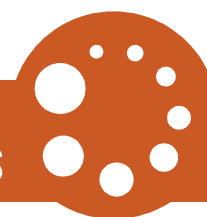




ADELE: Visual interpretation of aerial images for the national land use statistics

Summary

EXPERIMENTAL STATISTICS



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ADELE pilot project: summary

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The [FSO's land use statistics](#) are an invaluable tool for long-term spatial observation with an acquisition period that has been gradually reduced from 12 years (in 1979) to 6 years today. At present, internal resources are almost entirely allocated to visual interpretation, at the expense of other activities. In light of this, certain artificial intelligence algorithms could help though by facilitating land use and cover classification and by improving change detection. The objective of the pilot project "Arealstatistik Deep Learning" (ADELE) is to gain a better understanding of this field in preparation for the gradual development of a computer prototype.

Workshops held in 2018 and 2019 familiarised the pilot project team with the principles of artificial intelligence by performing *Deep Learning* type neural network training cycles, varying the sensitive parameters of the algorithm and testing the models obtained according to various quality criteria. A sample of aerial images and reference values from previous surveys was prepared and transferred for this purpose in an FSO cloud environment. This was supplemented with Python scripts, covering the definition of neural networks, their training, validation tests and predictions based on new images. The results obtained separately by participants were then jointly assessed based on standard evaluation criteria, in particular confusion matrices and validation curves to select the optimal model. This mainly focused on understanding the way these tools work in practice.

The results and knowledge obtained through this pilot project demonstrated within the scope of NDS the innovation potential for the FSO in using artificial intelligence to process images. They made a significant contribution to the revision project of the 2020 land use statistics during the initialisation phase, which took place in parallel. The experience gained will be leveraged in the follow-up to this project when much more complex neural networks are implemented and aerial images covering the whole of Switzerland are used.

The experiences and observations from the pilot project are detailed in a report for the benefit of future projects. In particular, the report calls for the continued sharing of insights and the further coordination of efforts. Setting up an expert group would perpetuate and expand this innovation capacity within the FSO.

Complementary analysis methods used:

- Various convolutional neural networks (CNNs) were used to train on aerial images based on keras.