

## **Large Scale Crop Classification Using Deep Learning Approach**

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With the constantly increasing volume of remote sensing (RS) data, this becomes a powerful tool in addressing the challenges and improving our understanding of the Earth system. In particular, with launches of Sentinel-1, Sentinel-2, and Landsat-8 satellites, there will be generated up to petabyte of free high special resolution raw images per year. These images and derived products are extremely

important for many applications in climate change, food security, and large-scale land cover and land use mapping. On the other hand, the increasing volume of remote sensing data, dubbed as a “Big Data” problem, creates new challenges in handling datasets that require new approaches to deal with it [1]. In past years there has been a large boost in developing advanced machine learning techniques, in particular deep learning (DL). DL is a powerful machine learning methodology for solving a wide range of tasks arising in image processing, computer vision, signal processing, and natural language processing. Within this technique, we propose a deep learning method, based on convolutional neural network (CNN) approach, using Tensorflow library and geospatial analysis [2]. Experiments are carried out for the Joint Experiment of Crop Assessment and Monitoring (JECAM) test site in Ukraine for classification of crops in a heterogeneous environment using time-series of images acquired by Sentinel-2 and Sentinel-1 remote sensing satellites.

[1] M. S. Lavreniuk, S. V. Skakun, A. J. Shelestov, B. Y. Yalimov, S. L. Yanchevskii, D. J. Yaschuk, and A. I. Kosteckiy, “Large-Scale Classification of Land Cover Using Retrospective Satellite Data,” *Cybernetics and Systems Analysis*, vol. 52, no. 1, pp. 127–138, 2016.

[2] N. Kussul, A. Shelestov, M. Lavreniuk, I. Butko, and S. Skakun, “Deep learning approach for large scale land cover mapping based on remote sensing data fusion,” *IEEE International Geoscience and Remote Sensing Symposium (IGARSS)*, pp. 198-201, 2016.

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