

## **Abstract**

Diploma thesis "Classification of UAV hyperspectral images using deep learning methods" focuses on the classification methods, namely convolutional neural networks (*CNN*), of hyperspectral (*HS*) images. Based on a thorough literature review, a comprehensive overview on CNN utilisation in remote sensing is assembled as a basis for identifying suitable methods for the specific task of this thesis. Two methods with an open solution in programming language Python were selected - Capsule Network and U-Net. The main aim of this work is to verify the suitability of chosen methods for the classification of hyperspectral images. The images were acquired by sensors with high spatial resolution carried by a UAV over Krkonoše Mts. tundra. Important step was to prepare input HS data (54 bands, 9cm) to have suitable form for entering the network.

Not all the required results were achieved due to the complexity of the Capsule Network architecture. The U-Net method was used in purpose of comparing and verifying the results. Accuracies retrieved from the U-Net overcome results achieved by traditionally used machine learning methods (SVM, ML, RF, etc). Overall accuracy for U-Net was higher than 90% where other mentioned methods did not get over 88%. Especially classes block fields and dwarf pine achieved higher accuracies comparing to other classes (UA – user's accuracy a PA – producer's accuracy over 99%).

## **Key words**

Deep learning, convolutional neural networks, hyperspectral images, Capsule Network, U-Net, classification, vegetation mapping