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Unusual Activity Detection for Prior Appraisal against Crime: A Review

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Abstract:
Suspicious activities seriously endanger at public areas and personal security. There are millions of video surveillance systems used in public areas, such as streets, prisons, holy sites, airports, and supermarkets. Video surveillance cameras are not intelligent enough to recognize unusual activities even at real time. It is essential to investigate the detection and recognition of suspicious activities contents from surveillance video. It is required to recognized scamper situation at real time from video surveillance for quick and immediate management. The objective of this paper is to review various implemented systems and their flaws. Most of the system uses Gaussian filter for classifying object from a video or frame as per the gesture recognized. Few systems are based on background or foreground subtraction that works with two layers; first one is background and second one is foreground i.e. object. But these systems are good enough for simple backgrounds or less crowded areas. These systems are simply recognizing some basic activities such as walking, sitting, running, waving hands, clapping and many more instead of classifying unusual activities. A system is required that should be intelligent enough for recognizing unusual activities from crowded area at real time.

Keywords: Unusual Activity Recognition, Gaussian Filter, Foreground, Video Surveillance.

1. INTRODUCTION

With the increase in the number of anti-social activities, security has been highly valued recently. Many organizations have installed CCTVs for continuous monitoring and interaction of people. For a developed country with a population of 64 million, each person is captured by camera 30 times in a day. Many videos are created and archived for some time period (India: 30 days). The image of the 704x576 resolution recorded at 25fps will generate approximately 20GB per day. Since the continuous monitoring of human data from the data, if it is unusual to see that the incidents are abnormal, then this is almost impossible task because this requires workforce and their constant attention. This creates the need to automate it. Apart from this, it is necessary to show which frame and its parts have unusual activity that helps speed up the decision of that unusual activity to be uncommon. This method involves making a motion effect map for the frame to represent the interaction captured in the frame. The main feature of the proposed motion effect map is that it effectively shows the speed, speed direction, and the size of objects and the speed characteristics of their interactions within a frame sequence. It extends the frames of high speed effects values and automatically detects global and local abnormal activities by comparing it with the test frame.

Figure 1: Unusual Activity [1]

2. RELATED WORKS

Zakia Hammal et al. proposed a system which is Based on Conventional Neural Network that trains for human facial recognition. System can be trained with different facial expressions and track activities w.r.t. to convicted expressions. The CNN-based AU detection revealed a similar modification in findings with reference to infant quality between tasks. The accuracy rate for recognition correct action or expression ranges between 79 to 93 % [2].

Figure 2.1: Recognizing facial expression as neutral, smile and cry [2]

He Xu et al. proposed a system which is based on RFID which is a physical sensor. RFID system can be divided into the following three components: readers, tags and back-end computer system, which is shown in Figure 2.2. The reader and tag can communicate through antennas. The work steps of RFID system is the following: (1) the reader send the radio frequency signal to surrounding environment, and check whether there exists a tag; (2) when the tag in the reader's antenna reading range, the tag is activated by its own antenna communicating with the reader and to send its chip electronic code or other data; (3) RFID reader receives the tag's electronic product code (EPC) or data signal by the antenna; then the data are decoded
and processed, and it will be sent to the back-end computer system. System is complicated due to complex installations and increases the cost of implementation [3].

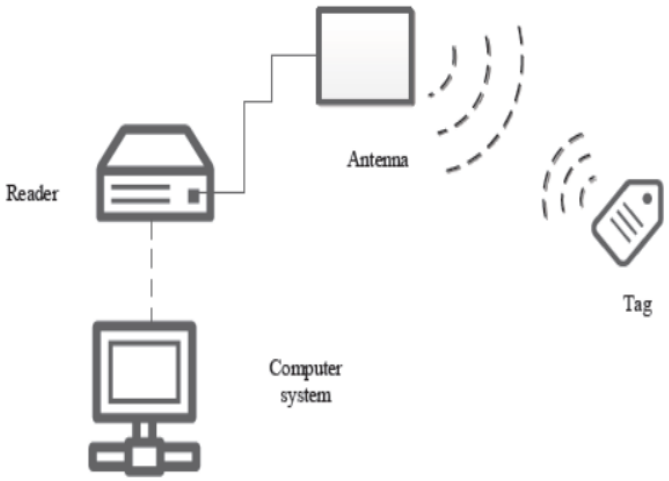

Figure 2.2: Components [3]

Action recognition module: first of all, the information is obtained from the knowledge assortment module.Then knowledge formation of the method is split into variety of information segments with the opposite temporary data along. Through examination with all the action model, if there's associate action model, then it calls the action response module to reply according action. If the action has not however finished, it does not respond, and waits for a lot of knowledge. If no more information arrives, it's assumed that the present action has terminated and therefore the identification fails, then the formula clears all the temporary knowledge and waits for the new action knowledge. Figure 2.3 shows the action recognition method [3].

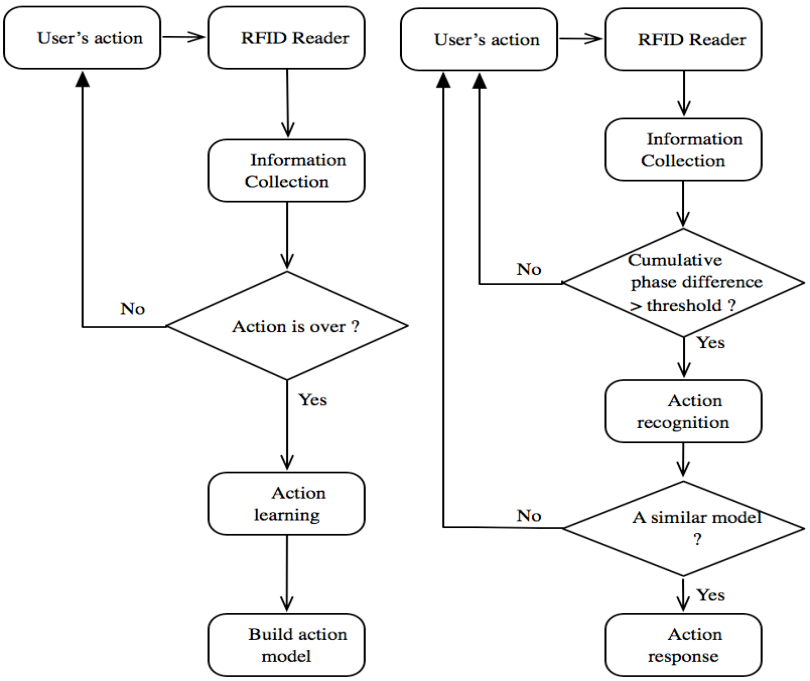

Figure 2.3: Operations [3]

Varsha Shrirang Nanaware et al. made a survey over various implemented system over action recognition. A number of researchers have worked on detection methodologies of multiple human chase & action recognition in a very real time moving video, thorough literature survey of the recent works done by numerous authors is being conferred during this exciting & application minded practical analysis field. In fact, the survey / review paper is done by U.S. as this is able to be the place to begin for our analysis work on "detection methodologies of multiple human chase & action recognition in a very real time moving video surveillance". The algorithms which have been proposed in earlier systems are effective for single target but not convenient for multiple targets. Computational complexities are very high and does not work in crowded areas [4].

Jiahao Li et al. proposed a system which is based on pyramid energy map as feature descriptor for a sequence of frames, it is able to save and present the action history that spatially compares with the actions recognized. It is based on bidirectional neural network which can back track the hidden layers and present the most relevant results. It is also effective for single target or skeleton but confuses with multiple targets [5].

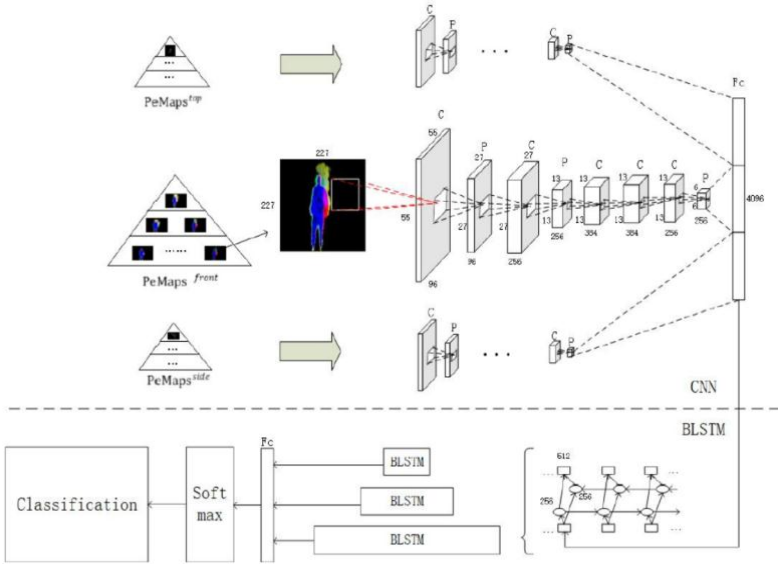

Figure 2.4: Convolution and BLSTM network for PeMaps [5]

Nour El Din Elmadany et al. proposed a system which is based on Biset Globality Locality Preserving Canonical Correlation Analysis, which aims to learn the common feature subspace between two sets. The second technique is

Multiset Globality Locality Preserving Canonical Correlation Analysis, which aims to deal with three or more sets. It create sequences of skeletons as data sets. The accuracy for correct recognition rate is 90.1% [6].

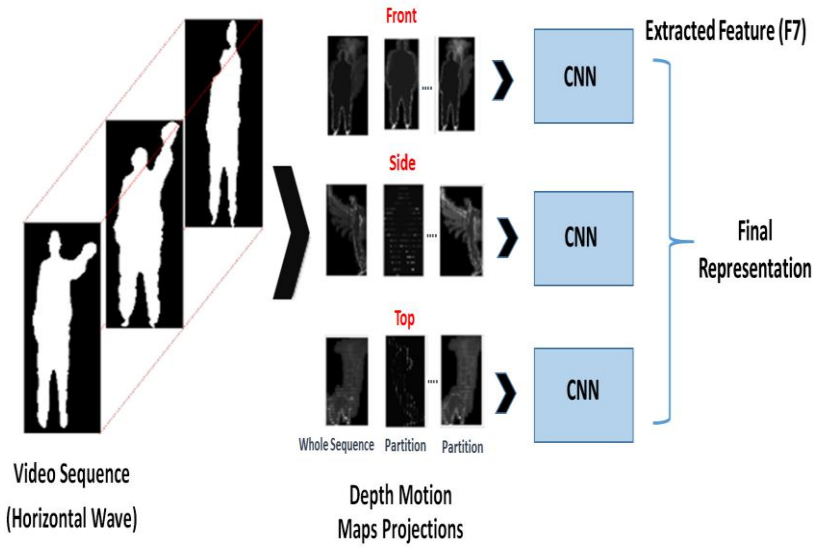

Figure 2.5: The pipeline of HP-DMM-CNN descriptor [6]

Aouaidjia Kam et al. proposed a system which is based on depth map and posture recognition using convolutional neural network. System recognizes the action as per the skeleton sequences mapped. System trained the network for various skeleton analysis that later compares with the recognized skeletons. System obtained the result on the basis of score fusion operations that possess combined or fully analyzed result. But crowded area may have various skeleton sequences which confuses system to obtain the correct result [7].

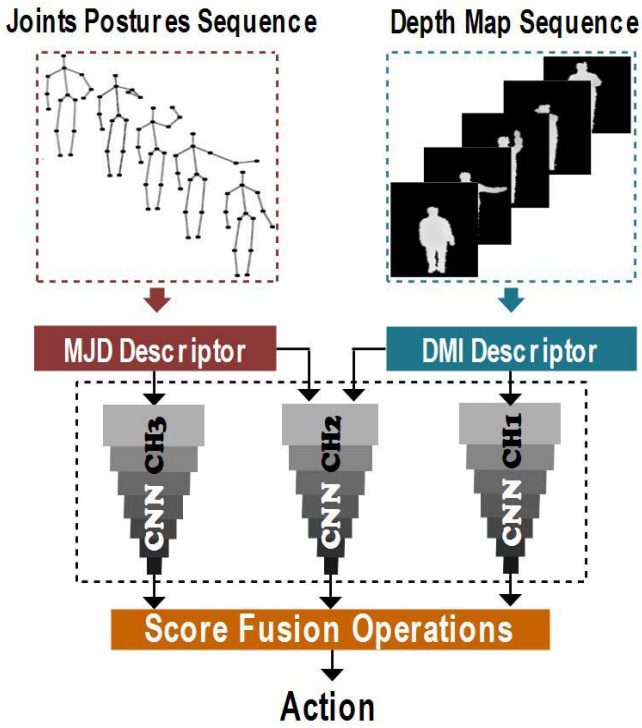

Figure 2.6: Framework [7]

Soumalya Sen et al. proposed a system which is based on image parsing technique. Image parsing relates different types of actions which are performed by human that can be recognized in sequence of frames. Action classifies as – walking, running, clapping, jogging, cycling, surfing, etc. It is based on foreground and background correlation through which system enhances the foreground object and stores these frames for future comparison. Image parsing unifies image segmentation, object detection or recognition. System is able to recognize human action with 88.70% of precision [8].

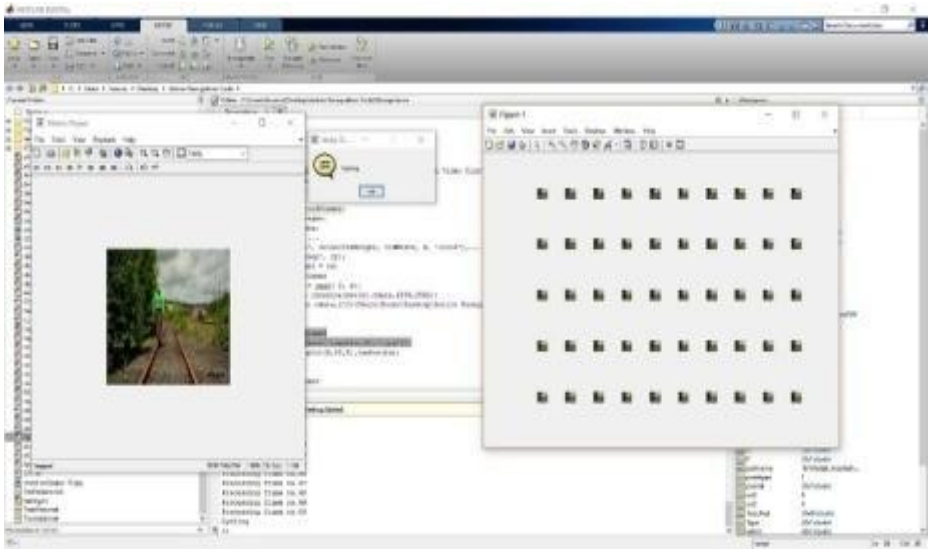

Figure 2.7: Overview of a System [8]

3. CONCLUSION & FUTURE SCOPE

As per the survey takes place on various researches made in the field of unusual action recognition, most of the systems are based on skeleton approaches that can recognize simple actions like walking, running, clapping and many more. These approaches are effective for single target only but do not effective for multiple targets or crowded areas. In future an ideal system can be represented with effective approach that can possess minimal error rate along with high precision. So, a system is required which can efficiently recognize unusual activities from crowd and notify accordingly.

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