

VIDEO ANOMALY DETECTION SYSTEM FOR AGED PEOPLE

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Abstract - This paper focuses on visual object tracking for monitoring the human activities of aged group people. We present a method for real-time detection of human fall from video of people living alone in their homes. Data sets are captured as a video with sample scenarios to test the proposed methods and detect the unusual behaviour. This system is used to detect the abnormal behaviour of a person. This system considers sitting, standing and walking as normal behavior and falling down suddenly is considered as abnormal. If the unusual behaviour is detected, an alert is sent through SMS and alarm. The detection is based on features that measures dynamics of human motion and body orientation. GSM and buzzer alarm are connected to Arduino microcontroller for producing alerts.

Key Words: anomaly, detection, abnormal, alert, human, behavior etc.

1. INTRODUCTION

Video Surveillance play a major role in monitoring the activities of human. Nowadays, different methods have been proposed for detecting falls; when classified by tools they use, such anomaly detection systems can be divided into the following three kinds of methods using wearable sensors, acoustic sensors and video cameras. The wearable sensors detect actions with the help of heart rate, Blood pressure, Acoustic sensors detect the action using those sensors in floor, Computer vision is uses algorithms to find the pattern and checks the fall detection.

To detect the fall in human, in videos image processing technique is used. Image processing technique is now a days used to automate the process of video surveillance. That too in the anomaly detection is used in various fields like security, military, monitoring people etc. The anomaly event can be anything like sudden changes in crowd behaviours, finding an abandon object in airport etc.

2. PROPOSED METHODOLOGY

Normally for monitoring aged people, always someone should look after them. So it is really difficult to monitor them 24x7. Even if we have video surveillance system to monitor them again some person has to be there for monitoring those surveillance videos. Now a days anomaly detection techniques is widely used. Image processing is used for detecting the abnormal activities of human such as people walking in subways, two people fighting in the road, monitoring vehicles in traffic signals etc.

In this paper we use two algorithms for detecting human abnormal behaviours namely Gaussian Mixture Model and Kalman Filter. It mainly focuses on detecting the normal and abnormal behaviour of the aged people. Here we classify the normal actions such as walking, sitting, standing and abnormal actions as sudden falling or fainting on the floor. If nobody is there to look after that surveillance video, if they fall down suddenly by slipping through the floor or if they had cardiac arrest. They will be helpless, so in our paper we provide a solution for this scenario. If any of the above incident happens our system will give an alert to the respected person or guardian. The alert will be given to the particular person through alarm and if the person is out of town or if the person is in office an SMS will be sent to alert them. Data sets used are 2 sample videos where one video has normal behavior and another one contains abnormal actions.

3. SYSTEM ARCHITECTURE

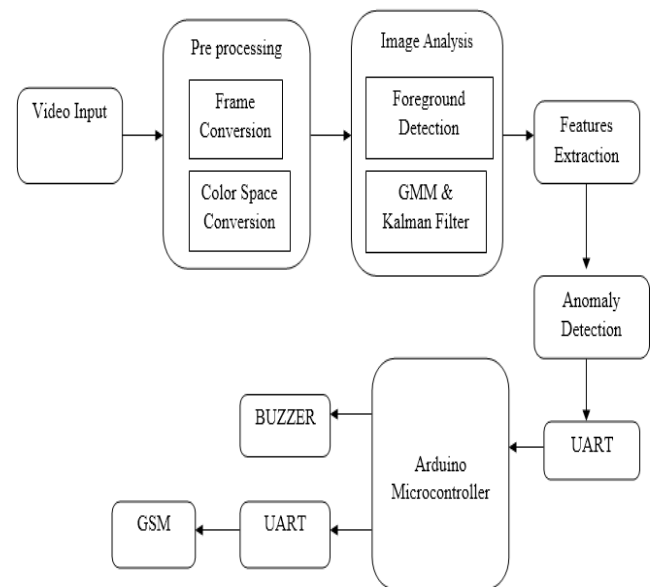


Fig -1: Architecture Diagram

Initially a video is given as input the video is processed and converted into frames. The frames are converted into black and white frames to make the process much faster. From those frames the foreground image is separated from the background. The separated foreground is tracked using two algorithms. Additional feature extraction is also done using those algorithms. If the fall is detected the Alert is sent via message or alarm you arduino microcontroller.

3.1 Gaussian Mixture Model

Generally GMM is used to detect the foreground image. In this algorithm the image is separated from the background by using mathematical equations. Before that the particular video is converted into frames to make the process easier as we can work only with images in the image processing technique. As in Fig-1 the original image is converted in Binary conversion. If any small pixels is present in human means it will detect it as an object. To avoid this problem we use the GMM algorithm.

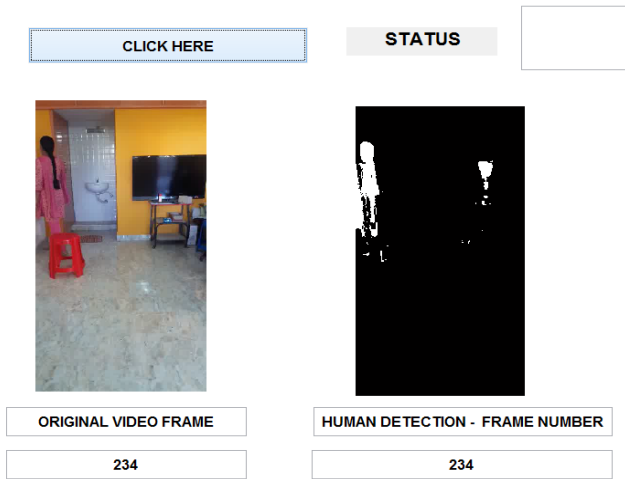


Fig-2: After GMM

3.2 Kalman Filter Algorithm

After GMM, Kalman Filter technique is used to compare the previous frames with the current frames .If there is a big change in the pixels location and orientation of the human it detects it as an abnormal action. We consider if the orientation is about 90 degrees, it is considered to standing or walking. Or if the orientation is slightly inclined, then the person is sitting as in Fig3.

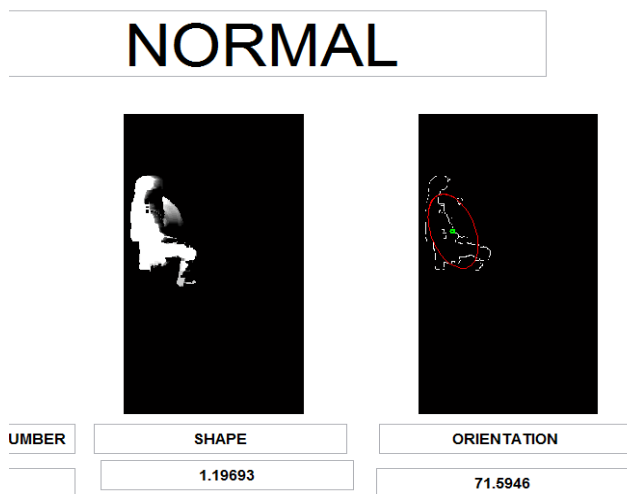


Fig-3: Applying kalman filter

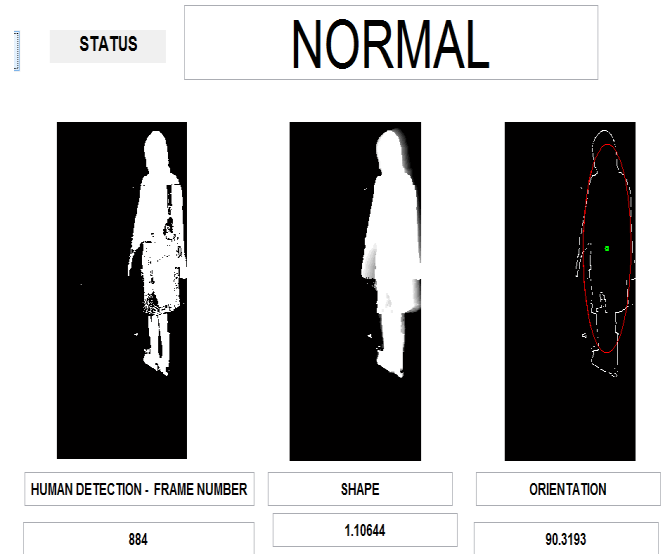


Fig-4: Standing, Walking

In Fig-4 We see that the action such as sitting,standing,walking is considered as normal.But in Fig-5 human started to fall but then it considered as normal since the orientation is still in 90 degrees.Now in Fig-6 The orientation of the ellipse is nearly around 180 degree so the system takes it as a sudden changes in the movement,so the fall is detected when the angle changes from 90 degree to 180 degree or 0 degree.If the person fall on left side as in Fig-6 it takes around 180 degree,or if they fall on right side the orientation will be around 0 degree or 360 degree.

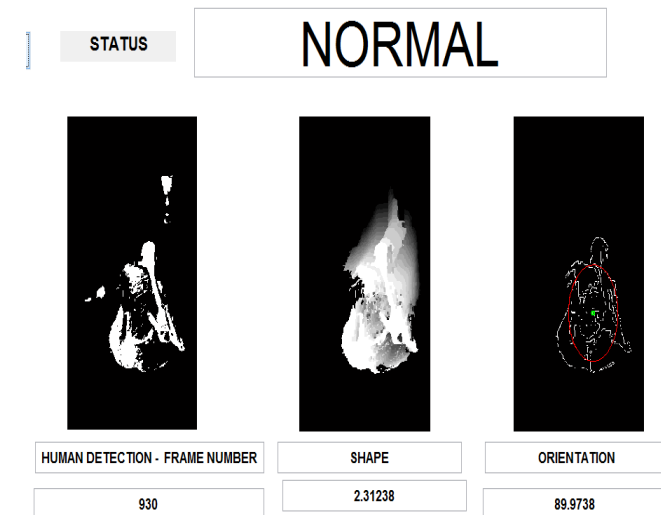


Fig-5: Started to fall

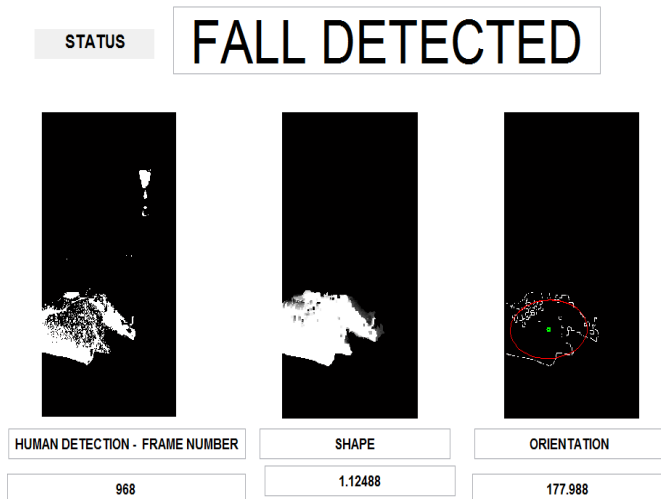


Fig-6: Fall Detected.

4. HARDWARE REQUIREMENTS

When the fall is detected to an alert GSM(Global System for Mobile)is used to send SMS(Short Message Service) to a particular number which is given by the user where the SIM slot is provided in the GSM (Fig-7).Then another alert is through buzzer alarm(Fig-8).These two are connected to the system through arduino microcontroller. UART is already present integrated in the microcontroller.



Fig-7: GSM MODEM



Fig-8: Buzzer alarm

5. CONCLUSION

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