

EMPLOYABILITY OF DEEP LEARNING APPROACHES IN ENHANCING THE EFFECTIVENESS OF SUSPICIOUS ACTIVITY DETECTION IN VIDEOS

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ABSTRACT

In today's sceptical world, video surveillance is fundamental in keeping up with indoor and outside security. Real-time applications can include video surveillance system components like behaviour understanding, behaviour detection, and classifying normal or suspicious activity. This article identifies suspicious behaviours of loitering, fainting, and trespassing using a hierarchical method. This approach depends on movement properties between various items. Initially, a semantic approach is used to define various suspicious activities. Background removal is then used to identify objects. Live (human), or non-live (bag) objects can be detected. Correlation methods are used to keep track of these objects, which need to be tracked. At last, movement elements and worldly data arrange occasions as typical or dubious. A semantics-based approach brings about low computational intricacy and high productivity.

I. INTRODUCTION

Lately, there has been an expansion in viciousness and crime percentages worldwide. Different devices are used to limit or control what is happening. The best option for both private and public locations is video surveillance. Video surveillance can efficiently identify suspicious or unusual activity. Humans manage the vast majority of current surveillance systems.

As a result, abnormal activity can only be detected with human attention. Because of human inclusion, the framework's effectiveness diminishes over the long run because of the human weakness factor. Video surveillance automation can solve this issue. The automated system issues an alarm or other indication when a predetermined abnormality occurs.

METHODOLOGY

A. System Model

This model displays the system's flow for detecting suspicious activity. The following explains each block:

1) Input Data: The system's input is a video stream. The input for the system, which will be used to detect suspicious activity, will come from the CCTV. Acquisition of background

images: The background image can alter the illumination effect. For further image processing, a reference image or standard background is used.

2) Pre-processing of images: Various image pre-processing methods enhance the image to reduce undesirable distortions or enhance essential features.

B. Object Detection in Implementation

Template matching is utilized for object detection. Cross-correlation between the new and template images is carried out using this approach. The different mathematical boundaries coordinate the reference picture with the information picture to see the required object. Let's say the input image is $S(x, y)$, and we need to locate the object in this image. The template image is then the image $T(x_t, y_t)$. The centre of this template, regarded as a mask, is moved over each pixel in the input image. The sum of the product of the coefficients of the input image $S(x, y)$ and the template image $T(x_t, y_t)$ is then calculated for the entire template area. When all the positions on the template are considered, the position with the highest score is the best place to find an object.

1) Item Following: Track detected scene objects using correlation-based tracking techniques. This technique puts a little subsequent window in the middle on the leading edge. This item is viewed as an objective. Each object in the frame is used to calculate its colour histogram. Thus, a red, green and blue histogram is determined for each item. If the objects' colour histograms in the current and previous frames match, they are identical. Knowing the variety histogram allows us to follow a specific object over numerous casings. Additionally, when new items enter the edge, they are effectively recognizable.



Fig 1: Workflow

2) Extraction of Object Features: Once fixed to the tracked frame, we must extract the object's features. Most of the work uses shape-based capabilities, yet they require enormous preparation of informational collections with numerous varieties in energized and uneventful shapes. Motion is used in this piece. Objects are characterized into four unique classes in light of their movement qualities. The state diagram for this classification is as follows:

3) Identifying Suspicious Behaviour: There are loads of activities which go under suspicious action. However, we have chosen the following for the project work:

4) Lost Luggage: A stationary object that a person does not touch for some time is what researchers call an abandoned bag.

5) Unapproved Access: Common citizens are not permitted entry into restricted areas. It is dangerous and necessary only to catch people attempting to enter the location with authorization. Loitering: Loitering occurs when a person is present in a location for a longer period than required for an activity.

EXPERIMENTS AND RESULTS

1) The system's main page is designed to be easy to use and navigate.

2) Users are presented with two modules when they access the main page: Sign in and Register.

3) Using these modules, users can quickly and easily sign in to an existing account or create a new one.

4) In general, the system's main page provides an account and a user-friendly experience.



CONCLUSION

Human behaviour is complex and highly variable in the natural world. The security system's suspicious behaviour detection is formulated in this paper. About 95% accuracy is achieved. We discovered that YOLOv3 performs better than Faster R-CNN regarding image recognition

processing speed. Current component extraction techniques give exact outcomes just in controlled conditions.

However, there were still some inconsistencies between test results and ground truth comparisons due to the limited training data. To get better results, better methods for extracting features can be incorporated. We will expand the training data set with suspicious videos of various activities and resolutions to improve detection and make the model more viable. Additionally, you can create more advanced algorithms for real-time applications.

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