Smart AI- Powered Traffic Surveillance System for Identifying using Optimized Deep Feature Engineering with Fuzzy Capsuled Convolution Neural Network

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Abstract

Traffic surveillance systems, once a futuristic concept confined to science fiction, are now an indispensable component of modern urban planning and traffic management strategies. These systems, leveraging a complex interplay of sensors, communication networks, and sophisticated software, provide real-time data and analytical insights that enable authorities to monitor, understand, and ultimately optimize traffic flow. Traditional methods for traffic surveillance often struggle with accurately identifying traffic feature entities and objects. In most forums, Preliminary methods are failed to identify the traffic feature entities object presence based on traffic pattens leads poor performance accuracy due to higher image degradation and false positives. So, the complexity increases to finding the traffic surveillance irregularities is difficult. To resolve this problem, we propose an advanced traffic surveillance system based on deep feature engineering with fuzzy capsuled convolution neural network (FC-CNN). Initially the traffic videos are collected from real time traffic monitoring system to take for converting videos into frames. Then preprocessing is carried out with adaptive mean Wavelet Filter (AMWF) to normalize the image frames. Next to segmentation is carried out by Entity pattern watershed segmentation (EPWS) to identify the object entities of traffic patterns objects entities based on feature recognitions. initially fuzzy capsuled Convolution neural network is applied to find the irregularities finding of helmet missing, triples flow, wrong route and other anomalies. The proposed system produces high traffic surveillance detection rate to perform best in higher precision rate, improved detection accuracy in true positive rates with redundant false rate. the proposed system archives improved accuracy compared to the other preliminary methods to support traffic patterns rules. This results in superior performance compared to existing preliminary methods and supports the enforcement of traffic pattern rules with improved accuracy. This novel approach offers a robust and reliable solution for enhancing traffic surveillance and promoting safer road conditions.

Keywords

Traffic Surveillance, Deep Feature Engineering, Fuzzy Capsule Convolutional Neural Network, Anomaly Detection, Image Preprocessing, Watershed Segmentation, Wavelet Filter, Traffic Irregularities.