# Deep Forest Classification: Mapping Deciduous and Coniferous Forests with Deep Learning

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### Abstract

This research aims to investigate the application of deep learning models in the context of remote sensing for forestry, specifically examining whether such models can reliably delineate deciduous and coniferous forests from Sentinel-2 satellite imagery. Sustainable Forest Management requires detailed and accurateinformation about forests to support a strong planning basis that supports risk management and decision making. Among other forestry parameters, the required information includes what kind of trees a forest stand consists of; deciduous or coniferous. This is relevant, since these types of trees have different fundamental weaknesses and pathogens that they are susceptible to. While other forestry parameters require precise measurements, this study hypothesizes, that deep learning models, trained using open-source machine learning frameworks such as TensorFlow, can reliably delineate forest types using freely available, medium-resolution Sentinel-2 imagery. One of the major challenges addressed in this study lies in the difficulty of collecting accurate training data that includes only deciduous trees, or only coniferous trees, a key obstacle in model development. The objective of this research is to evaluate the feasibility of using medium-resolution multispectral satellite imagery as input for a deep learning model to distinguish between these two forest types, which would be of great benefit for the operational forestry industry. The satellite data for this study will be divided into training, testing, and validation datasets. Eventually, the model’s performance will be evaluated based on its ability to correctly classify forest types, with results delivered as segmented images and a functional deep learning model. This research aims to provide a practical tool for the forestry industry, government agencies as well as private forest owners, offering a cost-effective and efficient method for forest classification that supports decision-making and risk management. The anticipated impact of this research is the enhancement of forest management practices through improved automated classification, contributing to more informed decision making in forest resource planning and stewardship.

### Keywords

Neural Network, Segmentation, Remote Sensing, Forestry, Forest Types