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Deep Learning Applications in Air Quality Monitoring for Sustainable Smart Cities Optimization

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Abstract:

Air quality monitoring is essential for the health and sustainability of urban environments, particularly in smart cities striving for optimal resource management and environmental quality. This study investigates the application of deep learning techniques for real-time air quality monitoring in urban settings. By integrating advanced deep learning models, including Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks, the research aims to enhance the accuracy of air pollution forecasting and pollutant concentration predictions. The proposed system utilizes IoT-based sensors deployed throughout smart cities to gather continuous environmental data, which is then processed by the deep learning models to identify patterns, predict pollution levels, and optimize air quality management strategies. Results demonstrate that deep learning models outperform traditional methods in terms of prediction accuracy and response time, providing a powerful tool for ensuring a sustainable urban ecosystem. This approach offers scalable solutions for improving air quality in smart cities, directly contributing to their environmental goals.

Keywords:

Deep learning, air quality monitoring, smart cities, IoT, sustainability, optimization.

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