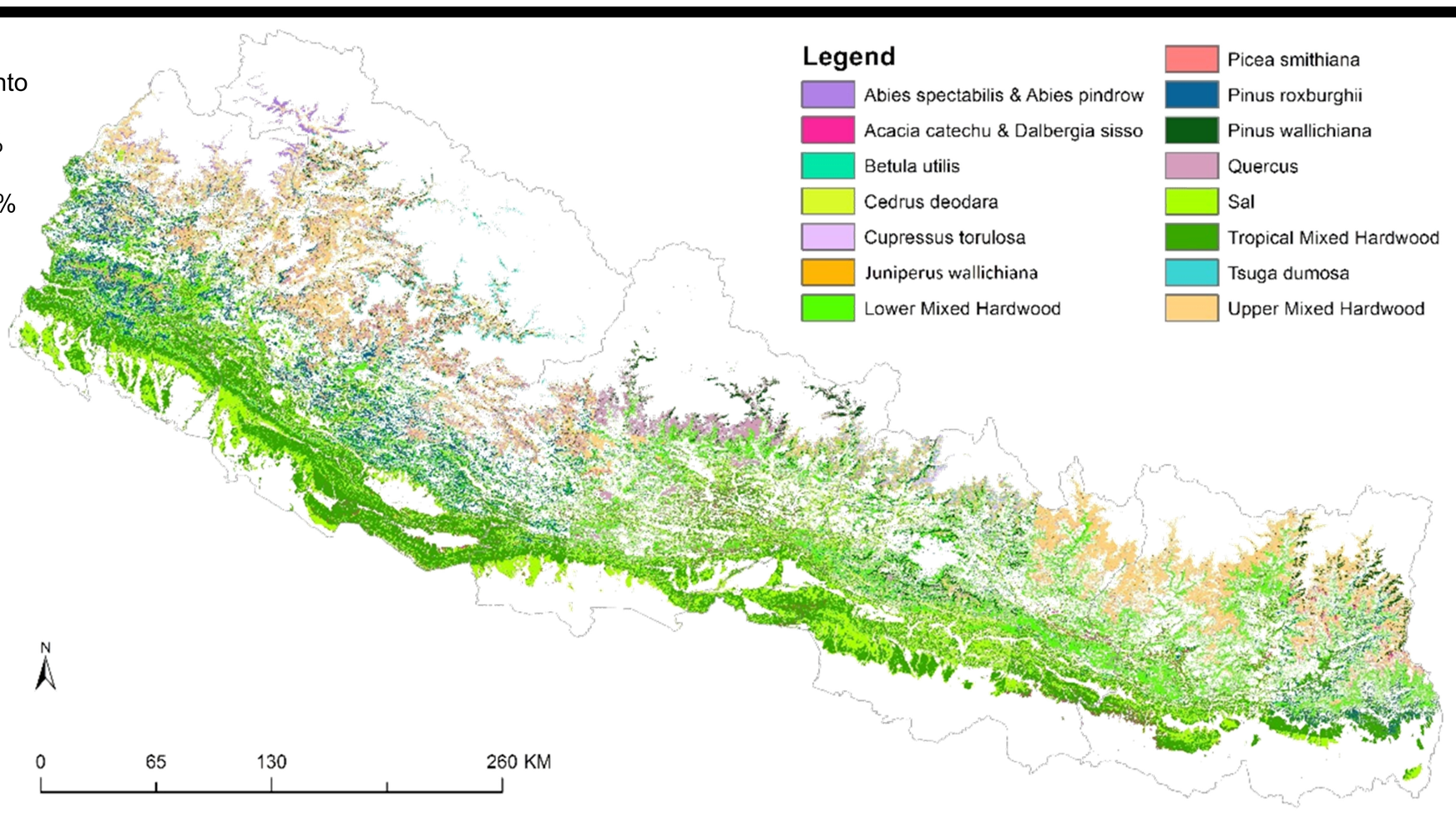


Results

The forested area of Nepal was classified into 15 forest types.
The overall accuracy was 69.85% with 95% Confidence Interval limits 0.66 and 0.73.
Similarly, kappa statistics was 0.63 with 95% Confidence Interval limits 0.58 and 0.67.

Table: Kappa statistics for each forest types





Conclusion

The results suggest that approach can be applied for forest type classification with reasonable accuracy. The most important strengths of the approach include efficient handling of large data as well as being reproducible whereby any user with same set of data and algorithm can obtain same result. This is quite remarkable advantage as compared to several other approaches requiring human interpretation which often leads to bias. Further, the results indicate that this method can be readily applied to other study areas, upscaled to even geographical extent and also estimate other ecosystem variables such as forest carbon.

Literature Cited

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