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AUTOMATED REMOTE SENSING FOREST INVENTORY USING SATELLITE IMAGERY

Abstract

UAV based forest inventory is well known for its high accuracy metrics in individual tree crown detection and classification tasks. The demands for automated tree crown detection and classification are increasing; thus, more scalable techniques of forest inventory need to be developed as UAV based approaches can not be easily applied for large scale forest inventory. Some of the recent works in the field have proposed the use of satellite imagery for large scale forest inventory tasks because of the availability of data for larger areas of forest. However, due to the low resolution of satellite imagery, detection and classification of individual tree crowns becomes a challenging problem. We are proposing a novel approach for the forest inventory based on Convolutional Neural Networks and classical machine learning techniques for individual tree crown detection and classification using only satellite imagery. Employing only raw pixels of satellite imagery as features for classification has shown to be not quite helpful when the labeled data is insufficient. In this paper, we show that using autoencoders trained on unlabeled data to extract feature embeddings allows the extraction of the most valuable information from labeled tree crown images. Hence, it allows models to make more precise predictions of the individual crowns.