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ADELE: Overview of a deep learning application for land use and land cover classification in Switzerland

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During the past decades, the Swiss Federal Statistical Office elaborates a highly accurate land use and land cover (LULC) classification for Switzerland. Representing more than 4 million points, these maps are realized through expert-based classification of aerial images. Composed of 46 classes for LU and 27 classes for LC, the generation of these two maps requires up to 6 years and a significant amount of resources. Therefore, a new procedure based on deep learning has been developed in order to shorten the production time and by keeping the same level of quality.

The present research (Arealstatistik Deep Learning – ADELE) highlights and investigates different possibilities for the integration of a deep learning algorithm for the classification of LULC and LULC-changes based on aerial and satellite imagery as well as including additional thematic information such as digital height models or the cadastral surveying. This contribution focuses on the description of a consistent methodology for the preprocessing of the data, the training of the models, and the assessment and validation of the generated results. In addition, several important issues of deep learning modelling, including feature optimization and imbalanced dataset management are discussed.

The considered approaches try to pilot each part of the process in order to maintain a high level of accuracy. In conclusion, the current challenges and future development in deep learning for LULC classification and change detection using highly diverse datasets are discussed.