Pattern Recognition based approach for Real time recognition of Human Activities in Videos

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A. Introduction:

A five year child has no difficulty in identifying different person, animals, plants etc. from their appearances. Also they can analyse the things that are happening around them. To provide similar ability to our computer machine, pattern recognition field came into existence. Biometric verification is one of the applications of pattern recognition. From last few decades lots of work has been done on various biometric verification such as fingerprint recognition, face recognition, eye retina recognition etc. and many of this biometric techniques are now going to use successfully for person identification particularly for attendance monitoring, secure authentication system, criminal verification etc.

Automatic identification Crops, crop disease, nutation deficiency is another growing field in pattern recognition. One of the most emerging topic in pattern recognition domain is "Human activity recognition /prediction from live streaming of pre-recorded videos.

Now a day's surveillance camera is being used everywhere for the purpose of security and for monitoring some abnormal and criminal activities. When some harmful activity is happened the operator need to check all the footage of CCTV camera. This process needs lots of time and concentration to watch all footage and then to investigate the case based on it. Also such system always needs human intervention to monitor the activity recorded in camera after some illegal activity is happened. So researchers have drawn much attention towards developing intelligent video surveillance system which can automatically recognize or predict the ongoing human activity in video. The goal of activity recognition is to automatically understand the ongoing human activity in video. The basic difference between activity recognition and activity prediction is that, activity recognition is after-the- fact classification. It mean that the activity is recognized after it is fully happened while activity prediction means guessing (or predicting) the type of ongoing activity before it is fully observed. In short, activity prediction means inferring the ongoing activity given temporally incomplete video. Such as: in intelligent prediction system can be useful in real world scenario such as healthcare monitoring system for automatically analysing and understanding patient's activities, in intelligent driver assistance system for monitoring driver activities, in ATM surveillance for detecting criminal activities etc.

B. Challenges in Activity Recognition

Activity recognition from videos is very challenging task as unlike image video is dynamic in nature which consists of spatial as well as temporal information. Various challenges in activity recognition are as following:

1. **Viewpoint:** Changes in viewpoint of camera can affect the performance of prediction system. The person's activity may look different from different viewpoint and camera locations.

2. **Background:** If the background is clutter then at first it needs to extract human from its background. Object segmentation from video is again highly depends on camera position i.e. static or moving camera.

3. **Motion Style:** The same activity can be performed in different style by different person. For example some person walks very fast so it may seems similar to running activity of another person.

4. **Speed:** The speed at which human performs the activity may differ from person to person.

5. **Duration:** Performance duration can vary every time, so size of extracted features can vary.

6. **Occlusions:** Occluded part in video is often difficult to monitor. If the video is occluded then it becomes difficult to track targeted human activity which may affect the accuracy of recognition system.

7. **Scale:** The scale of the persons in video can affect the performance of the system.

C. Human Activity Recognition system:

There are lots of variations in human action recognition. For example an activity can be simple short duration activity such as walking, running, sitting, jogging etc or it could be long duration complex activity such as cooking, playing, dancing etc. Long duration complex activity consists of series of short duration activity. Various scenarios for activity recognition system are as follows:

1. **Single Person Activity Recognition**

This system works for the video which consists of single person. When a video consists of single person then it is easier to track and monitor that person. Such recognition system can be useful to ATM Surveillance, Patient's Activity

monitoring in ICU room, Driver action recognition System etc.

2. Multiple person Interaction or crowd activity recognition

This system works for environment when videos which consist of Multiple people interaction and the crowd behaviour. Such Recognition task is very difficult and challenging and it have drawn much attention recently due to the needs of environment security. The main three important issues in such system include people counting, tracking each individual separately and then analyse activity of each individual separately. Such systems can be useful for public places such as hospitals, office etc where limited number of peoples are present in video.

3. Abnormal Activity Recognition:

This system is helpful for recognizing abnormal or criminal activities at public places such as malls, bus stands, railway stations etc. To explicitly define abnormal activity is very challenging, since their definition depends on the contexts and surrounding environments.

D. Application

1. Surveillance System

In surveillance systems human activity recognition can be used for identifying the criminal and detecting suspicious activities. This needs automatically tracking of every individual in crowd and understands activities.

Now days most security surveillance systems are equipped with several cameras and it require human intervention for monitoring of video and for video content understanding when some abnormal or criminal activity is

reported. By applying automatic human activity recognition techniques to video-based surveillance systems, we can effectively reduce the workload of security staff as well as systematically creating an alert immediately when security events are detected in order to prevent potentially dangerous situations.

2. Healthcare System

In healthcare environment this system can be used to continuously track patients in ICU and immediately raise an alarm if some critical situation arises.

3. Entertainment Environments

In Entertain environment such recognition system can be used to analyse and predict success rate of sport, dance and gaming etc. in order to enrich lifestyles

4. Daily Life Activity Monitoring

This system can be effectively used to monitor the activity of seniors at home. This would be useful for the safety and immediate help to senior persons.

E. Conclusion:

To develop a system for automatic recognition human action is crucial task because of diversity in different actions performed by different people. Today's word is very fastest growing world and everyone wants enriched life style with emerging technologies along with safety. Real time human action recognition system to investigate the doubtful situations at their early stages and can also reduce human effort and can also help to provide safety.

F. References

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