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Deep Learning Solutions for Real-Time Monitoring of CO_2 Levels in Smart City Environments

Sam M. K., Lima Hongou, Sofia Arkhstan

1. The Higher Institute of Telecommunication & Engineering, Information Technology Department, Philippines
2. Faculty of Engineering, Computer Technology, UCSI University, Kuala Lumpur 56000, Malaysia
3. Department of Computer System, South Ural State University, 454080 Chelyabinsk, Russia

Abstract:

The continuous monitoring and management of CO_2 emissions are essential for developing sustainable and livable smart cities. This study introduces a deep learning-based framework for real-time CO_2 level monitoring across urban environments using IoT sensor networks. Data collected from strategically deployed sensors in traffic zones, industrial areas, and residential neighborhoods are analyzed using advanced deep learning models such as Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks. These models enable accurate prediction and pattern recognition of CO_2 concentration trends, facilitating timely interventions and policy decisions. The integration of deep learning enhances data interpretation, anomaly detection, and system scalability. Results demonstrate the model's effectiveness in providing high-resolution, real-time insights into urban air quality dynamics, supporting environmental sustainability, and informing smart governance strategies.

Keywords:

CO_2 monitoring, deep learning, smart cities, real-time systems, air quality, environmental sustainability.

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