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Deep Learning Solutions for Real-Time Air Quality Control and Virus Detection Systems

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Abstract:

The increasing prevalence of air pollution and airborne viruses has prompted the need for intelligent systems capable of real-time monitoring and response. This study presents a dual-purpose deep learning framework for simultaneous air quality control and virus detection using IoT-integrated sensor networks. Environmental and biological data are collected in real time from distributed sensors, including particulate matter levels, volatile organic compounds, temperature, and humidity, as well as pathogen biomarkers. Convolutional Neural Networks (CNNs) and Long Short-Term Memory (LSTM) networks are employed to process and classify the data, enabling timely identification of hazardous air conditions and potential viral threats. The system is designed to trigger automated responses, such as ventilation control or health alerts, enhancing public health safety. Experimental validations show that the proposed framework achieves high accuracy, low latency, and scalability, making it a robust tool for smart city health and environmental management.

Keywords:

Deep learning, air quality control, virus detection, IoT, CNN, LSTM.

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