


Chapter 18

Smart City Approaches Using Machine Learning and the IoT

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ABSTRACT

Machine learning has attracted the interest of academics and industrialists and is likely to develop. Machine learning may deliver widespread wireless connectivity. Machine learning enables the internet of things (IoT), which allows objects to communicate without human intervention. Healthcare, smart grids, vehicular communications, etc. use machine learning. The authors explore IoT-based machine learning methods applied in these sectors and others. Lessons learnt and judgments of machine learning's use in IoT networks are also discussed here.

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1. INTRODUCTION

IoT is a connection of diverse, portable devices. The low power WAN (Bing et al., 2022) provides large area expanse for restricted IoT devices. IoT links billions of devices for communications, sensing, data collecting, along with analysis. It presents newer possibilities and difficulties. By 2025, 20.4% more IoT devices are predicted to connect to the Internet. IoT gives continuous chances and networks to boost the efficiency of existing explanations regulating industrial network expansion. With high-tech advances and smart appliances, data is gathered regarding smart Fog, healthcare, smart cities, industries, smart homes, waste management smart Cloud (Abualigah & Alkhrabsheh, 2022) and smart cars (Krishnan et al., 2022). These apps create an environment where all gadgets interact to form smart cities, households, and industries. Smart cities boost security (Pandey et al., 2022), efficiency, privacy, and living quality. Smart healthcare, grids and traffic management are smart city features.

This chapter explains ML approaches for IoT applications like smart grids, healthcare, environment, agriculture, VANETs and device management. According to a research, machine learning enables acquisition without explicit programming. A better description of machine learning is given in (Mehta, Bhushan, & Kumar, 2022), that defines it as a software that learns from experience e about job j and a few performance estimate p , if its performance on job j increases having experience e calculated by p . The approaches are described by their applications and contributions. We're the first group to examine machine learning methodologies for IoT-enabled gadgets to our knowledge. No article has catalogued IoT-enabled machine learning approaches in medical, transportation, environmental, and agricultural areas.

2. IOT-DEPENDENT ML TECHNIQUES

This section contains articles on ML applications in the environment, healthcare, VANET, device security, agriculture, energy management.

2.1. Medical ML

According to the WHO, an unhealthy lifestyle is one of the leading causes of mortality. Existing health monitoring techniques have restricted intelligence. A clever, smart system is required to track users' psychological and physiological wellness. In this sense, numerous techniques are provided below.

2.1.1. SPHC

Hossain, Muhammad, and Alamri (2019) proposes a smart private healthcare counselor (SPHC) to analyze users' health. Physiological conditions may be studied using bodily characteristics like heartbeat, body temperature and blood pressure that are usually received through (i) structured data—the patient's medical history, (ii) text data—physicians' analysis, and (iii) recorded and picture data—medical equipment. Psychological circumstances are difficult to recognize, thus they are cleaned from speech and facial expressions via Bayesian fusion technique. For this technique, data is integrated and psychological user traits are retrieved to identify the situation. Fig. 2 shows this.

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