Chapter 11
Intelligent Surveillance on Wireless Sensing and Recognition of Suspicious Activities in Crowded Environments

R. Radhika
https://orcid.org/0009-0005-2415-4930
Bharath Institute of Higher Education and Research, India

A. Muthukumaravel
Bharath Institute of Higher Education and Research, India

ABSTRACT

Intelligent surveillance systems are crucial for monitoring densely populated areas for a wide range of applications, including security and crowd control. The primary objective of this study is to use wireless sensing technologies in order to identify and analyze the actions of subspecies inside various habitats. The suggested system utilizes sophisticated machine learning algorithms to differentiate and evaluate various actions in congested areas, hence improving situational awareness and decision-making. Wireless sensors facilitate the gathering of data in real-time, allowing for prompt reactions to identified abnormalities or suspicious activities. Moreover, the system's capacity to identify distinct behaviors provides a more intricate comprehension of crowd dynamics, enabling customized actions and allocation of resources. This study makes a valuable contribution to the advancement of intelligent surveillance systems

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INTRODUCTION

Intelligent surveillance systems have emerged as essential instruments for the observation of densely populated areas, fulfilling a diverse array of functions, including security enforcement and crowd control in public domains. With the ongoing increase in population density in metropolitan areas, there is a growing need for the use of efficient monitoring systems. Conventional surveillance techniques often have difficulties in dealing with the intricacies present in densely inhabited areas, where several actions take place concurrently, making it difficult to distinguish essential information within the cacophony (Yuxuangu et al., 2023). In light of these obstacles, scholars and practitioners have resorted to using new technologies, including wireless sensing and identification systems, in order to devise surveillance solutions that are more effective and intricate (Zhu et al., 2022). The primary objective of this study is to examine the use of wireless sensing technologies in conjunction with sophisticated identification algorithms to identify and classify the behaviors of animals in densely populated settings. The concept of "subspecies activities" pertains to the vast array of behaviors and actions shown by individuals within a collective group. The activities may exhibit significant diversity, including regular motions, interactions, and behaviors, as well as possible dangers or irregularities that might jeopardize public safety (Wang and Breckon, 2022). It is essential to identify and comprehend these behaviors in order to carry out monitoring effectively and take aggressive action when needed. Conventional surveillance systems often depend on stationary cameras or human intervention, both of which possess inherent limitations in their capacity to acquire instantaneous data and evaluate intricate behaviors inside densely populated settings (Yu et al., 2022). Wireless sensing technologies use a network of dispersed sensors to gather data from different locations within the monitoring area, providing a more dynamic and adaptable approach. The sensors used in this context include a range of devices, including WiFi routers, Bluetooth beacons, and specialized motion detectors. These sensors provide extensive coverage and precise monitoring of population movements and activities (Deepak Babu, 2022).

The use of wireless sensor technology with sophisticated recognition algorithms allows for the real-time analysis of gathered data, facilitating the identification of patterns and anomalies that may indicate the behaviors of certain subspecies. Machine learning methodologies, including deep learning and pattern recognition, are crucial to this procedure since they facilitate the system's ability to acquire knowledge and adapt to diverse surroundings and tasks as time progresses. Wireless sensing-based surveillance systems provide a significant advantage in their capacity to furnish security personnel and decision-makers with instantaneous situational awareness. Through the ongoing surveillance of the surrounding environment and the examination of incoming data streams, these systems possess the capability to

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