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## **A Review of Path Detection in Intelligent Video Surveillance**

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### **ABSTRACT**

Intelligent video surveillance is used to describe the monitoring of human activities. Most surveillance systems today provide only a passive form of site monitoring. Extensive video records may be kept to help find the instigator of criminal activities after the crime has been committed but preventive measures usually require human involvement. In addition to this, there is a need for large amounts of data storage to keep up to several terabytes of video streams that may be needed for later analysis. In order to achieve any form of real-time monitoring, guards often need to be employed to watch video feeds for hours on end to recognize suspicious, dangerous or potentially harmful situations. In a multi-camera scene monitoring system, this can be quite infeasible as there can be up to 20 to 50 cameras on average in a large building complex such as an airport or megamall. Intelligent video surveillance aims to reduce or even eliminate the need for human supervision of video feeds, and continuous recording. Having such a system will provide numerous other facilities and services to operators and emergency teams, by conducting behavioral analysis on incoming video feeds and detecting unusual or suspicious behavior. Behavioral analysis itself can be applied to numerous features extracted from video sequences including path detection and classification of which several methods are reviewed here. In this paper, an overview of path detection is presented followed by a detailed explanation of path analysis as well as a review of work related to path detection is given.

Keywords: Intelligent Video Surveillance, Path detection, Video content analytics, behavioral analysis.

### **1. BACKGROUND INFORMATION**

Intelligent video surveillance is a relatively new concept in expert systems which aims to automate video surveillance of scenes by replacing human monitoring and evaluation of video feeds by medium level or high level reasoning and scene analysis [1]. This will save money and storage space otherwise needed to monitor and archive video streams from surveillance cameras which may go up to several terabytes of data. However, monitoring and storage space are not the only concerns. Even if these costs can be borne, there is the additional problem of reviewing this vast amount of video data after a crime or incident has occurred. An integrated intelligent video surveillance platform will network with the relevant authorities to speed up the response time of emergency services by having automatic, real-time alert mechanisms put in place [2].

Several challenges face the development of such an integrated platform. Despite the widespread availability of video and image processing techniques, there is still a lack of effective algorithms that can be used to create meaningful intuitive abstractions that can capture human behavior. Furthermore, these algorithms should be able to work with seemingly random and chaotic scene behavior such as those found in crowded scene involving many people. Such scenes require complex processing like multi-object detection and tracking as well as occlusion handling [1].

There are some fundamental components that need to be developed in an intelligent video surveillance system, which will allow it to perform the following tasks (figure 1) [2, 3]: