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An Improved Fire Detection Approach Based On Yolo-v8 for Smart Cities

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Abstract: *Systems for detecting fires are essential for preventing property damage and saving lives. defending people and property. Conventional techniques frequently depend on sensor-based strategies, which have limitations in intricate settings. In order to improve accuracy and efficiency, this study suggests an intelligent fire detection system that makes use of machine learning and computer vision techniques. The technology analyzes video streams in real time using deep learning algorithms to identify fire incidents based on visual patterns and attributes. Future research on fire detection systems will benefit from the information this study will provide for smoker and fire detection issues in both indoor and outdoor situations. The improved fire detection technique for smart cities that is based on the YOLOv8 algorithm is the smart fire detection system (SFDS), which uses deep learning to identify fire-specific properties in real-time. The SFDS strategy may be more cost-effective, reduce false alarms, and improve fire detection accuracy when compared to traditional methods.*

It can also be extended to find other intriguing aspects of smart cities, such as gas leakage or flooding. The proposed smart city framework consists of four primary levels: the application layer (i), cloud layer (iii), fog layer (ii), and internet of things layer (iv). The recommended technique uses fog, cloud computing, and the Internet of Things layer to collect and understand data in real time. This reduces the chance of damage to persons or property and enables faster reaction times. The SFDS demonstrated state- of-the-art performance in terms of precision and recall, with a high precision rate of 97.1% across all classes. Among the potential applications are intelligent security systems, forest fire monitoring, and public space fire safety management.

Keywords: smart city, fire detection,yolo-v8, deep learning