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# Video Surveillance Systems with Presentation of Existing VSS

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**ABSTRACT:** This paper is review of many existing video surveillance systems. Video surveillance is increasing significance approach as organizations seek to safe guard physical and capital assets. At the same time, the necessity to observe more people, places, and things coupled with a desire to pull out more useful information from video data is motivating new demands for scalability, capabilities, and capacity. The aim of the surveillance applications is to detect, track and classify targets. These demands are exceeding the facilities of traditional analog video surveillance approaches. Provisionally, digital videosurveillance solutions derived from different data mining techniques are providing new ways of collecting, analyzing, and recording colossal amounts of video data. This paper addresses some of the approaches for video surveillance systems.

**KEYWORDS:** Video surveillance system, Video Analysis, Object Tracking, Multimedia surveillance system, Real Time Video surveillance.

## I. INTRODUCTION

Video surveillance systems are widespread and common in many environments. Video surveillance has been a key component in ensuring security at airports, banks, casinos, and correctional institutions. More recently, governments' agencies, businesses, and even schools are turning toward video surveillance as a meansto increase public security.

Human motion analysis helps in solving problems in indoor surveillance applications. K. Srinivasan et al presentedan attempt to give an idea of human body tracking in surveillance area of monocular video sequences.They have discussed various kinds of background modeling techniques like Background Subtraction Method, Adaptive background subtraction method, Adaptive Gause Mixture Method, 2D and 3D human body tracking methods etc. Human body modeling identifies the bodypositions and activities in video sequences. The model proposed by them is shown in Figure 1.

The frame work of the system starts with the acquiring of video images by means of camera and pre-processing has to be done on them for enhancing the quality of frames in the sequences. The video frames have a lot of noise due to camera, illumination and reflections etc. This can be removed and quality of images can be enhanced with the help of preprocessing stages. The suitable steps should be carried out in this stage.

The next stage is motion segmentation which separates foreground images from background images and it is followed by Object classification, Tracking and Human pose modeling. At the end, the activity analysis will be processed. The need for monitoring public and private areas is gaining more popularity nowadays due to persisting security reasons. This awakens the need of surveillance systems. A better security system that provides automatic analysis of the data provided by surveillance with less human operations is gaining more and more demand. Tremendous progress has already been made inthis area of research.

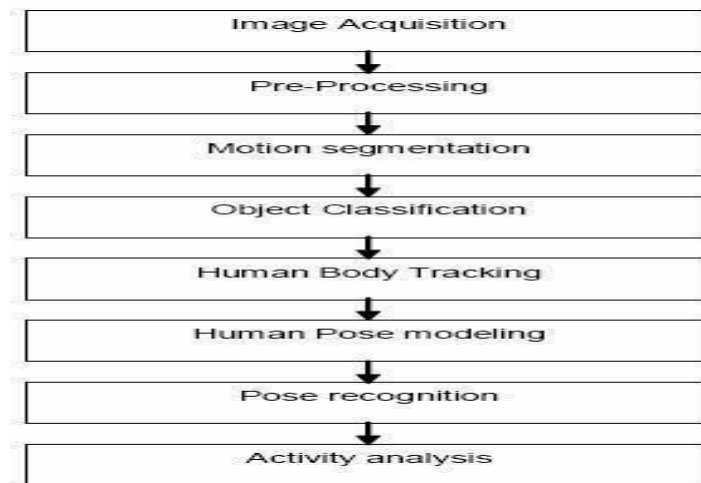


Figure 1: System Model of the Video Surveillance System

Surveillance systems operate 24 hours a day, 7 days a week. Due to the large number of cameras which have to be monitored at large sites, for example, industrial plants, airports, and shopping areas, the amount of information to be processed makes surveillance a tedious job for the security personnel. Furthermore, since most of the time video streams show ordinary behavior, the operator may become inattentive, resulting in missing events. In the last few years, a large number of automatic real time video surveillance systems have been proposed in the literature as well as developed and sold by companies.

Every day there are thousands of cameras collecting a huge amount of data. Scientists try to implement an automated system to extract information from this data. The scene structures coming from one camera is limited because it does not show the area for its entirety. In order to surveil an extended section, like tracking a vehicle running in a city's road or analyzing global activities taking place at a major station, it is necessary to use a video stream from multiple cameras. Many intelligent multi-camera video surveillance systems have been developed for this purpose.

The connection between the main station and the devices can be categorized into three types: analog, digital and network.

## II. LITERATURE SURVEY

**C.Lakshmi Devasrna , R.Revathi, M.hemalatha [2019]:** This paper reviews and exploits the existing developments and different types of video surveillance systems which are used for object tracking, behavior analysis, motion analysis and behavior understanding.

The inspiration of writing a survey paper on this topic is to evaluate and reach insight in visual surveillance systems from a big picture first. This enables us to understand and answer the questions like: What are the Developments and different stages involved in a visual surveillance system; how to detect and dissect behavior and intent; etc

**J Obermaier, M Hutle:** workshop on IoT privacy, trust, and security, [2016] - dl.acm.org ... Camera A is a medium-priced camera system with extended features. It can store video streams in the cloud. This paper presented a security analysis of four video surveillance systems.

**MA Alsmirat, I Obaidat, Y Jararweh: Multimedia Tools [2017]**

:Springer for this configuration of video surveillance systems. IoT and cloud based large scale video surveillance system that was recently described. This work studied a surveillance system

**Omar Elharrouss, Noor Almaadeed, Somaya Al- Maadeed [2022]:** Security and monitoring systems are increasingly being deployed to control and prevent abnormal events especially in situational awareness applications, to ensure public security. The need of a system to ensure a good management and control of all life part in the society is also necessary. The main interest of these system is to simplify people's lives and make it automatically monitored and more secured. These systems have seen an exponential improvement during the past 20 years but it still is not able to cover all the needs. In this paper, a general review of video surveillance systems with a



presentation of existing VSS is provided. We started with a detailed presentation of the current surveillance systems and a study of their evolution. In addition, different components of a system are discussed regarding the architectures and the analyses in each system. The comparison of existing systems is presented. In this comparison we attempt to collect the architecture of different proposed systems also a comparison of functionalities and the analyses provided by each system are presented. As a final section of this review, a set of future trends of video surveillance systems was presented.

### III. VIDEO SURVEILLANCE SYSTEMS

Video surveillance is an active area of research. Object detection and tracking in video surveillance systems are commonly based on background estimation subtraction. The primary focus of today's video surveillance systems is the application of video compression technology to efficiently multiplex or store images from a large number of cameras onto mass storage devices (video tapes, discs). From the perspective of real-time threat detection, it is well known that human visual attention drops below acceptance levels, even when trained personnel are assigned to the task of visual monitoring. On the other side, video analysis technologies can be applied to develop smart surveillance systems that can aid the human operator in real-time threat detection. Specifically, multiscale tracking technologies are the next step in applying automatic video analysis to surveillance systems.

Application of video surveillance includes car and pedestrian traffic monitoring, human activity surveillance for unusual activity detection, people counting, etc. A typical surveillance application consists of three building blocks: moving detection, object tracking and higher level motion analysis.

Multimedia systems can provide surveillance coverage across a wide area, ensuring object visibility over a large range of depths and can be employed to disambiguate occlusion. Techniques that address handover between cameras, in configurations with sheared or disjoint views, are therefore becoming increasingly important. Events of interest identified as moving objects and people must be coordinated in the multiview system and events of special interest must be tracked throughout the scene.

Video surveillance systems with real-time video analysis give a promising view. These systems are still accurate for the real-time reactions that may also be delayed. In addition, the environmental changes present a limitation for any system.

**Analog surveillance system:** Over the last 20 years, the surveillance systems used analog technology. Analog signal processing technology is the basic model for image transmission, exchange, and recording using a short-distance coaxial cable and a long-distance transceiver optical fiber. Image restoration is one of the advantages of this system type, while the main drawback is represented in limited transmission distance, complex engineering cabling, and the application that can be inflexible.

**Digital surveillance system:** The analog system is the source of introduction of digital video recorders (DVR). In this stage, the computer network transmission system transmits the digital image files. The cameras are connected to the video server via IP network so that, the transmission is made using existing computer LAN or even Internet. Using a computer terminal network, controlling the camera and zooming a part of the scene can be achieved, whereas the traditional systems, transformed into distributed ones. The difference between the analog video surveillance and digital video surveillance is at the aspects of signal transmission, control, and storage. Using the efficient video encoding such as MPEG-4 and H264, in digital video surveillance systems, image monitoring could be performed with a remote transmission in all existing digital transmission networks and with low bandwidth.

Also, digital video surveillance ensures security, and remote transmission makes the applications more flexible. Unlike the analog video surveillance, digital video surveillance mainly accounts on signal processing innovations.

**Network surveillance system:** The network system is based on digital signal processing and involves network cameras or IP cameras which is a type of digital video camera. The system can connect as many IP cameras as needed directly to the IP network. Networking techniques are used to realize signal transmission, exchange, control and video storage. It can, also, perform a centralized control and management on all the devices (cameras, sensors).

Fig. 2 describes the functionalities of a video surveillance system by the definition of each part. The acquisition allows the acquisition of images using more or less sophisticated cameras. Some situations lead to using cameras with specifications very special (waterproof, wide-angle, IR, etc ...). The switching/processing part allows "dispatching" of video signals to recording and visualization functions. It also makes it possible to perform a treatment on the video (Brightness/contrast, motion detection, clutter emergency exit, etc ...). The recording of the videos is mainly done digitally. PTZ control allows control of the position of cameras with the functionality PTZ (Pan-tilt-zoom).

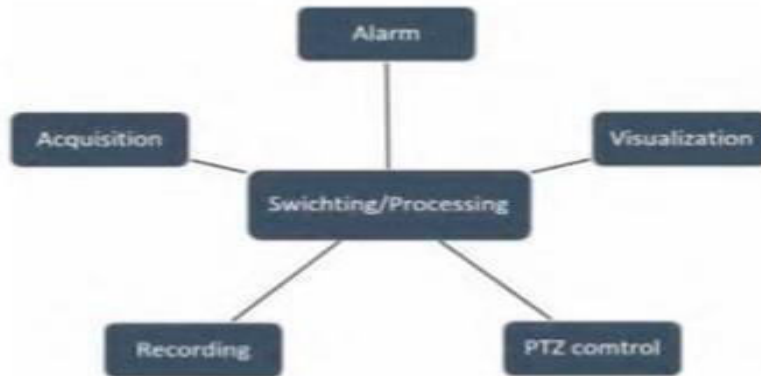


Fig. 2. Video surveillance system functionalities

#### IV. VIDEO SURVEILLANCE ANALYSES

Among the principal tasks of an automated surveillance system is to observe the surveilled environment using cameras, detect, and qualify easily the observed scenario and then raise alarms. The task can be, motion detection, objects tracking , objects detection, individual interactions and behaviors, person re- identification , crowd detection and management , etc. Fig. 3 represents the computer vision task related to video surveillancesystem.

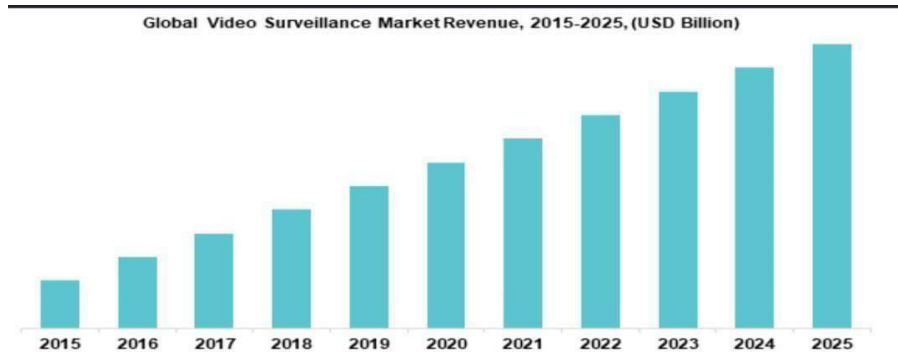


Fig. 3. Video analyses for VSS

There are many other tasks than the quoted ones, because in an intelligent system we can add functionalities to obtain a good performance. In this field and especially when a surveilled area that is crowded, we can extract a lot of information that can be useful for security of people, but this extraction can be difficult when the scene is complex. In addition, objects recognition and tracking pose a problem mostly in the environment with complex scenes and this is the main difficulty in computer vision for all the tasks. Computer vision tasks related to VSS.

- (a) Motion detection.
- (b) Object detection.
- (c) Action detection and recognition.
- (d) Person re-identification.
- (e) detection.

## V. COMPARATIVE RESULT



Previously in 2015 the global video Surveillance market size was valued at USD 38.9 billion and expected to grow significantly over the forecast period increasing demand for security observation products on account of rising criminal and threat activities is the key factor to propel the video surveillance system market by 2025.

The global Video Surveillance market size is expected to reach close to 76.4 by 2029 with an annualized growth rate of 9.4% through the projected period

## VI. CONCLUSION

As a final section of this review, a set of future trends of video surveillance systems was presented. This paper reviews and exploits the existing developments and different types of video surveillance systems which are used for object tracking, behavior analysis, motion analysis and behavior understanding. Security and monitoring systems are increasingly being deployed to control and prevent abnormal events especially in situational awareness applications, to ensure public security. The need of a system to ensure a good management and control of all life part in the society is also necessary. The main interest of these system is to simplify people's lives and make it automatically monitored and more secured. These systems have seen an exponential improvement during the past 20 years but it still is not able to cover all the needs. In this paper, a general review of video surveillance systems with a presentation of existing VSS is provided. We started with a detailed presentation of the current surveillance systems and a study of their evolution. In addition, different components of a system are discussed regarding the architectures and the analyses in each system. The comparison of existing systems is presented. In this comparison we attempt to collect the architecture of different proposed systems also a comparison of functionalities and the analyses provided by each system are presented. The inspiration of writing a survey paper on this topic is to evaluate and reach insight in visual surveillance systems from a big picture first. This enables us to understand and answer the questions like: What are the Developments and different stages involved in a visual surveillance system; how to detect and dissect behavior and intent; etc.

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