

Chapter 8

Learning–Aided IoT Set–Up for Home Surveillance Applications

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ABSTRACT

Of late, home surveillance systems have been enhanced considerably by resorting to increased use of automated systems. The automation aspect has reduced human intervention and made such systems reliable and efficient. With the proliferation of wireless devices, networking among the connected devices is leading to the formation of internet of things (IoT). This has made it essential that home surveillance systems be also automate using IoT. The decision support system (DSS) in such platforms necessitates that automation be extensive. It necessitates the use of learning-aided systems. This chapter reports the design of IoT-driven learning-aided system for home surveillance application.

INTRODUCTION

Most, security systems required an automated approach of monitoring, verification and execution. A significant part of it involves real-time monitoring, capturing hundreds and thousands of images each day, recording the contents as streams of videos of different objects and deriving decisions. It is relevant for all sensitive areas like home, an office, institutions, traffic point, airport entrance, defense installations, hospitals, roadsides, buildings, elevators, or any other property/asset or resource used and accessed by human beings. Most of the time the primary sensor or pickup device used for surveillance and monitoring is the camera which may be placed at different locations. With tremendous growth in information and communication technology (ICT) and the proliferation of human habitation, the demand for increasing use of innovative security aids have become an often observed phenomena. The role of Information

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and Communication Technologies (ICT) is significantly increasing in our everyday lives and it has a predominant influence on the development of the economy and information society (Inas, 2018). The positive impact across various economic sectors in the interdisciplinary applications is only possible with the growth of these technologies. In Luxembourg, ICT is largely used for the development of innovative products and services in order to address societal, market, and business challenges. Nowadays, IoT is considered to have a potential to advance the quality of life of the citizens and economic growth of the country. Adoption of IoT technology in various domains, such as Smart cities, Smart transportation, Smart logistics, Smart industry, Smart meter and Smart grid improves their current operational efficiency and interaction with the people.

Security systems thus talks using the language of images it captures and processes the image to derive some decision as done by the brain. Security and safety are two intertwined terms. It is a common belief that when a place or system is secure, it is safe. Security and safety are always intertwined and it is impossible to design a security system without taking into account the safety of the object or person into consideration. Security whether it be in industry or government or any other sensitive areas including home or personal assets has myriads of context ranging from individuals to nation-wide. AI and machine learning (ML) technologies are now being widely employed and developed across the spectrum of security are an unavoidable and important matter of concern of the world. For the purpose of identification of unknown process or factors can be done by training the network to predict the sequences originated from the sources. The perception of human motion is one of the most important skills people possess and the visualization system of the people provides rich information. Human motion analysis has received much attention in last few decades due to the plethora of its applications. The immense amount of video data being recorded and collected every day from surveillance security cameras it has become an essential task to automatically analyze and understand the contents. The paper reports the work related to the integration of three devices for physical intrusion detection. This paper throws light on the means of increasing the level of security in sensitive areas including home. This paper intends to show that a system with more than one security device in place tends to prevent unauthorized access.

The surveillance system in the proposed work is formulated using an embedded system connected to a control unit. Most security arrangements based on vision require human intervention for decision making. Therefore, there is a necessity to urgently automate the mechanism using learning aided tools so that the system is independent of human intervention once it is deployed. The primary mechanism of which will revolve around the working of the learning aided decision support system (DSS) which continuously learns to discriminate between authorized and unauthorized entries.

Of late, automation has triggered many changes in the existing technologies. These, due to their user-friendly nature and the facilitation of access to information, have become indispensable elements of Information and Communication Technology (ICT) systems. Further, catalyzed by connected states of systems and networking between devices, DSS have become real-time. Most networked devices are being provided with the ability to adapt to the deployed environment. With the ability of network devices to sense and collect data from around the world, and then share that data across the internet, a host of applications are evolving. We are now entering into the era of 'Internet of Things (IoT)', and Artificial Intelligence (AI) working together.

Providing security relies on two main elements:

1. Equipment or technology
2. People

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