Detection and Analysis of Precarious Activities near secure areas

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Abstract- **In today's era surveillance is the prime requirement of the society as act of violence in the world is rapidly growing. In past decade Precarious activities were recorded through the video cameras. Due to the limitations of the human observer, this manual system proves to be inefficient in detecting precarious events. This leads to the development of the automated systems which can detect suspicious activities, behavior or objects automatically and notification is sent to the concern authority. In this paper various novel approaches are discussed and detailed analysis is presented.**

Index Terms- **Intelligent Video Surveillance, Precarious Activities Detection, Intelligent Suspicious Activity Detection Framework**

I. INTRODUCTION

Security in public places is a vital issue now a day. Video surveillance consists of remotely monitoring public or private places, of people or some objects using power-operated cameras [9]. If the surveillance process is manual, it may fail due to limitations of the human operators because it impossible for a human monitor to analyze all of these video recordings in order to detect Precarious behavior or events. Precarious activities are those which are not normal like Crowd fighting in secure areas like ATM machines, people loitering near protected areas. Those activities must be detected automatically in order to ensure the security. Here various novel approaches are presented.

II. LITERATURE REVIEW

In one very well-known approach intelligent suspicious activity detection frame work is proposed [1]. Intelligent Suspicious Activity Detection Framework (ISADF) contains mainly two parts. One is Video recording and Image extraction unit and the other one is Video Processing unit [1]. The video data can be captured by Video (CCTV) cameras and then those data can be transmitted to video recording and image extraction unit through the network. This unit stores the captured video data on video database for future processing. Image Retrieving tools are very efficient tools; those tools from video data will extract the images and uploads those images to video processing unit [1]. Video processing tool is very important tool for detecting the precarious activities. VPU contains three main components i) Online Training data ii) Image Classifiers iii) Suspicious activity detection mechanism [1]. Image Classifiers performs the initial operation in VPU that is background subtraction. In order to detect the moving object and motion Image classifiers will take all extracted images from image extraction unit. These image classifiers has to perform various operations like static back ground extraction, fore ground separation, noise removing from fore ground, Object identification, tracking human body, pose modeling and pose recognition, Motion detection [1].

Human Activity Identification is very crucial and important task. This method is efficient only for simple human behaviors like walking, sleeping, running, sitting etc. Scene interpretation techniques are failed because they are domain dependent approaches means the input parameters and event detection rules of one domain could not useful for other domains. Holistic approaches identify human activities by using human body movements (dynamics) either at body level or parts level. Many research implementations were proposed for this holistic approach, but we selected the holistic approach for ISADF frame work. This approach concerns on moving objects in 2D plane by the polygonal shaped objects and extracts object dynamics from the very low resolution images [1].

Support vector machine is used to detect the precarious activities where data from the past activities are taken for the training purpose. Experimental results show that ISADF is a high speed intelligent threat detection system than existing approaches [1].

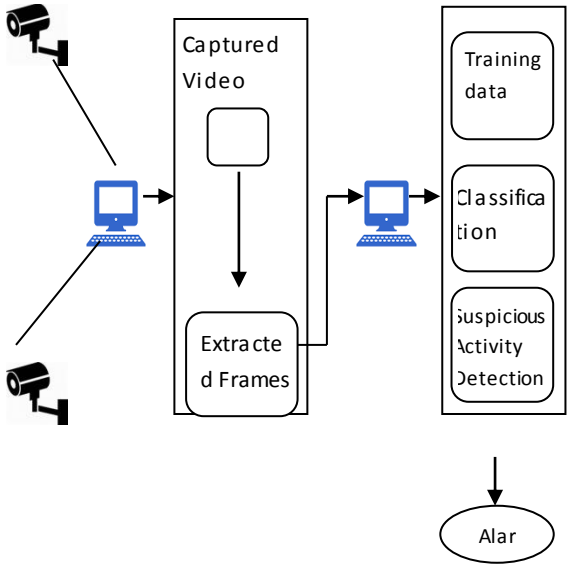

Figure 1: The ISADF based approach [1].

One another well-known approach is used to classify suspicious activities in examination hall. SURF (Speed up Robust Features) is used to extract interest points, and SURF method is also used to match and find the corresponding features [2].In this method object detection algorithms are used to detect faces and hands, while tracking algorithms are used to track the locations of the objects. Interest points of two correlated images are captured and If there is any suspicious activity found, the system will detect the hands and the faces of the subjects and also notify the invigilators by alarm [2].

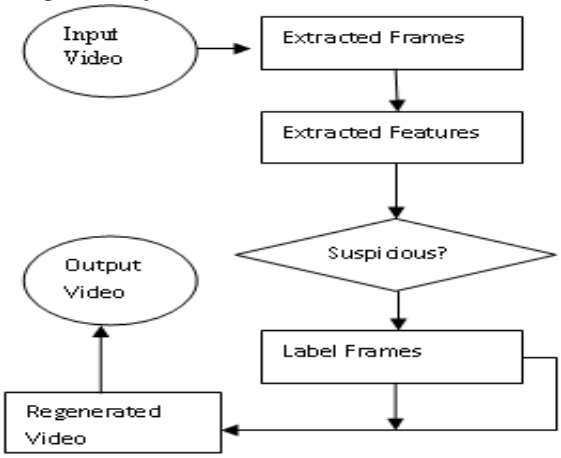

Figure 2: Procedure overview [2]

One anther well-known approach is based on Gabor based features used to detect precarious events [3]. In this approach, the input video frames are extracted and preprocessing is applied on sampled frames. Background subtraction is applied to remove unwanted regions as a part of preprocessing. Gabor filter is applied on those preprocessed sampled frames and features are extracted from each one of the sampled frames. Extracted features are given to Artificial Neural Network which is used to recognize whether the input event is Precarious or not [3]. Gabor filters are well suited for motion analysis in abnormal event detection because these filters have been shown to possess optimal localization properties in both spatial and frequency domain [3]. Multiresolution analysis is possible with Gabor filter by giving a coefficient matrices and Gabor filter are also found to be unaffected by illumination changes and noise. Here 2D Gabor filter is used for the purpose of feature extraction. Gabor filter is a modulation of a Gaussian function means whose impulse response is defined as a harmonic function multiplied by the Gaussian function [3]. This method is more appropriate for the local events like theft near secure areas, abnormal behavior in ATM.

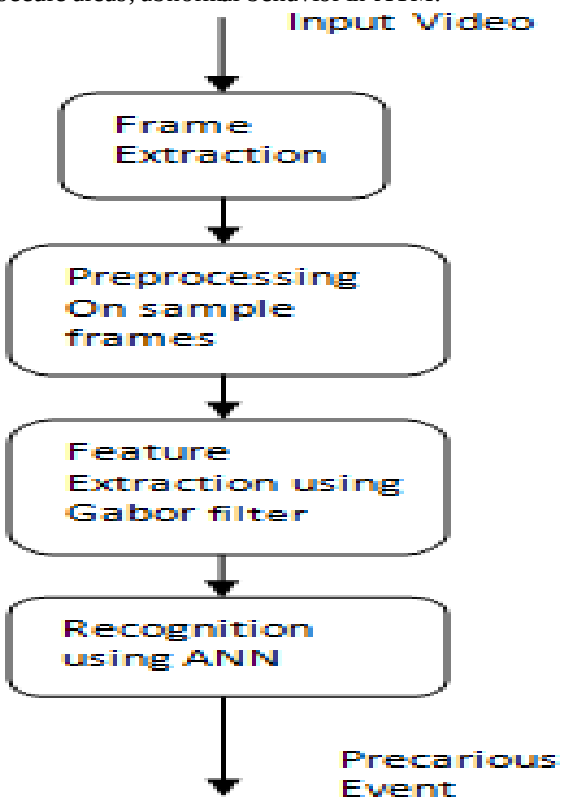

Figure 3: Gabor Feature based Approach [3]

III. CONCLUTION

Precarious Activity Detection has been a vital component in ensuring security at private or public areas like ATM, airports or some commercial institutions. Approach based on ISADF frame work provides high speed intelligent threat detection systems then existing approaches. It can detect any dynamic events. Second SURF based approach is well suited for the events like precarious activities in classrooms or during examinations. Third Gabor feature based approach is more appropriate for the local events like theft near secure areas, abnormal behavior in ATM.

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