

# **Bachelor Thesis**

## **Evaluation of ensemble pruning and fusion techniques**

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**

Ensemble Learning refers to the approach to train multiple base models and combine their output during prediction. While it has its high time with Random Forests, it is still of high relevance even for deep learning. The advantage of ensemble learning is a more precise, better calibrated, and robust estimate. The disadvantage is obviously the need to train and evaluate multiple models. While training an ensemble is usually less problematic (i.e. because in most approaches the ensemble members are independent and can be trained in parallel), the inference time increases linearly with the ensemble size.

### **Project**

The goal of this thesis is to evaluate different approaches to prune a given ensemble, i.e. to reduce the ensemble size, and fuse the outputs of the ensemble members. This allows to decrease the computational load during inference while maintaining accuracy.

### **Expected outcome**

- Literature research on existing pruning and fusion methods
- Implementation of approaches for ensemble fusion and pruning
- Evaluation of the approaches on benchmarks

### **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**

Ronny Hänsch, [ronny.haensch@dlr.de](mailto:ronny.haensch@dlr.de)

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.