

Bachelorthesis

in the field of computer vision and automation

Analyzing and evaluating anomaly detection methods for thermal leakage identification in district heating systems

■ Background

District heating networks are commonly used to transport heat over large distances to satisfy the thermal energy demand of end users. Decades of use cause the subterranean pipelines to fatigue, eventually inducing leakages with potentially catastrophic effects. As many networks lack modern forms of surveillance, airborne thermography has emerged as a means for widespread network monitoring. Underground leakages can be identified in thermal infrared (TIR) images as anomalies owing to the increase in temperature they generate at the surface. To identify such areas of interest, thousands of TIR images are acquired via Unmanned Aircraft System (UAS). A suitable anomaly detection method needs to be found in order to automate the detection of these thermal anomalies that pertain to network leakages.

■ Your contribution

The aim of this thesis lies in ascertaining the most promising method(s) for thermal anomaly detection in a real-world dataset of thermal images. This includes:

- researching different image analysis, segmentation and computer vision methods to create an overview of useful options
- drawing a comparison between these by analyzing literature as well as taking into account any implementations in similar fields of study
- identifying potential key methods for a real-world dataset of UAV-acquired thermal images and occurring types of leakages

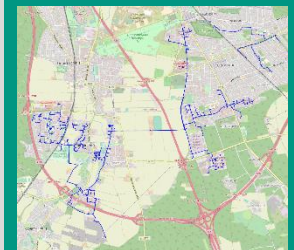
■ Requirements

- independent, structured way of working with an enthusiasm for scientific research and working with real-world data
- knowledge of image analysis and computer vision very helpful, albeit not required
- proficiency in English

■ Interested?

Please contact Elena Vollmer (elena.vollmer@kit.edu) with your application.

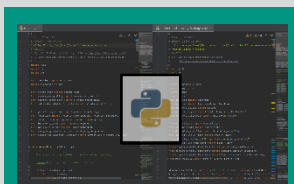
Starting date: as soon as possible



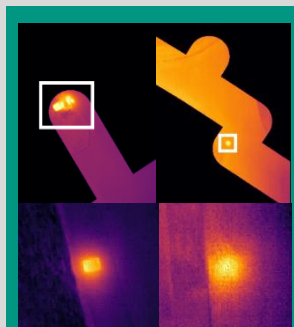
District heating network, displayed in QGIS



Exemplary thermal images acquired via Unmanned Aircraft System (UAS)



Python - the programming language used for this software development



Leakages within the dataset