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Research Article

Abnormal Human Activity Recognition using Scale Invariant Feature Transform

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Abstract

Human detection in camera attract wide interest because of its extensive applications in anomalous incident recognition, counting human being in a crowded area, person classification, and recognition of falling activity for aged people, etc. The paper discuss abnormalities in the human activity and provide efficient solution to detect abnormality. The first step in the proposed work is to capture the video using webcam and then to detect abnormal behavior. The captured video is divided into frames and extract the features such as edges and boundaries using scale invariant feature transform (SIFT). Feature vectors are developed from the extracted features. These feature vectors are compared using Hidden Markov Model with the data set developed to recognize abnormal behavior. If there is a match between feature vectors and available data set, then abnormal human activity is detected and simultaneously an alarm is given for medical assistance. The proposed algorithm is tested on six different activities. The proposed methods achieve accurate recognition.

Keywords: *Abnormal activity, Scale Invariant Feature Transform, Hidden Markov model.*

1. Introduction

The extent of elderly individuals in the populace are growing rapidly; the rate of those aged people more than 60 years is anticipated to twofold in the following two centuries. As a result, single principle destinations of only few general public legitimate get due consideration and can live the extent of independent, free and content lives. Notwithstanding, it is realized that anomalous action, particularly in elderly individuals, can result in genuine wounds with related therapeutic muddling, for example, inward draining and hypothermia, which might inevitably prompt fatalities. One conceivable arrangement is to make utilization of a productive irregular movement recognition framework, which can expand their certainty and empower them to keep appreciating their dynamic way of life. Utilization of an anomalous action recognition framework can supplant human observation by observing completely an individual's through computerized innovations. The advancement in sensors can be utilized as a part of shopper gadgets, with applications in elderly individuals wellbeing observing, security reconnaissance, games action detection, and face detection frameworks for brilliant house. The old aged people individuals living alone are expanding tremendously. They have old age issues that require persistent observing to perceive anomalous actions. Hospitalization and treatment watch over 24 hours is not feasible because of high expenses and restricted resources in healing facilities. This examination intends to build up a programmed social insurance framework for elderly individuals to perceive strange action viably. Six strange action of elderly people are identified as follows: forward fall; regressive fall, midsection agony, swoon, regurgitation, and migraine. The existing technique to discover abnormal action is connection versatile sensor to different parts of the human body. These sensors have various limitation such as elderly individuals effectively neglect to wear the versatile sensors for abnormal action detection, or frequently they feel uncomfortable to carry sensors along with them everywhere they go. The proposed system eliminates the above limitation and explore the guaranteeing feature recognition strategy, which gives more care to old age people in their day by day activity. The proposed system extract feature using Scale Invariant Feature Transform (SIFT) and detect abnormal human action using hidden markov model.

2. Proposed Method

An outline of typical abnormal activity detection system is given in figure. 1. There are four main functional blocks Video capture, feature extraction using SIFT, abnormal action detection using HMM, and alerting system.

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Fig.1 Block diagram abnormal activity

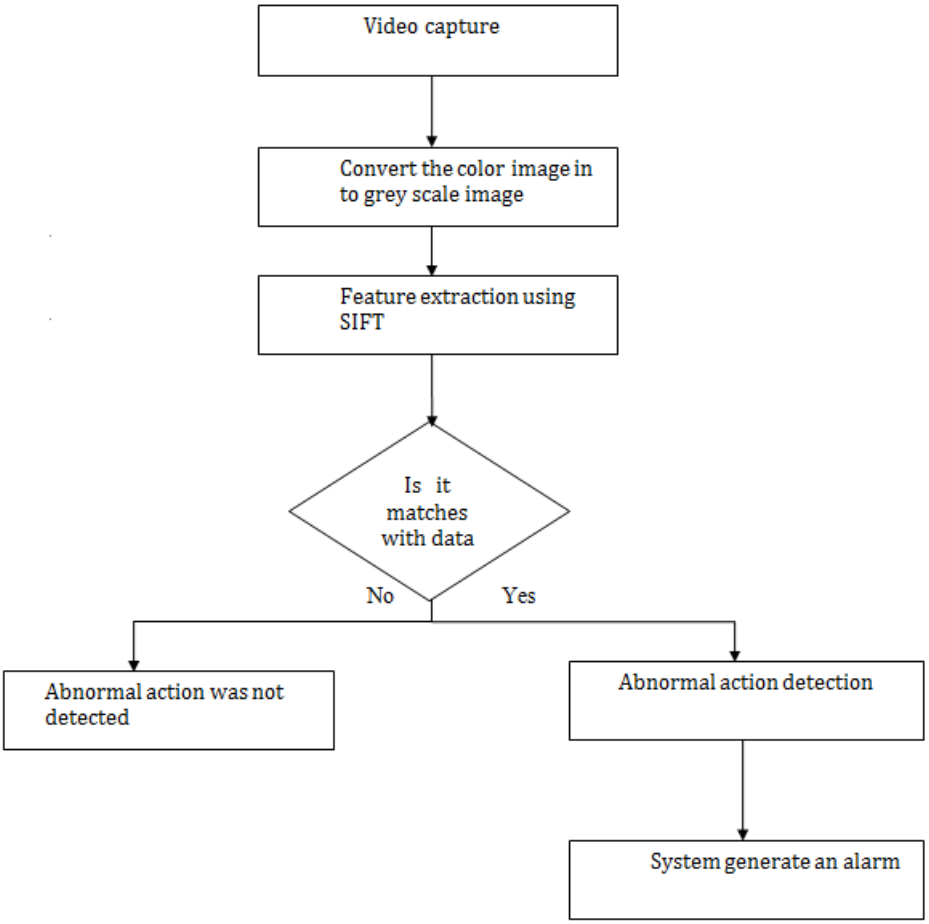

Fig.2 Flow charte of the proposed system

The following steps involved in the proposed system:

(1) Video capture

The first step is video capture of the person using webcam while his/her daily activity. The video input color image is converted in to gray for fast and easy processing.

(2) Feature extraction

Features are extracted using SIFT. SIFT is an algorithm in workstation visualization to identify and extract skin tone in imagery. SIFT identify the object in an image by extracting attractive points to describe the features of the object. The extraction of features is performed on the input and trained images. The extracted features from trained images are converted to feature vectors and data set is developed. The feature vector of data set are used to recognize the object with input image. To achieve accurate identification, it is essential to extract features obtained from the trained image is invariant to picture scale, clatter and lighting. Such points are positioned on dark-contrast places of the picture, for example object boundaries. One more significant attribute of these skin tones is that the respective points among them in the original picture shouldn't vary from one object to another. SIFT accurately recognize objects even along with noise and fractional occlusion, as its feature attributor are invariant to identical scaling, direction, and partly invariant to affine distortion and lighting variations. In this paper, important points of objects are calculated from a collection of reference imagery using SIFT and saved in a folder for abnormal activity detection.

(3) Abnormal Activity Detection - Hidden Markova Model (HMM)

Once the features are extracted, the obtained features are compared with previously saved actions from the data set using hidden Markov model. Hidden Markov model (HMM) is an arithmetic Markov system in which the structured created model is assumed to be a Markov process with unobserved states. An HMM can be consider as the dynamic Bayesian system. The idea

of HMM was first proposed by L. E. Baum and partners. It is approximately on an previous effort on best nonlinear filtering problem developed by Ruslan L. Stratonovich, who are first persons to explain the front end-back end method. In a normal Markov method, the status is straightly observable to the observer, and as a result the state change probabilities are the simple parameters to calculate. In a hidden Markov model, the condition is not directly visible, except output, need on the status is observable. Each status has a likelihood allocation over the achievable production tokens. As a result the chain of tokens obtained by HMM gives a quantity information regarding the series of states. Reminder that the sound 'unknown' is refers to the status series during which the method is passed, not for the parameters of the model. The experimental sign sequence as $x = x_1, x_2 \ldots x_L$ and the underlying state sequence as $y = y_1, y_2 \ldots y_L$, where yn. The important state of the n the inspection x_n. Every sign x_n point out a limited numeral of probable values from the collection of annotations $O = \{O_1O_2,\ldots,O_N\}$ and every state yn takes some of the values from the collection of states S ={1,2,...,M}, where N and M indicate the number of dissimilar annotations and the number of dissimilar states in the model, respectively. The unobserved state are arranged in first-order Markov sequence. The probability of the state j depends on the present state i, and the probability does not vary with time. So, the states' S (i, j) for all $n \geq 1$. t(i,j) is called probability of transition from state i to state j. For the initial state y1, we describe the first state probability as $\pi(i)= P \{y_1 = i\}$ for all i S.

(4) Alerting System

Once an abnormal action is detected using an HMM, alerting system is activated in the form alarm, indicating assistance.

3. Result

The behavior of the proposed method is evaluated using *dataset of twelve popular human actions such as bending, falling, hands up, standing etc. The proposed system is evaluated in MATLAB. Some activity is used from KTH. In the proposed* SIFT calculates match score. If match score>=1.75 then abnormal action detected.

Fig.3 Data Set used for the proposed system

Fig.3 shows some of actions of proposed dataset. The result of proposed system are shown in Fig.4.An input is compared with already created data set images. If match is more that is finally detected image. And that image is displayed separately.

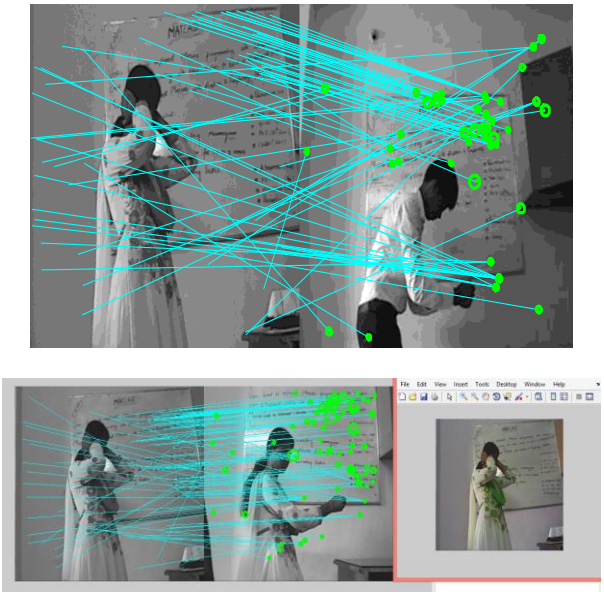

Fig.4 Result of the proposed system

Conclusion

This paper propose a video based anomalous human being action identification using SIFT and HMM. The system is designed for abnormal human activity detection. The proposed system benefits old aged people. The method is tested using data base with various anomalous actions. Features are extracted using SIFT, and HMM is used to detect abnormal action detection.

The proposed method improves care for old aged people by identifying anomalous actions of their day to day life and assist them living independent life.

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