A Novel Intelligent Video Surveillance Mechanism to Real-Time Identify Abnormal Activities

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The main reason for the existence of most anti-corruption laws today is the inability to address the root causes. Abnormal behaviors occur through robbery, corruption, murder, threats, etc. Proper solutions to these are implemented only after abnormal incidents occur. Some CCTV cameras support object detection, but nothing beyond that. Manual monitoring of CCTV footage for abnormal events is laborious and time-consuming. Therefore, this study aimed to develop a new method for real-time identification of abnormal behavior in fighting scenes using a 3D Convolutional Neural Network (CNN) based spatiotemporal autoencoder. Initially, the study suggested an intelligent video surveillance system which uses deep learning techniques, including facial expression detection with CNN and YOLO v7. However, the accuracy of facial expression detection alone is limited in the real world. The proposed video surveillance system accurately detects abnormal fights by comparing a specially prepared video stream to frames generated by an autoencoder. A model was created using TensorFlow and other libraries to identify fighting scenes in a video stream through spatio-temporal encoders. After studying the proposed method using three case studies respectively, the last case study was able to reach the desired result. They were also tested on three different publicly available datasets: fer2013.csv facial expression dataset, emotion-facial-expression dataset in the Roboflow library, and CUHK Avenue dataset. The three case studies aimed to detect abnormal behavior in real-time, and the last method proposed achieved a 72.56% accuracy in identifying fighting scenes. Furthermore, future research could be carried out on this approach by studying areas with highly reported fighting incidents and developing new models specifically for those areas. The proposed system has the potential to detect abnormal activities in real-time, which can be useful in addressing the problem of abnormal behavior in both public and private environments.

Keywords: Abnormal, Activities, Machine Learning, Real-Time, Video Surveillance