AUTOMATED VIDEO PROCESSING AND SCENE UNDERSTANDING FOR INTELLIGENT VIDEO SURVEILLANCE

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ABSTRACT

Recent advances in key technologies have enabled the deployment of surveillance video cameras on various platforms. There is an urgent need to develop advanced computational methods and tools for automated video processing and scene understanding to support various applications.

In this dissertation, we concentrate our efforts on the following four tightly coupled tasks: *Aerial video registration and moving object detection*. We develop a fast and reliable global camera motion estimation and video registration for aerial video surveillance. *3-D change detection from moving cameras*. Based on multi-scale pattern, we construct a hierarchy of image patch descriptors and detect changes in the video scene using multi-scale information fusion. *Cross-view building matching and retrieval from aerial surveillance videos*. Identifying and matching buildings between camera views is our central idea. We construct a semantically rich sketch-based representation for buildings which is invariant under large scale and perspective changes. *Collaborative video compression for UAV surveillance network*. Based on distributed video coding, we develop a collaborative video compression scheme for a UAV surveillance network.

Our extensive experimental results demonstrate that the developed suite of tools for automated video processing and scene understanding are efficient and promising for surveillance applications.