


Chapter 4

Detection of Video Anomaly in Public With Deep Learning Algorithm

M. Dhurgadevi

 <https://orcid.org/0000-0002-3156-9545>
Sri Krishna College of Technology, India


D. Vimal Kumar

Hindusthan Institute of Technology, India

R. Senthilkumar

Hindusthan Institute of Technology, Coimbatore, India

K. Gunasekaran

 <https://orcid.org/0000-0003-1677-6308>
Sri Indu College of Engineering and Technology, India

ABSTRACT

For traffic control and public safety, predicting the movement of people is crucial. The presented scheme entails the development of a wider network that can better satisfy created synthetic images by connecting spatial representations to temporal ones. The authors exclusively use the frames from those occurrences to create the dense optical flow for their corresponding normal events. In order to eliminate false-positive detection findings, they determine the local pixel reconstruction error. This particle prediction model and a likelihood model for giving these particles weights are both suggested. These models effectively use the variable-sized cell structure to produce sceneries with variable-sized sub-regions. It also successfully extracts and utilizes the video frame's size, motion, and position information. On

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the UCSD and LIVE datasets, the proposed framework is evaluated with the most recent algorithms reported in the literature. With a significantly shorter processing time, the suggested technique surpasses state-of-the-art techniques in relation to decreased equal error rate .

INTRODUCTION

Presently, there has been a widespread use of surveillance cameras both in public and private areas. However, surveillance monitoring is usually done by humans. It is a tedious and time-consuming task. Due to the rapid increase of surveillance cameras, it is difficult to efficiently and effectively monitor many surveillance cameras with humans, leading to a need to automate surveillance monitoring. Using a computer vision system to monitor all surveillance cameras to detect abnormal or anomalous events instead of humans is the aim of video anomaly detection (VAD).

Anomalous events are activities that occur at an unusual location and/or unusual period. Examples of anomalous events, especially for surveillance monitoring, are fighting, stealing, arson, accidents, and so on. Note that being anomalous highly depends on the scene and context, i.e., some events is considered normal at some places/times but anomalous at some others. For example, riding a horse on an expressway is considered anomalous but is normal on a ground field. Its dependency on the context makes anomaly detection more challenging.

Some kinds of anomalies can be detected at the image level, so-called image anomaly detection. That is, given only an image as input, anomaly detection can be done by either detecting unusual objects (object-level anomaly detection) or detecting unusual relationships between objects and scenes (scene-level anomaly detection). For the example of horse riding, detecting a horse and recognizing the background scene is sufficient for anomaly detection. However, image anomaly detection can only utilize spatial information while ignoring temporal information.

For some other examples of anomalous events such as sudden movement or loitering, both spatial and temporal information are crucial. To detect these kinds of anomalies, it is required to know how objects move and how the relationships among objects and scenes change. Hence, it is difficult to achieve at the image level. VAD, on the other hand, aims to analyze a video input to detect and localize unusual events/activities (event-level anomaly detection) using spatiotemporal information. Given an input video, an expected output of a VAD system is a list of start/end times of all anomalous events found. So we can know which frames contain or do not contain anomalous events, enabling a VAD system to generate an alarm for human staff when it is detected. Some VAD systems can further identify

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