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A CNN-Based Framework for Video Analysis and Accident Detection

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Abstract: This research investigates the development and deployment of a Convolutional Neural Network (CNN) model for automatic accident detection in CCTV footage. The ever-increasing reliance on video surveillance necessitates efficient and accurate methods for accident identification. CNNs, with their inherent ability to learn complex spatial relationships within images, are particularly well-suited for this task. This study proposes a CNN architecture that utilizes a pre-trained MobileNetV2 base for feature extraction, followed by a custom classification head tailored to the specific task of accident vs. no accident classification. The model is trained on a dataset of grayscale video frames, achieving an impressive accuracy of 92% on the testing set. This high level of accuracy suggests that CNNs hold significant promise for real-world accident detection applications. Furthermore, to bridge the gap between research and practical implementation, the model is converted to a TensorFlow Lite (TFLite) format for deployment on resource-constrained devices. Additionally, a user-friendly frontend application is developed, empowering users to interact with the model and analyze both images and videos. This user-centric approach broadens the model's accessibility and paves the way for potential improvements in road safety through real-time accident detection.

Keywords: Convolutional Neural Network (CNN), Accident Detection, CCTV Footage, MobileNetV2, Computer Vision

