

Large-Scale Deep Learning Framework for Video Anomaly Detection in Surveillance Environments

Dr. Kakumani K C Deepthi

Department of Computer Science and Engineering, SRM University, Andhra Pradesh, India

Pavan Prabhas Karri

Department of Computer Science and Engineering, SRM University, Andhra Pradesh, India

Vaishnavi Vemulapalli

Department of Computer Science and Engineering, SRM University, Andhra Pradesh, India

Sai Rishika Kotnani

Department of Computer Science and Engineering, SRM University, Andhra Pradesh, India

Dinesh Dhaniyala

Department of Computer Science and Engineering, SRM University, Andhra Pradesh, India

Abstract:

Video surveillance systems produce a massive amount of visual data which need to be constantly monitored in order to detect abnormal activities such as violence, theft, or suspicious behavior. Manual surveillance footage monitoring is inefficient and error-prone, hence the development of automated surveillance anomaly detection systems. This paper proposes a framework for detecting abnormal human activities in surveillance images and videos based on deep learning. The proposed system works by using two-dimensional Convolutional Neural Network (2D-CNN) for the spatial feature extraction from input visual information and Multilayer Perceptron (MLP) classifier to categorize the activities into normal and multiple anomaly classes of activities such as abuse, assault, burglary, fighting, shooting, shoplifting, stealing, and explosion. For video inputs, frames are extracted based on fixed intervals and analyzed separately, and predicted result is achieved by aggregate result of frame level. The system is deployed via a lightweight web-based application where the users can upload images or videos, do the anomaly detection and store the prediction results for further analysis. Experimental evaluation shows that the proposed approach can well determine the abnormal activities in surveillance environments while keeping computational efficiency suitable for the implementation in real-time applications. The framework offers the end-to-end solution of deep learning inference and practical system deployment for intelligent surveillance systems.

Keywords:

Anomaly detection, Surveillance Systems, 2D convolutional neural networks, Multi layer perceptron, Video Analysis, Deep learning.