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Detection of Abnormal Human event using SURF Algorithm with HOI

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Abstract - **Detection of complex human occasions in recordings and pictures is a testing issue of PC vision. The difficulty lies in developing compelling association between human exercises and particular occasions. In this paper we concentrate on unsafe human activity, particularly when individuals with handheld weapons before they utilize it. By presenting Human-Question-Interaction model, we can set up techniques and frameworks to perceive occasions that are dangerous. In this paper, the procedure of occasion comprehension depends on recognizing dangerous human events predicted by the human body parts. Using a developed dangerous human event date set, we demonstrate our model and framework beat ordinary occasion order approaches in efficiency.**

Keywords: **Dangerous object classification, Human event classification, Human-object-Intereaction, SURF Algorithum.**

I. INTRODUCTION

Computer vision based complex human event classification, due to its application in surveillance frameworks, is getting increasingly consideration. Human being events can be considered as arrangements of different movements and propensities of human bodies. Existing methodologies concentrate on social parts assurance in huge group and passerby occasion discovery for driver help frameworks [1-4]. Helpful characterization display like Speeded up powerful components - (SURF) consolidated with Active shape show (AVM) [12] has been effectively executed on occasion acknowledgment. In this paper, we talk about an uncommon circumstance of human occasions that has risky inclinations. As fear based oppressor assaults including later one to Mumbai (CST) keep on raising frenzy in broad daylight. Perceiving unsafe human occasions and giving early cautioning are fancied.

With a point of understanding dangerous human event, the utilization of existed techniques in human exercises understanding has appeared to increased detection rate. In recent years, developed methodologies, for example, Deformable Parts Model (DPM) [5-7] and pose lets [8] regard human activities as gatherings of human body parts.

To a limited extent based models, human body parts are an arrangement of areas whose geometric plans are picked up by a Gaussian dispersion [9] or an arrangement of "springs" which interface the body parts [10]. At the point when methodologies, for example, wavelet-like components [11-12] or locally normalized histograms of gradients [13] were utilized, the execution of activity acknowledgment was progressed. Expanding upon the past models, pose lets, algorithm for identifying people[13] utilizing the 3D and 2D comments of human key focuses to speak to body developments was produced and get high precision when connected. At the point when all techniques above are connected to dangerous human event, it appears that the execution will guarantee.

In any case, not at all like other human events, dangerous human events have nearly association with extraordinary objects. As appeared in Fig.1, without knowing that the men are holding dangerous weapons, it is difficult to appraise risky propensities in those images. Built up strategies in human posture acknowledgment like ASM and SURF can identify dangerous human event. But not precisely in light of the fact that the key part of images in human occasions arrangement is dismissed.

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Fig.1 Dangerous human event recognition

Subsequently, Human-Object Interaction (HOI) [14-16] with SURF is viewed as relevant strategies to give comparatively effective solution that can be acquainted with comprehend dangerous human occasions. Existing methodologies in identifying HOI from still pictures include modeling the shared context between objects and human poses in exercises [18], recognizing it by exemplar model based displaying [19-21] and other motivating methodologies [22-24]. These models have an extraordinary impact on classification of individuals playing sports, performing with instruments [17], drinking and smoking [25]. However, they are rarely used in human dangerous event recognition.

We developed up algorithm by developing HOI model demonstrating connection of suspicious objects and particular body parts, which regards objects as the extension of human's hips. At the point when HOI method is presented, the detection of dangerous human events is finished by determination of dangerous objects (blades, gun, and etc...) in predicting bound drawn by certain direction and distance in view of the area of hips. Our approaches increment the exactness in dangerous event discovery from different picture sources.

The paper is sorted out as takes follows: In Section 2, the HOI model for dangerous human event is portrayed. The recognizing systems for dangerous human event with SURF are presented in Section 3. The calculation results and their analysis are exhibited in Section 4. Summary is in Section 5.

II. HUMAN-OBJECT-INTERACTION MODEL WITH SURF FOR DANGEROUS HUMAN EVENTS

In this section, our goal is developing connections between body parts and handheld objects in order to give accurate perdition of holding objects. Our initial thought concentrated on particular associations between hands and holding weapons. As human postures are exceptionally explained and parts of bodies are self-occluded, we need to avoid parts that are hard to find, effectively affected by the position of human in images. What's more, there is no suspect that hands are the hardest parts for computer to recognize in pictures.

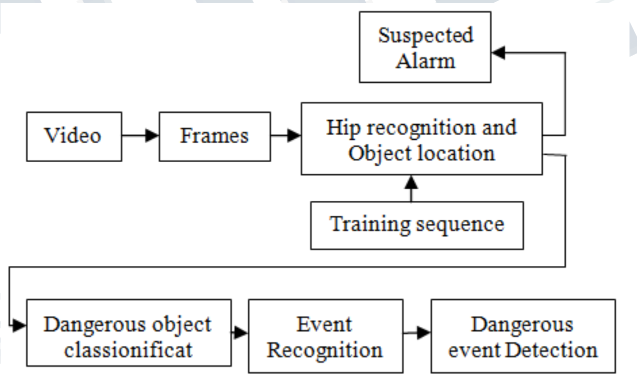

Fig.2 Object recognition block diagram

Understanding the issues above, here, we propose a model that utilizes hips rather than hands to predict areas of handheld objects as indicated by the mechanism of the human body. As Fig. 2 shows, our thought partition the space into 9 disjoints regions based on the nature of human body. Subsequent to distinguishing dangerous objects in areas that are predicated with reference to hips, dangerous human event comprehension can be simplified as object recognition in pictures sections.

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With everything assembling, we can represent our model as:

$$\psi(0,X)=\sum_{l=1}^{N_e}\sum_{i=1}^{N_b}\sum_{j=1}^{N_d}1_{(o^i=o_j)}\Box\Upsilon_{i,j}^{T}\Box h(x_E^l)$$

Where $\psi(0,X)$ models the judgment system based on the Classification in the broad areas of human's hips. X and O are the hips and objects of human body located by Poselets. N_b is the number of object areas detected by hips. O^i represents the detected objects in predicted area.
N_d is the number of weapons trained to detect in pictures. $1_{(o^i=o_j)}=1$ if dangerous objects are recognized in the idea area. N_e is the number of the hips recognized. $\Upsilon_{i,j}^{T}$ Stands for the assessing rules extended from hips in still pictures. Finally $h(x_E^l)$ is the function aims at finding near position of hips to shoulders in pictures to decide if somebody's hands are up or down.
.

III. DANGEROUS HUMAN EVENT DETECTION

An overview of our identifying system is appeared in Fig.3. We first identify the location of hips utilizing Poselets and draw a boundary that stamp the range that hips cover. At that point set up Human-Object-Interaction model are applied to gauge the possible for objects. After that we can recognize regardless of whether the object is dangerous by objects classifier. Finally, the dangerous human events can be identified.

A. Hips recognition based on poselets

The initial phase in our detecting systems for dangerous human event is to find where the hips are the effective ways. These days human body parts are generally descried in an innovative translation called Poselets. This description permits us to portray the similar body parts by persuasive criterion [26, 27]. In view of the models used to obtain the features in still pictures like Histograms of arranged angles (HOG), it is reasonable for us to segment human bodies into a few sections and get features of parts we required. In this paper we concentrate on special poses in order to get bounds that contain hips. Detection of other body parts is additionally included on the grounds that they help in hip recognition.

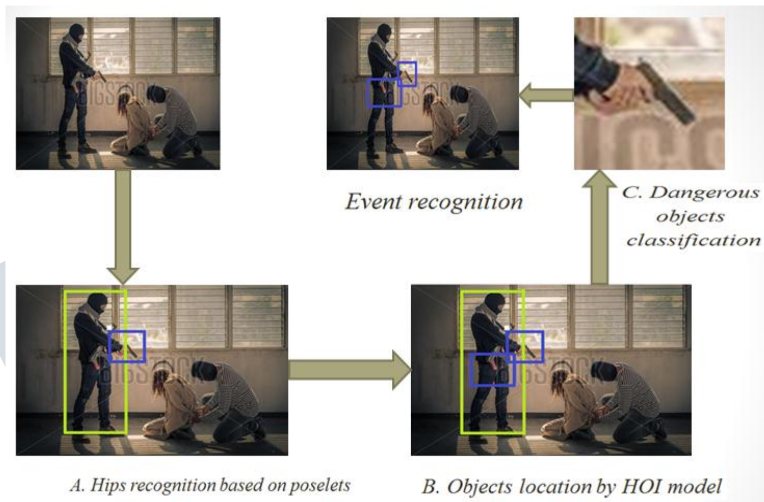

Fig. 3 Overview of our detecting systems

B. Objects location by HOI model

In our work, the possible area of objects in dangerous events is obtained by established HOI models. When people are recognized in pictures, it is easy to get the location of hips in view of the body proportion and practice of body movement in past sections. The area in diagonal upward direction of hips on both sides can be drawn relying upon our HOI model. As appeared in Fig. 4, our model performs well in accurately finding hand-held weapons and swords. The limits drawn in pictures limit the place we are searching for and benefit the following classification of handheld objects.

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Fig. 4. Effect of HOI model for objects location

C. Dangerous objects classification

In this segment, our aim is to recognize whether the handheld objects are dangerous using valuable objects order classification. When predicted location of dangerous objects is acquired in previous method, human event can be judged dangerous if objects detected in the drawn bounds are danger. In this way, the object classification decides the final outcomes of our systems.

SVM classification has turned into an extremely prevailing kernel based classification approaches in objects classification since it can give high detecting rate.

In this work the objects recognized in predicted location are separated into two Classes which represent that they are dangerous. A binary classifier is trained for both classifications. The greater part of the preparation tests in both class are picked up by removing handheld objects from dangerous and not non-dangerous pictures to ensure its accuracy.

In our work, the HOG features of handheld objects are viewed as the training and testing input of linear kernel based SVM classifier. At the point when the target of the classification is decided, appropriate choice of training samples will help us to comparatively exact recognition of violent events.

IV. EXPERIMENTS

A. The PHW data set

Among all the data sets in computer vision, pictures gathered for human and objects interaction are relatively rare compared and the abundant accumulations of scenes [26] and objects [27, 28]. By the by date sets for human and objects interaction, for example, People-playing-music instruments date sets and games date sets, have been connected widely in comparing advantages of models created with recognize human activities.

With the purpose to construct a date sets belong to violent event recognition, we hence gathered another date set named People- Holding-Weapons. Each group comprises of 50 PHW+ pictures (people holding weapons) and 50 PHW-pictures (people not holding weapons). As Fig.5 demonstrates, pictures in PHW are highly various and cluttered.

In this date sets we will help computer figuring of whether a human is holding a weapon with his hands up or down at first, then we can recognize different objects by PHW+ and PHW-samples.

B. Results

In this analysis, we evaluate accuracy of our methods and existing picture classification algorithm on dangerous human events classification on PHW date sets. Conventional image classification approaches which get SIFT features and received them to SVMs classifiers is presented in our paper.

Our aim is to separate dangerous human events using HOI models to limit the detecting areas according to human postures and understand dangerous human events by developing connection between danger objects and body movements. Linear kernel SVM classification is applied in both ways to deal with ensure the result is not affected by different classification methods.

TABLE I. TABLE TYPE STYLES

Approaches	**Dangerous**		
	Training Sequences	***Testing samples***	***Accuracy***
HOI Method			
HOI + SURF Method			

As TABLE I shows, this methodologies has better results over classic methods in dangerous event classification. Results are gained by testing samples representative training.

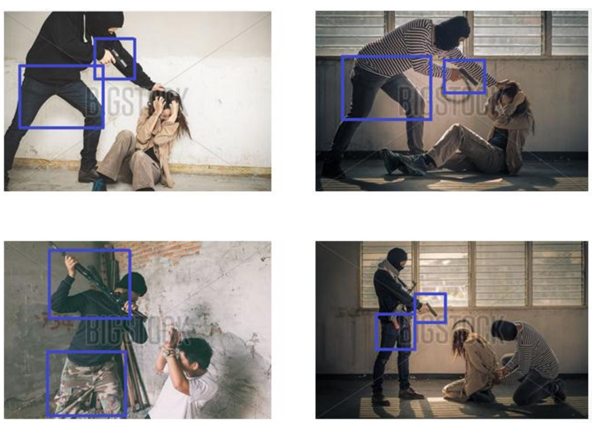

Fig. 5 Experiment in well-known terrorist attacks from cameras.

In this work, recognizing systems is implemented by Mat lab and the HOI model for violent events. The system can be applied to detect dangerous human events in divergent situations including bank robbery and terrorist attacks. As appeared in Fig. 5, the dangerous person can be detected in past danger threat attacks by our methodologies.

V. CONCLUSION

In this paper, human-object interaction (HOI) is introduced with detect dangerous human events. The dangerous human events can be distinguished by recognizing dangerous objects in areas predicted to the position of hips. Consolidating the movement of hips and classified objects, we can identify dangerous human events. We have set up the PHW date sets for further research. In any case, some exceptional dangerous human events remain to be recognized in better ways. Additional training samples required. In future works, we plans to extend learning information for our PHW date set and apply our models in huge scale detection.

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