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Anomaly Detection in Remote Optical Imagery

Remote optical imagery, including panchromatic, multispectral, and infrared, can be acquired during on-site inspection (OSI) to search for anomalies and artifacts. Imagery acquired during an OSI can provide unique information that may increase an inspection team's efficiency and effectiveness at prioritizing regions of interest within an inspection area. For example, optical imagery can reveal large scale spatial or spectral patterns that may be indicative of activities relevant to the OSI, but are not directly apparent from ground based visual observation or other inspection techniques. Although imagery is a powerful tool, processing and analyzing large volumes of optical imagery that can be produced from surveying an inspection area can be computationally and manually intensive. In the case of OSI, the situation is compounded by Comprehensive Nuclear-Test-Ban Treaty (CTBT)-imposed manpower and time limitations. Automated processing and analysis techniques offer a means to enhance the utility of remote optical imagery for OSI by increasing the throughput of OSI-relevant information while reducing manual processing requirements. This work examines automated statistical techniques for anomaly detection in remote optical imagery. These techniques can be used to generate anomaly maps of areas that differ significantly from background, thereby reducing the regions to be reviewed or inspected manually.

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