Master Thesis

How to look at things: Fusing image representations and deep learning

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

Traditional image processing has developed a multitude of different representations of image data including various transforms (wavelets, DFT, DCT) and descriptors (BoW, GIST, etc.). However, since the rise of deep learning, the relevance of traditional image processing and analysis approaches has steadily declined as deep neural networks continuously outperform modular pipelines that are based on hand-crafted features.

Project

While early studies have clearly shown that learned features clearly outperform hand-crafted features, it is also known that neural networks are sensitive regarding data representation. The goal of this thesis is to use traditional image representations to enhance the training of deep neural networks either as additional input modality or auxiliary task.

Expected outcome

- Literature research on existing work regarding image representations for deep learning
- Implementation of an approach to leverage image representations for deep learning
- 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.