Master Thesis

Cross-modal learning for the semantic analysis of Earth observation imagery

Collaborate within an international team with strong ties to the German Aerospace Center and contribute to the development of next-generation AI models for the advanced analysis of remote sensing imagery, making contributions with real-world applications to the sustainable development goals, climate change, and natural hazards.

Background

In remote sensing, most approaches are expert systems: They can be applied to a single sensory input (images of a specific sensor in a specific mode or a specific sensor combination) and a single task (or combination of tasks). If either sensor or task changes, a completely new system needs to be built and trained.

Project

The goal of this thesis is to mitigate the above mentioned shortcoming. A deep neural network can be thought of as consisting of three parts: A sensor-specific network at the beginning, a target-specific network at the end, and a representation network in the middle. This allows to have different branches for different sensors at the beginning and/or different branches for different tasks at the end of the overall network. The final network can handle different sensors and different tasks, yet can even be applied to sensor and task combinations it has not been trained on.

Expected outcome

- Literature research on existing cross-modal learning approaches
- Implementation of an approach to cross-modal learning in the context of Earth observation
- Evaluation of the approach on benchmarks, comparison with relevant reference methods

Your Profile

- Scientific curiosity, very good ability to work independently, strong communication skills
- High motivation to deeply explore a given research topic
- Background in computer vision and/or machine learning
- Strong programming skills (python)
- Knowledge in remote sensing is not required

Contact

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Please feel free to reach out for more topics e.g. on Machine Learning, Deep Learning, Ensemble Learning, Computer Vision, Remote Sensing, Earth Observation, Synthetic Aperture Radar or regarding the option to conduct your Master thesis at the DLR in Oberpfaffenhofen.