Chapter 12
Intrusion Detection and Analysis in IoT Devices Using Machine Learning Models

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ABSTRACT

This study proposes utilizing deep learning and machine learning techniques to identify network anomalies. The IoT-23 dataset serves as the basis for the analysis. The proposed approach models are designed to classify network flows as benign or assign them to one of the 11 labels in the dataset, as well as to differentiate between malicious and benign connections. Performance and time costs of various models are compared to determine the optimal algorithm for maximum performance in minimal time. This comparison identifies the better performing model with the least overhead cost for deployment on IoT devices, ensuring the security and privacy of users by blocking malicious connections. The experimental results show that decision tree offers maximum efficiency and the lowest overhead cost, making it suitable for use in IoT devices.

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INTRODUCTION

The Internet of Things (IoT) is the network of physical devices that can see, learn from, and respond to their surroundings through the use of underpinning networking protocols. It has developed as a result of advancements made in the fields of embedded technology, Wireless Sensor Networks (WSNs), and established networking protocols to make it easier for smart objects to communicate with one another (Gubbi et al., 2013). These days, IoT devices are being incorporated into practically every industry, including manufacturing, transportation, healthcare, smart disaster management systems, smart homes, smart cities, and smart grid systems as shown in Figure 1.

Figure 1. IoT device incorporation

Human engagement in these industries is extremely challenging. The number of IoT devices connected worldwide is nearly 13.14 billion in 2022, with the count forecasted to increase every year. Figure 2 depicts the expected number of IoT devices by 2030. IoT networks have numerous difficulties that necessitate upgrading traditional internet infrastructure (Neshenko et al., 2019).

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