Institut für Photogrammetrie
und GeoInformation

Leibniz Universität Hannover

Institut für Photogrammetrie und GeoInformation,
Nienburger Straße 1, 30167 Hannover

Thermal anomaly detection in Thermal Infra-Red image based on saliency analysis.

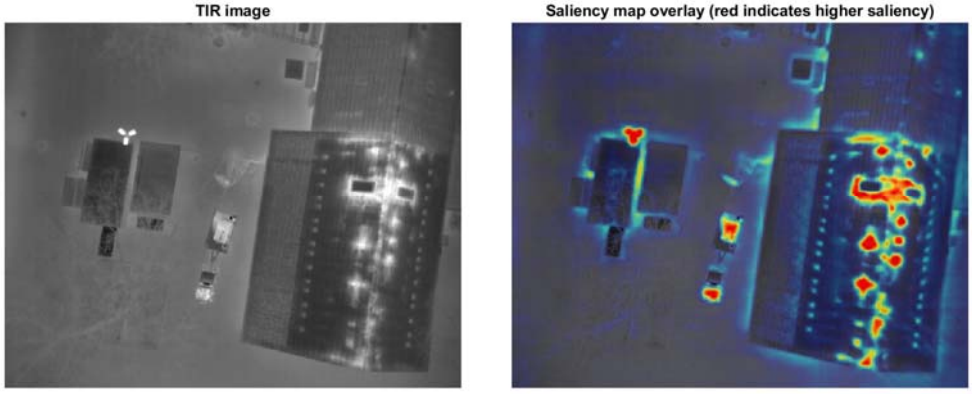
Proposal for a Master thesis topic (EN)

Anomaly detection is the process of identifying unusual components, events, or observations that raise concerns because they differ significantly from the majority of data or expected behavior. The purpose of thermal anomaly detection is to find locations with unusually high temperatures that differ from their surroundings. In remote sensing, thermal anomaly detection plays a crucial role to capture abnormal heat signatures in a non-destructive manner. Due to its ability to capture heat signatures in the infrared portion of the electromagnetic spectrum, a Thermal Infrared (TIR) camera is one of the most extensively used equipment for this purpose. Thermal anomaly detection is formulated as a salient region detection in this research, which is driven by the premise that a hot region in thermal infrared images commonly captures the human eye's attention, thus being salient. Numerous writers have established a relationship between thermal target detection and saliency detection, which has been demonstrated to be a useful approach.

Saliency models analyze at how distinct image regions are in comparison to their surroundings. A saliency map is the output of an image transformation that gives each pixel in an image a distinct quality based on how much it varies in its surroundings. Itti et al. (1998a) created the first saliency computational model by applying local centre-surround operations on low-level visual characteristics to create a saliency map. In the last 20 years or more, the field of saliency analysis has advanced tremendously. While the earliest saliency models were based on image processing techniques, recent advances in deep learning approaches are also showing promise in this sector.

The major goal of this thesis is to examine and compare several methods to detecting thermal anomalies using various saliency models. Because most saliency models are built using optical pictures, the problems involved with this research are adapting state-of-the-art approaches to TIR images and distinguishing hot areas from cool spots, which are both recognized as salient regions by most existing methods. The following criteria should be used to compare the performances of various techniques: visual assessment and statistical analysis. This research relies on a dataset of TIR images collected by a UAV in the Hannover area, however other TIR datasets that are freely available to the public might also be utilized.

This thesis will be supervised by Artuom Sledz, M.Sc.



Nienburger Straße 1, 30167 Hannover
Fakultät für Bauingenieurwesen und Geodäsie

Institut für Photogrammetrie
und GeoInformation

Prof. Dr.-habil. Christian Heipke

Artuom Sledz

Tel.+49 511 762-2566
Fax +49 511 762-2483
E-Mail: sledz@ipi.uni-hannover.de

Besucheradresse:
Nienburger Straße 1
30167 Hannover
www.ipi.uni-hannover.de