

Abstract

Deep learning is growing in popularity in the remote sensing community, especially as a classification algorithm. First part of this thesis describes deep neural networks commonly used for remote sensing classification and their various applications. Capabilities of selected geospatial software suites in relation to deep models are also discussed in this part.

Theoretical findings from the first part of the thesis are validated using two deep convolutional Encoder-Decoder networks – U-Net and its proposed adaptation called KrakonosNet. They are used to perform a semantic segmentation of spruce trees and dwarf pine shrubs in the tree line ecotone of the Krkonoše Mountains, Czechia. A normalised digital surface model is employed for creation of sufficiently large amount of training data, while the classification itself is performed using only optical imagery with very high spatial resolution.

Resulting classification is compared to a set of traditional remote sensing classifiers, namely Maximum Likelihood, Random Forest, and a Support Vector Machine. Both U-Net and KrakonosNet significantly outperform the other classifiers on this dataset and will be consequently used in a related research project.

Key words

deep learning, U-Net, Krkonoše mountains, classification, vegetation mapping, picea abies, pinus mugo, orthoimage