Master's Project ST 2023

Research Group Computer Graphics Systems
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Technology for Tackling Climate Change: Spatio-temporal Sensing, Analysis, and Visualization of Forests and Vegetation Stocks

Background

Climate change poses enormous challenges for people, the economy and society. The condition and diversity of vegetation, especially forests, play a crucial role in the climate system. Forests are not only responsible for storing carbon dioxide, but also regulate microclimate, provide shade, release moisture, influence wind patterns and provide habitat for animals. Maintaining, preserving, and reforesting is therefore important for mitigating climate change and achieving sustainable development. To this end, precise decision support systems and continuous, reliable data for forests are needed.

Description

This master project aims at designing a forest and tree aligned data processing and visualization technique that allows for automated capturing of the state of forests and their trees as well as deriving analytically parameters that describe attributes of trees. Participants will be involved in the process of on-site data acquisition using UAVs and handheld scanners. A machine learning framework will be extended to classify, segment, and evaluate massive remote sensing data. Other objectives include:

- Study and evaluation of methods for sensor fusion of various types of remote sensing data
- Implementation of processing techniques to analyze vegetation stocks
- Estimation of clime-related information such as carbon dioxide storage
- Visualization of vegetation stocks and derived information
- Development a dashboard for visualization of forest-related vegetation metrics

The presented topic ties in with current research work in geoinformatics. It is particularly suitable for further research in the context of a master's thesis or a future doctoral dissertation. Cooperating experts from forest sciences will help to get an in-deep understanding of the domain knowledge.

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