

Chapter 18

Critical Video Surveillance and Identification of Human Behavior Analysis of ATM Security Systems

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ABSTRACT

Video surveillance cameras are placed in many places such as bank, hospital, toll gates, airports, etc. To take advantage of the video in real time, a human must monitor the system continuously in order to alert security officers if there is an emergency. Besides, for event detection a person can observe four cameras with good accuracy at a time. Therefore, this requires expensive human resources for real time video surveillance using current technology. The trajectory of one or more targets obtains for object tracking while recording above space and time. By tracking various objects, the burden of detection by human sentinels is greatly alleviated. Efficient and reliable automatic alarm system is useful for many ATM surveillance applications. ATM Video monitoring systems present many challenging research issues in human abnormal behaviors detection approaches. The framework of ATM video surveillance system encompassing various factors, such as image acquisition, background estimation, background subtraction, segmentation, people counting and tracking are briefly discussed in this chapter.

INTRODUCTION

Every sphere of life has embedded computer vision field. The increased level of global terrorism and life threatening activities in public places increase the demand for object tracking which is the core objective in the computer vision field. The availability of computers with high efficiency in terms of quality, cameras and cost for fully automated object tracking algorithms. Surveillance cameras are installed in airports, parking lots, train stations and banks etc. To take advantage of the video in real time, a human must monitor the system continuously in order to alert security officers if there is an emergency. Moreover, manually a human can observe only four cameras at a single instance of time for event detection. Therefore, this requires expensive human resources for real time video surveillance using current technology. Object tracking aims to automatically record trajectories of one or more targets across time and space. By tracking various objects, the burden of detection by human sentinels is greatly alleviated.

The fundamental step in object tracking is video analysis. Detecting and tracking the moving object frame wise is the key point for analyzing the object's behavior. The object must be tracked in a two dimensional image plane as the object moves in the frame. The image tracking algorithm should labels for the tracked object in the consecutive image frames of the video. The tracker needs to provide the information regarding the area, shape, orientation of the object also. The issues in projecting the 3D image into 2D space as image, noise in the transformation process, Complexities in the object motion, non rigidity in objects, full human occlusion, complex shapes of the object, changes in scene lightening details during real time processing makes tracking complex.

Many different approaches are available for object tracking. Modeling the object, the suitability of object representation for tracking, selection of features from images are the key requirements of an object tracking algorithms. The choice is made based on two factors: environment and use when tracking is performed. The significance of object tracking are realized in various activities like automated surveillance, motion-based recognition, traffic monitoring, video indexing, industrial applications, medical applications etc.

- **Motion Based Recognition:** It basically deals with object recognition, pattern matching and motion analysis. Nowadays, Motion recognition is used in design of augmented reality based video games, where the player controls the navigation by using their body movements. Another interesting application includes design of a virtual dance or aerobics instructor, which would inspect different dance movements or exercises and provides feedback based on the performance. Other applications include automated control of home appliances through gesture, design of assistive devices for elderly people etc.
- **Automated Surveillance:** The primary is to reduce human intervention by including software in a surveillance which works effectively to analyze behavior changes automatically. High resolution cameras are ideal to distinguish indoor and outdoor activities of various real world environments to spot suspicious behavior. Other applications include facility protection, managing parking lots, event monitoring etc.
- **Traffic Monitoring:** Application of video sensors in traffic applications is getting significant attention because of its speed case in installation, operation and maintenance, and its good monitoring capacity. Furthermore, the speed measurement, count of multiple point vehicles, classification of vehicle categories, assessment in highways during congestion or incidents are its advantages.

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