KIT
Karlsruhe Institute of Technology

Institute for Industrial Production (IIP)
Chair of Business Administration,
Production and Operations Management
Prof. Dr. Frank Schultmann

Bachelor-/Masterthesis
in the field of computer vision and automation

Automatic analysis of real-world data: Implementing computer vision algorithms to find a suitable anomaly detection method for leakage identification

◾ 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.

District heating network, displayed in QGIS

◾ Your contribution

The aim of this thesis lies in ascertaining applicable methods, testing various implementations on real-world data, and identifying methodological strengths and weaknesses to thus determine a preferred method for automatic image analysis. This will therefore include:
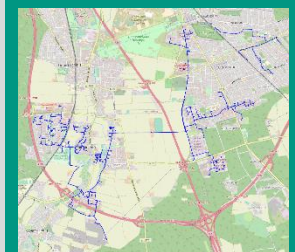
- researching different image analysis and segmentation methods to create an overview of useful options
- applying select methods and/or methodological combinations to real-world data (previously acquired UAS-based thermal images) in Python
- drawing a comparison between methods by evaluating found benefits and drawbacks to identify a preferred tool for automatic image analysis

Exemplary thermal images acquired via Unmanned Aircraft System (UAS)

◾ Requirements

- independent, structured way of working with an enthusiasm for scientific research, coding, and working with real-world data
- programming skills (particularly in Python) and knowledge of image analysis / computer vision very helpful, albeit not explicitly required
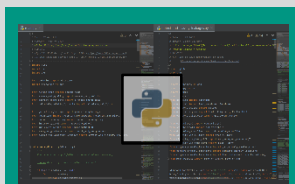- proficiency in English

Python - the programming language used for this software development

◾ Interested?

Please contact Elena Vollmer (elena.vollmer@kit.edu) with your application.
Starting date: as soon as possible

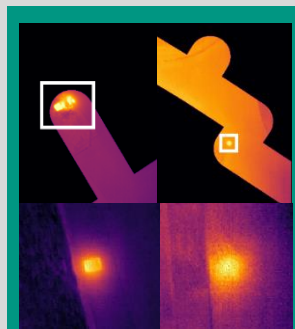Leakages within the dataset