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| Title | Real-time smoke and fire detection using you only look once v8-based advanced computer vision and deep learning | | |
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| Abstract |  |
| Fire and smoke pose severe threats, causing damage to property and the environment and endangering lives. Traditional fire detection methods struggle with accuracy and speed, hindering real-time detection. Thus, this study introduces an improved fire and smoke detection approach utilizing the you only look once (YOLO)v8-based deep learning model. This work aims to enhance accuracy and speed, which are crucial for early fire detection. The methodology involves preprocessing a large dataset containing 5,700 images depicting fire and smoke scenarios. YOLOv8 has been trained and validated, outperforming some baseline models- YOLOv7, YOLOv5, ResNet-32, and MobileNet-v2 in the precision, recall, and mean average precision (mAP) metrics. The proposed method achieves 68.3% precision, 54.6% recall, 60.7% F1 score, and 57.3% mAP. Integrating YOLOv8 in fire and smoke detection systems can significantly improve response times, enhance the ability to mitigate fire outbreaks, and potentially save lives and property. This research advances fire detection systems and establishes a precedent for applying deep learning techniques to critical safety applications, pushing the boundaries of innovation in public safety. | |