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Machine Learning-Based Optimization of Air Quality Monitoring Systems in Urban Smart City Networks

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Abstract:

Air quality monitoring has become a critical component of urban planning in smart cities, where real-time environmental insights are essential for public health and sustainability. This research presents a machine learning-based framework for optimizing air quality monitoring systems within urban smart city networks. The proposed system integrates data from distributed IoT sensors to model and predict pollutant levels using advanced machine learning algorithms such as random forests, support vector machines, and deep neural networks. Feature selection and data fusion techniques are employed to enhance prediction accuracy and reduce sensor redundancy. Results from case studies in metropolitan areas demonstrate improved air quality forecasting, enabling proactive environmental management and policy interventions.

Keywords:

Air quality, smart city, machine learning, IoT, environmental monitoring, optimization.

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