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A Review on Unusual Activity Detection for Prior Appraisal against Crime

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Abstract*— Unusual activities on public areas and personal safety are seriously endangered. Millions of video surveillance systems are used in public areas, such as roads, prisons, holy sites, airports, and supermarkets. Video surveillance cameras are not intelligent enough to detect unusual activities even in real time. It is necessary to investigate the detection and recognition of the contents of suspicious activities from surveillance video. It is necessary to identify crook status in real time from video surveillance for quick and immediate management. The purpose of this paper is to review various implemented systems and their drawbacks. Most systems use Gaussian filters to classify objects according to gestures identified from a video or frame. Some systems are based on background or foreground subtraction that work with two layers; The first one is the background and the second is the foreground. But these systems are good enough for simple backgrounds or less crowded areas. These systems are recognizing many more basic things such as walking, sitting, running, waving hands, clapping, and classifying unusual activities. A system is required that must be intelligent enough to recognize unusual activities from a crowded area in real time.

Keywords*— Unusual Activity Recognition, Gaussian Filter, Foreground, Video Surveillance.

I. INTRODUCTION

With the increase in the number of antisocial activities, security has recently been accorded extreme importance. 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 a camera 30 times a day. Many videos are created and stored for some time period (India: 30 days). A 704x576 resolution image recorded at 25fps will generate around 20GB per day. Since continuous monitoring of human data from data, if it is unusual to see that events are unusual, it is an almost impossible task as it requires the workforce and their constant attention. This creates a need to automate it. In addition, it is necessary to show which frame and its parts have unusual activity which helps to speed up the decision of that unusual activity. This method involves creating a motion effect map for the frame to represent the interactions captured in the frame. The main feature of the proposed motion effect map is that it effectively shows the speed, speed direction, and size of objects and the speed characteristics of their interactions within a frame sequence. It expands frames of high speed effect values and automatically detects global and local abnormal activities by comparing them with test frames.

Fig. 1 Unusual Activity [1]

II. RELATED WORKS

Zakia Hammal et al. proposed a system that is based on traditional neural networks that provide training for human facial recognition. The system can be trained with various facial expressions and track activities w.r.t. Convicted sentiment. A similar modification was found in the findings in terms of infant quality between CNN-based Au detection tasks. The accuracy rate of recognition correct action or expression varies between 79 and 93% [2].

Fig. 2 Recognizing facial expression as neutral, smile and cry [2]

He Xu et al. proposed a system based on RFID which is a physical sensor. The RFID system can be divided into the following three components: the reader, the tag, and the back-end computer system, which is shown in Fig. 3 Readers and tags can communicate via antennas. The following are the steps of the RFID system work: (1) readers send radio frequency signals to the surrounding environment, and check if a tag is present; (2) When the tag in the reader's antenna reading range, the tag is activated by its own antenna to communicate with the reader and send its chip electronic code or other data; (3) The RFID reader receives the electronic product code (EPC) or data signal of the tag by the antenna; Then the data is decoded and processed, and will be routed to the back-end computer system. The system is complex due to complex installations and the cost of implementation increases [3].

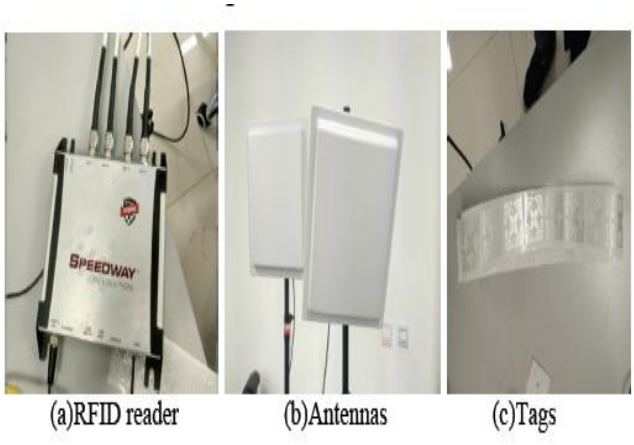

Fig. 3 Components [3]

Action recognition module: Firstly, information is obtained from knowledge classification module. The knowledge formation of the method is then broken into different information segments with inverse temporal data. Through examination with all action models, if there is a collaborative action model, it tells the action response module to respond according to the action. If the action is not yet finished, then it does not react, and waits for a lot of knowledge. If no more information comes, it is assumed that the current action has ended and so the identification fails, then the formula clears all temporary knowledge and waits for new action knowledge. Fig 4 illustrates the action recognition method [3].

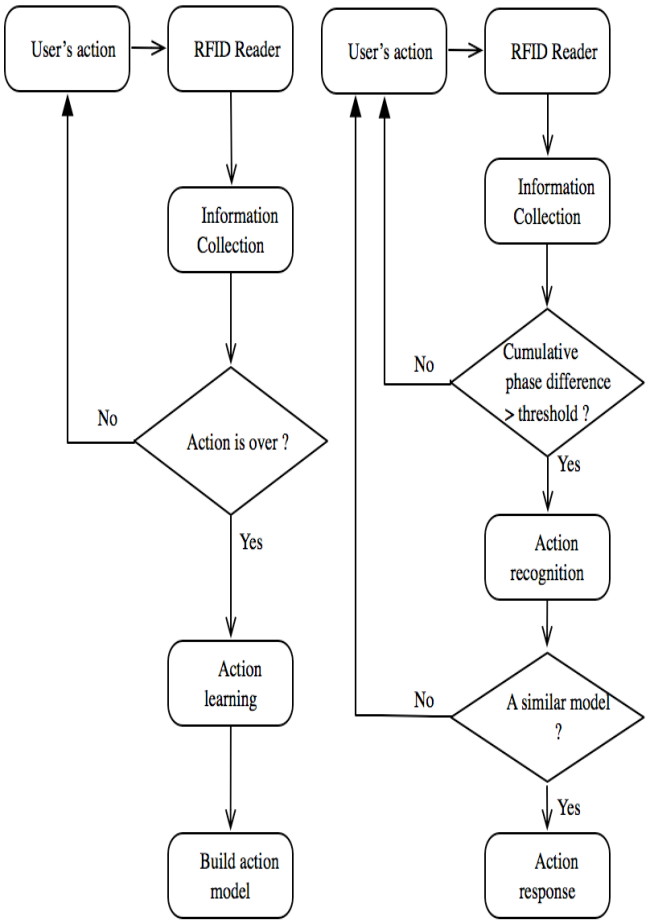

Fig. 4 Operations [3]

Varsha Srirang Nanvare et al. performed a survey on various implemented systems on action recognition. Many researchers have worked to explore the methodology of multiple human pursuit and action detection in very real-time moving video, a thorough literature survey of recent work done by many authors in this exciting and application-Minded practical analysis area. In fact, the survey / review paper U.S. It is able to start for our analysis work on "multiple human pursuit and action recognition detection methods in very real-time moving video surveillance". The algorithms that have been proposed in earlier systems are effective for single targets, but are not convenient for multiple targets. Computational complexities are very high and do not work in crowded fields [4]. Jiahao Li et al. proposed a system that is based on a pyramid energy map as a feature descriptor for a sequence of frames, it is able to save and present action histories that visually compare with recognized verbs. It is based on bidirectional neural networks that can track hidden layers and produce the most relevant results. It is also effective for single targets or skeletons, but confuses with multiple targets [5]. Noor El Din Almadni et al. proposed a system that is based on bisite globality locality, preserving canonical correlation analysis, which aims to learn common feature subspaces between two sets. The second technique is Multiset Globality Preserving Canonical Correlation Analysis, which aims to deal with three or more sets. These form sequences of skeletons as a data set. The accuracy for the correct detection rate is 90.1% [6].

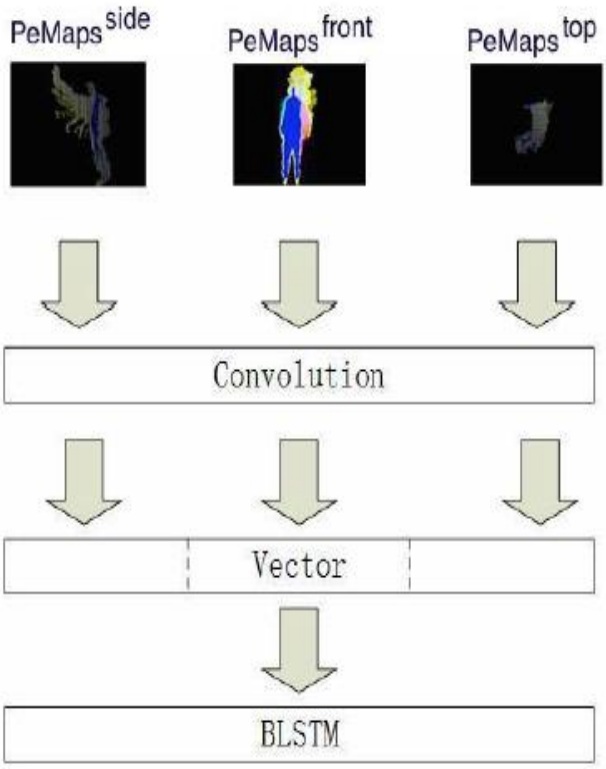

Fig. 5 Fusion method for PeMaps from different views [5]

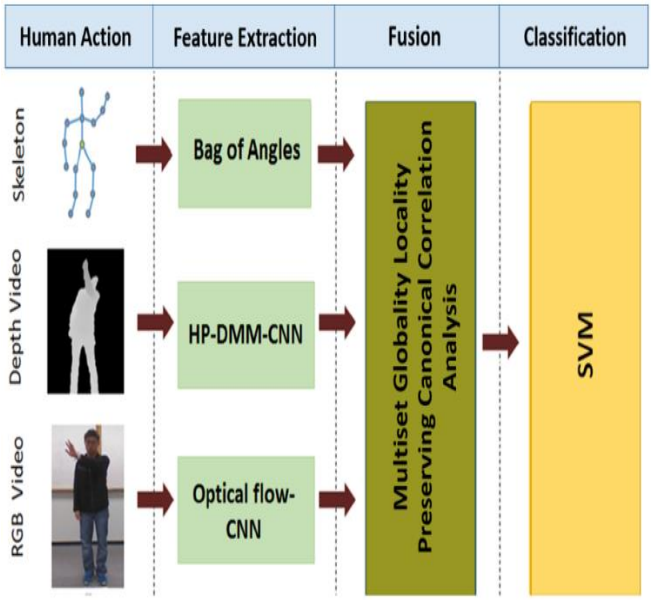

Fig. 6 The proposed human action recognition framework using MGLPCCA [6]

Aouaidjia Kam et al. proposed a system that is based on depth maps and posture recognition using deep neural networks. The system recognizes actions according to skeletal sequences. The system trained the network for various skeletal analyzes that later compared with recognized skeletons. The system achieved results based on score fusion operations that combined or fully analyzed results. But the congested region may contain different skeletal sequences that confuse the system to obtain the correct result [7].

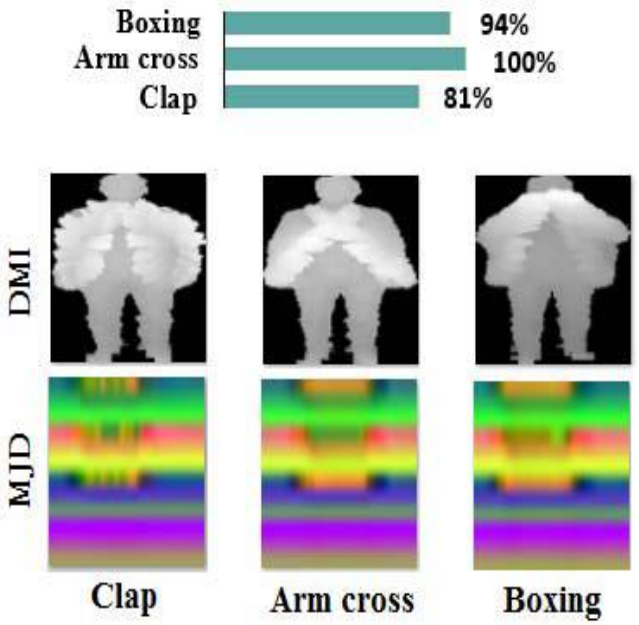

Fig. 7 Classification accuracy of three different actions presented in the confusion matrix of UTD-MHAD dataset [7]

Saumalya Sen et al. proposed a system that is based on image parsing techniques. Image parsing deals with a wide variety of tasks that are performed by humans that can be identified in a sequence of frames. Classifies the verb - walking, running, clapping, jogging, cycling, surfing, etc. It is based on the correlation of foreground and background, through which the system extends the foreground object and stores these frames for future comparison. Image parsing integrates image segmentation, object recognition or recognition. The system is capable of recognizing human action with 88.70% precision [8].

III. Conclusion

As the survey draws on various research conducted in the field of abnormal action recognition, most systems are based on skeletal approaches that can identify simple actions such as walking, running, clapping, and more. These approaches are effective only for single targets, but are not effective for multiple targets or crowded areas. In the future an ideal system can be characterized with an effective approach that can possess a minimum error rate with high precision. So, there is a need for a system that can efficiently identify unusual activities from the crowd and inform accordingly.

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