



## DEEP LEARNING FOR DETECTING ABNORMAL ACTIVITIES IN SURVEILLANCE VIDEOS

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### Abstract

The ability to spot unusual behaviour is crucial in monitoring which is used to record anomalous human behaviour without requiring much human effort, i.e., the system ability to automatically take video and to detect abnormal activity. Human fall detection is namely the detection of a person rapidly leaping down which has significant security and safety implications. This application involves explosion risk, violence detection, theft identification and it is also used to improve security in many ways. The objective is to automatically identify and mark occurrences that need human attention using computer algorithms and deep learning approaches. This research provides a framework for action detection to address the limitations of existing methods for activity identification by using STAE (Spatial Temporal Auto Encoder) model to find anomalous activity.

**Keywords:** Abnormal event, Normal event, surveillance, Anomalous Human Behaviour, Normalization.

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## 1. SCOPE

The concept can be applied to video surveillance systems to quickly identify unusual activities, such as intrusion or vandalism. The model is used on the typical patterns of behaviour in a given environment and spot any departures from those patterns. In surveillance videos, anomalous behaviour can be found using spatial temporal autoencoder models.

## 2. INTRODUCTION

Closed-circuit television, also known as CCTV, is used for video surveillance. People are becoming more and more interested in applications of video surveillance. The identification and detection of human activity in general, and abnormal activity in particular, is a topic of extensive investigation. The observation of old and disabled persons at home, in care facilities, or in hospitals is a significant application and we will keep an eye on actions that take place in locations including indoor settings, buildings, surroundings, highways, traffic intersections, etc. The detection and classification of human activities are made possible by a relatively new field called recognition of human activities, which has now expanded to include the recognition of normal and pathological activities. Due to its recentness and interest, this field has caught the interest of numerous researchers who are working to find solutions to the challenges associated with studying these kinds of activities. The recommendations put forth up to this point, meanwhile these are essentially the same as those for the recognition of typical human activities. Human activity recognition is a relatively new area that seeks to give tools for identifying and categorizing human actions, with the goal of determining whether such actions are typical or deviant. The goal of the latter is to act swiftly in order to save lives or to guarantee people access to services they

can't offer for themselves. For obvious reasons (its novelty and potential for intriguing study), this area has garnered the attention of many scholars. In this paper, we propose a summary and analysis of the prior works in order to give researchers a broad overview of what has been done in this area and to give them a tool to help them with fresh ideas according to the situations.

## 3. RELATED WORK

**“Methods for recognizing human actions are discussed. AI and Robotics: New Horizons,”**

Background noise, partial occlusion, variations in size, perspective, lighting, and look are only some of the obstacles that make it hard to recognize human actions in surveillance videos or still photographs. Multiple activity recognition is necessary in several fields, such as video surveillance, human-computer interaction, and robots for characterizing human behaviour. In this paper, we survey the most up-to-date findings in the study of human activity categorization. We suggest classifying methods used to study human behaviour and talk about their uses and limits. In specifically, we classify approaches for identifying human activities into two broad groups: those that include data from several modalities and those that do not. Sub-categories are then studied for all of these categories to see how they mirror human behaviours and what types of pursuits they are engaged in. In addition, we analyse the current open-source human activity categorization datasets and look at the criteria for the perfect human activity identification dataset. Lastly, we highlight some outstanding challenges in human activity recognition and reflect on the features of future research areas in this area.

## “Recognizing Abnormal Human Behaviour in Videos: A Literature Analysis”

Much scientific effort has been focused on modelling people's behaviour and behavioural patterns for the discovery or detection of unique events in recent years. There are a wide variety of approaches that may be used to construct intelligent vision systems that interpret scenes and correctly infer semantic meaning from the motion of moving things. The most common uses are in security systems, video search engines, and user interfaces. Not only does this article provide an expansion and update to analogous surveys from the past, but it also zeroes down on contextual aberrant human behaviour identification, particularly as it relates to video surveillance. The primary objective of this review is to thoroughly catalog current approaches and define the material in a way that highlights significant problems.

### 4. METHODOLOGY

Several stages are required to identify unusual activity in surveillance films using a spatial temporal autoencoder (STAE):

**Data collection:** Data collection is the initial stage in acquiring surveillance video frames to examine for anomalous activities. These videos might have been taken using a range of surveillance methods such as CCTV cameras, drones, and other devices.

**Data Pre-processing:** To remove background noise and undesired video content, the collected video frames are first processed. To make the videos smaller,

they can also be resized or downscaled. Using this, we will extract each image pixel and then normalise the image pixel values between 0 and 1.

**Training:** The STAE model is trained using the extracted features. The model gains the ability to encode typical behaviour and decode abnormal behaviour throughout training. Using the STAE model, features are recovered from the pre-processed videos. Convolutional neural networks (CNNs) are a type of deep learning model that are used to extract spatial and temporal characteristics from video frames.

**Anomaly Detection:** The STAE model is used to find unusual activity in the surveillance recordings after training. The model contrasts the input video's encoded properties with the ingrained usual behaviours. The model defines the input video as anomalous if the encoded features considerably vary from the ingrained usual activities.

### 5. RESULTS

The STAE (Spatial Temporal Auto Encoder) deep learning algorithm was used in this project to predict abnormal behaviour. The model was trained on frames of videos of people walking normally, and then it was fed a test video. The model analysed the STAE pattern and returned an event, the event was then compared to the frame using Euclidean distance, the application displays an alarm message as seen in the figure if the distance exceeded a certain threshold value.

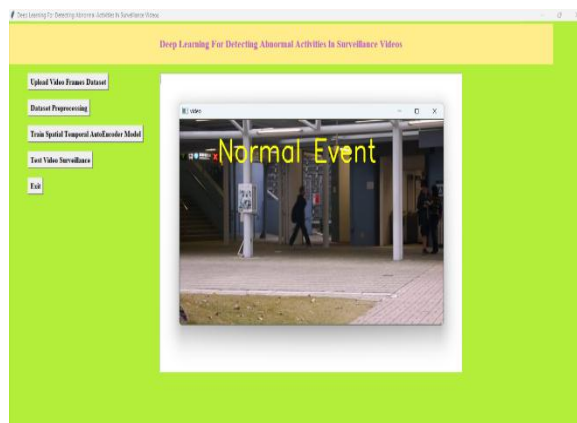


Figure 1 Displaying Normal Video

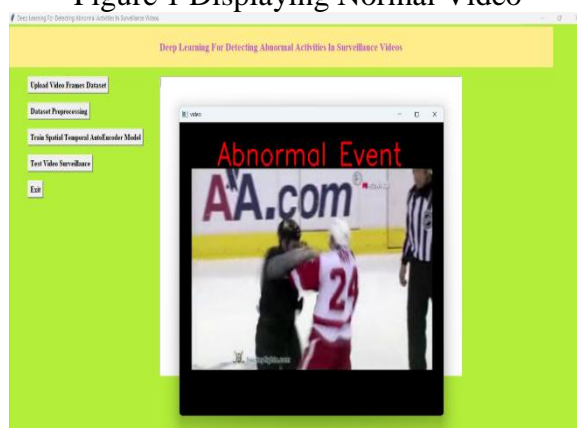


Figure 2 Displaying Abnormal Video

## 6. CONCLUSION

The suggested method is meant to pave the way for future developments in the area of surveillance cameras and provide the foundation for detecting unusual actions. User monitoring will be simplified. It has been very challenging to keep track of unusual occurrences in areas like security, criminal prevention, and traffic monitoring. When an unexpected event is detected, the user will get a notification. The current number of criteria is an effort to encompass all relevant features of video surveillance, from the most fundamental to those that have been ignored but should not be. This study provides a short survey of current research goals in the subject of video surveillance, with a focus on the identification of anomalous human actions. In order to identify suspicious behaviours, we have deployed the STAE model. In conclusion, this work provides the framework for

detecting anomalous actions using video surveillance by analysing current research efforts in the area.

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