

Control, Registration, and Exploitation of Video Sensor Networks

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With the proliferation of video surveillance cameras in today's society, novel techniques for automated video monitoring and interactive visualization systems are needed to coordinate and interpret the video imagery to help reduce the perceptual and cognitive overload of human operators. Our current research aims to provide methods for 1) controlling and interacting with pan-tilt-zoom (PTZ) video cameras via automatically constructed spherical panoramas, 2) registering the PTZ camera view spaces to large aerial orthophotos of the scene (e.g., Google Maps) to provide a base representation for coordination, and 3) exploiting the camera control and registration for coordinated tracking, user interaction, and data analysis. With the addition of external Geographical Information System (GIS) content data (e.g., locations of building, roadways, sidewalks, doors, etc.), the combination of these capabilities provides more intuitive visualization/interaction with camera networks and leads to the capability of more context-aware scene interpretations for automated analysis tasks. We demonstrate these control, registration, and exploitation concepts using our own multi-camera, outdoor building-mounted surveillance camera network installed at Ohio State University. Extending the network beyond building-mounted cameras, we also relate the research to ongoing "layered sensing" data collections and analysis efforts that additionally incorporate imagery captured from video sensors on low-altitude and high-altitude aircraft. Support for this research has been provided by the National Science Foundation and Air Force Research Laboratory.

