OAK RIDGE NATIONAL LABORATORY
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FACT SHEET

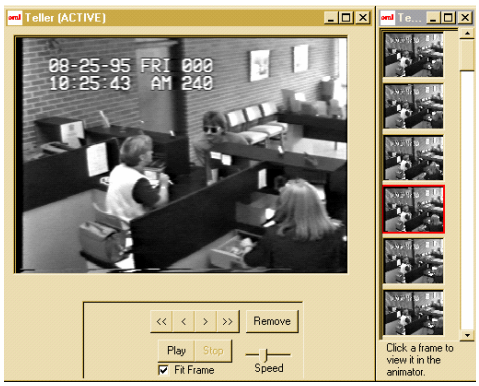
ESTD
Engineering Science & Technology Division

National Security

A Workflow Environment for Video Forensics

Image Enhancement and Recovery Methods for Analyzing Surveillance Imagery

Researchers at ORNL have developed a video forensics workflow environment that provides a forensic analyst with image restoration and enhancement tools for managing and processing digitized streams of video surveillance data. The functionality of this system was driven by user needs specified by video analysts from the U.S. Secret Service, FBI, and ATF. This software environment, known as ViTAL (Video Tool for Aiding Law Enforcement), provides unique capabilities for the video forensics analyst. An abbreviated list of capabilities include sequence-oriented processing of sets of video frames, as opposed to single frame processing; de-interlacing and de-multiplexing of input sequences to accommodate a wide variety of security camera formats; frame alignment and comparison to detect and track subtle time varying changes; use of object motion to perform multiple-frame fusion for resolution improvement and noise reduction; image de-blurring to accommodate expected optical aberrations; macro-recording for batch processing; and, automatic case logging and report generation in HTML format to provide technical evidentiary documentation. The work on ViTAL has also led to the development of a limited capability for face tracking and recognition in surveillance video sequences.



ViTAL provides an image processing and workflow environment for investigating crime scene video data.

Base Technology

The ORNL ViTAL software system uses multiple technologies to take and image and attempt an improvement of fidelity. It uses demultiplexing and de-interlacing methods to input data; motion-estimation, multi-frame fusion, and optical deblur methods to recover resolution; and provides image data management, automatic document generation for evidentiary reporting.

Specifications and Features

- Windows OS / MS Visual Studio (VB, C++)
- Standard image I/O (JPG, Tiff, BMP, etc.)
- Automatic document generation (HTML)
- Batch processing and macro recording
- Hardware independent utility

ViTAL uses image enhancement and recovery methods such as multi-frame fusion using projection onto convex sets.

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