



## **Automated System for Crop Mapping in Amazon Web Services based on Sentinel Data**

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For providing reliable annual crop classification maps based on time-series of high resolution satellite data for national scale it is vital to solve such challenges as downloading huge volume of satellite data, big data processing and utilizing high performance computational resources (HPC) for using the state-of-the-art classification approaches.

Within the study we propose an automated crop classification system CropZoom which is based on machine learning and deep learning techniques. The main operations in data processing workflow are: satellite images downloading and preprocessing, in-situ data collection, classification itself and validation, crop specific maps visualization and delivery to the end users. By deployment CropZoom on the cloud platform, for example Amazon Web Services (AWS) EC2, we avoid the problem with downloading and storing satellite data (Amazon platform provides easy and fast access to Sentinel -1, -2 imagery) [1]. Thanks to AWS ability of parallel data processing using different instances we solved the problem with data preprocessing, training advanced classifier (ensemble of neural networks) [2] and crop mapping for large territory. So, workflow for automated data processing, classification and obtained results analysis composed into orchestra. We provide crop classification maps for Ukraine and England for 2016 and 2017 utilizing proposed system. Detailed results and accuracies will be presented within conference.

[1] A. Shelestov, M. Lavreniuk, A. Kolotii, V. Vasiliev, L. Shumilo, and N. Kussul, "Cloud Approach to Automated Crop Classification Using Sentinel-1 Imagery", *Big Data form Space*, pp. 122-125, 2017.

[2] N. Kussul, M. Lavreniuk, S. Skakun, and A. Shelestov, "Deep Learning Classification of Land Cover and Crop Types Using Remote Sensing Data," *IEEE Geoscience and Remote Sensing Letters*, vol. 14, no. 5, pp. 778-782, 2017.