Professorship for Big Geospatial Data Management
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Global Active Fire Detection – Towards a SAR-enabled Multi-Sensor Global Monitoring System

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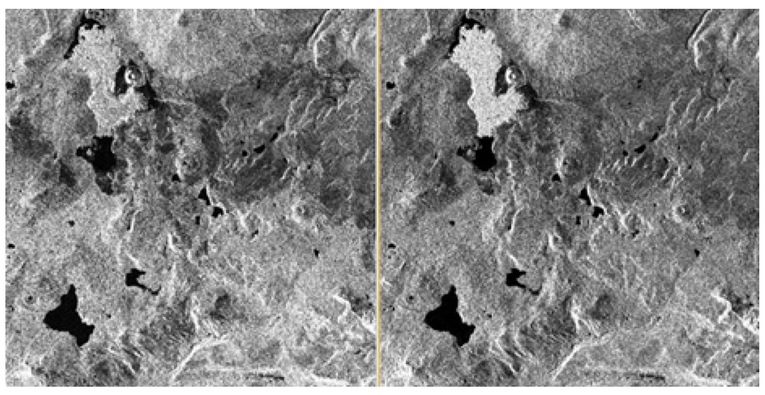
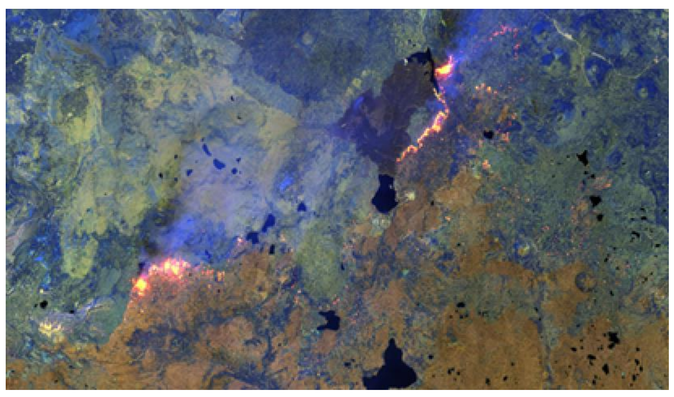
Introduction

Active fire detection for environmental monitoring is a very important task that can significantly be supported by satellite image analysis. Active fires need to be detected not only for fire-fighting in settled areas but also for finding fires in the wilderness, which is only possible from satellite global coverage. Classically, active fire detection is based on multispectral signatures of fire on a per-pixel basis, sometimes including statistics of the surroundings. Such classical methods are fast, easy to apply, and surprisingly powerful both in detecting and dissecting active fires.



Captured wildfire from Sentinel 1with VV (left) and VH (right) polarizations



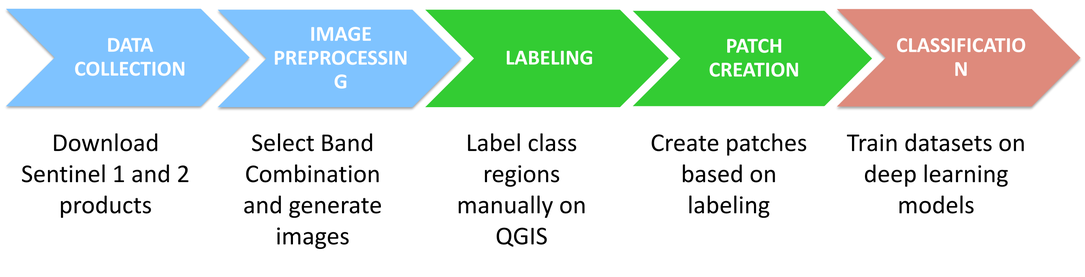
Captured wildfire from Sentinel 2 using the bands 12, 11, and 8.

Research Question

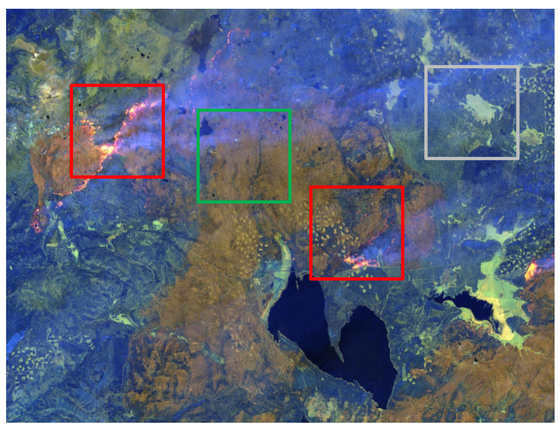
Is it possible to label wildfires in multispectral and SAR images ?

Methodology

In this project, we work towards closing the gap by using the Landsat data together with the given deterministic fire detection methods and fit minimalistic deep neural networks to reproduce the exact same of multispectral detections on Sentinel-2 data.
We extend the work to integrate SAR data from Sentinel 1 and various methodologies of data preparation and fusion.



Visualization of the processing chain to generate and classify the wildfire patches



Sentinel-2 image with sample labels, where the red bounding box shows active fire, the green represents burnt area, and the gray box includes unaffected area.

Conclusion

The outcome of this project is a methodology to derive global active fire datasets, which might suffer from errors of the underlying deterministic methodology and the transformation process, but which allow for global fire monitoring, which is of high interest in the context of climate and deforestation analysis together with baseline models both from simple data mining and deep learning regimes.
In the poster, we want to present our early results giving hints on the baseline performance of all steps, which we are going to improve during this master thesis research project.

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