Chapter 4
All Pervasive Surveillance Techniques and AI-Based Applications:
Current Trends and Challenges

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ABSTRACT

Surveillance is the process of close observation of a person, place, or object to avoid and minimize the risk of any undesired dangerous situations or suspicious activities to maintain normalcy. However, manual surveillance techniques have certain constraints including unavailability of trained manpower and erroneous observation triggering tricky situations. The proliferation of the use of information and communication technologies (ICT) have increased the levels automation and have made it a part of surveillance application. The aspects of automation have greatly reduced human intervention and have made systems more reliable and efficient. The new advancements in internet of things (IoT) and artificial intelligence (AI) have made automation in surveillance security even more convenient and efficient. It has been found that the application of IoT and AI-based learning mechanism have made significant performance improvement for automated surveillance purpose. Here, the authors discuss some of the recent trends and challenges faced by all pervasive surveillance systems.

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INTRODUCTION

Over the years, a number of surveillance systems have been developed that have helped in managing security task, limiting the chances of intrusion or unauthorized access. The act of surveillance conducted for various reasons by different individuals, organisations, institutions etc. can be covert or overt depending on the requirement and intensity of applications. Security being the main issue today, protecting the life and property of the human has become a prominent matter of concern of the world today. The concept of security from manual door lock and key mechanism has now transformed into using more sophisticated security devices such as cameras, motion detection sensors, proximity sensors, alarms etc. In security surveillance system while maintaining the redundancy, the concept of total security is unavoidable such that the system continuously tracks the identity, location and activity of objects within the monitored space. A surveillance system typically focuses on tracking location and activity, while biometrics systems focuses on identifying individuals (Hampapur, Brown, Connell, Pankanti, Senior and Tian, 2004). The ability to recognise objects and humans, to describe their actions and interactions from information acquired by sensors is essential for automated visual surveillance (Valera and Velastin, 2004). The increasing need for intelligent visual surveillance in commercial, law enforcement and military applications makes automated visual surveillance systems one of the main current application domains in computer vision (Valera and Velastin, 2004).

With the advent of technologies and services, the facilities of interaction between human and machine has increased to a great extent. It is an often observed phenomenon of increasing the use of innovative security-aids with the rise in information and communication technology (ICT) and proliferation of human habitation. The user friendly nature and the facility to access to information has made automation a significant part of ICT systems. The automation has triggered many changes in the existing technologies. The security systems are designed taking into consideration the safety of the person or objects. Thus, providing security lies in factors such as equipment or technology and people. Taking into account the various issues related to security such as ease of access, lack of intrusion detection alert, inefficient monitoring method (Ansari, Sedkyl, Sharma and Tyagi, 2015), the different methods employed in monitoring is the key to prevent dangerous situations. This involves resorting an automated approach of monitoring and controlling once deployed. The ability of the network devices to connect to various other devices involves collection of a large amount of data from around the world and sharing that data over the internet, a host of application has been evolving, making revolution in technology. A part of such a technology and mechanism lies in continuous monitoring of the sensitive areas like home or areas such as an office, institutions, traffic point, airport entrance, defence installations, hospitals, roadsides, buildings, elevators, commercial organisations etc.