Person Locator from a Real Time Video

Dibyendu Sur, Mugdha Mondal, Soumitaa Chatterjee

Abstract— Real time person location from a public place with group of people is a necessary issue of modern world. Tracing a theif, burglar in a crowded region is an outstanding issue of today's world. Tracing the present students or employers in everyday school, colleges and working field can be easier by this face regocnition technique. A method is proposed here to locate a particular person from a real time video and generate some audio alarms.

Index Terms— face detection, face recognition, frames, trigger, features, orientation, message printing, alarm.

1 Introduction

THE location of certain person or a group of persons from a particular location has plenty of applications in modern world. Real time video observation for prolonged time period is an impossible job for human beings. An intelligent system should be designed in order to locate the person by observing the video for a long perion of time. An image detection technique has been proposed in this paper in order to identify a person or a group of persons from a complex and crowdy video inspite of the variation of the gesture and face orientation effect. The face of the target person has been stored to extract features. Those extracted features are then applied as the input to the real time video in order to track the person. A suitable text message can be printed in the screen or a file if the person is tracked with proper time. This method can be used to trace certain person in urgent basis, can track a student whether he or she is present or not in the class or to trace certain employee of a company whether he or she is present on certain day.

Fig. 1. Detected face from the target person.

2 Image Storage and Feature Detection

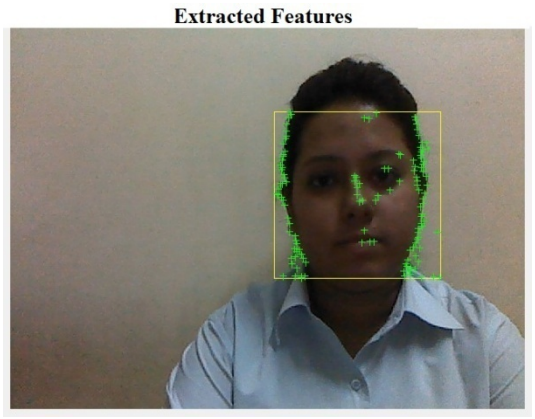
2.1 Image Capture Stage

An image has been stored or captured with high pixel information. Viola–Jones face detection technique [8] has been used for face detection and features extraction. Figure 1 shows an image with detected face and Figure 2 shows the extracted features. The extracted features will be monitored and tracked by Kanade–Lucas–Tomasi (KLT) algorithm [2, 3, 4].

2.2 Feature Extraction from Stored Image

The stored image is used for detecting features. The features of face are observed by Viola–Jones face detection method. These features are stored to compare the points with any detected faces in a real time acquisitioned video. The features are extracted keeping the face completely forward with no angle orientation and no special gestures. The background screen is kept unicolour with no stray marks. The features are shown in Figure 2. These features will be used to track that particular face from a real time video of multiple persons and print a text message after any successful recognition. The time information will also been provided alongside the recognition information in the printed message in the software platform. A suitable alarm can be generated in order to make any concerned person aware of this successful face recognition.

- *Dibyendu Sur is Assistant Professor in Electronics and Instrumentation Engineering Dept., Narula Institute of Technolog, West Bengal, India, PH-+919433921879. E-mail: dibyendumalay@ieee.org*
- *Mugdha Mondal is currently pursuing bachelor degree program in Electriconics and Instrumentation Dept., Narula Institute of Technolog, West Bengal, India, PH-+919062261355. E-mail:mugdhamondal30@gmail.com*
- *Soumitaa Chatterjee is currently pursuing bachelor degree program in Electriconics and Instrumentation Dept., Narula Institute of Technolog, West Bengal, India, PH-+918017243894. E-mail: soumichatterjee76@gmail.com*



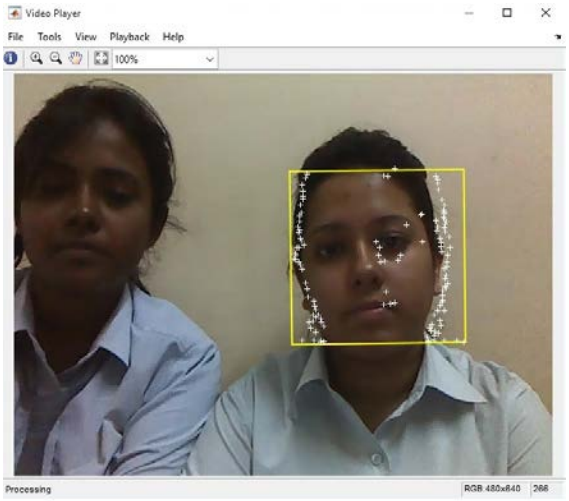


Fig. 2. Extracted features from the target person.

3 Feature Recognition From a Set of Examples

The person, whose face picture is used as the target face, is now assumed to be in a real time video with another person. The proposed system should recognize the face of the target person among the other peoples. The feature recognition has been done by Kanade–Lucas–Tomasi (KLT) algorithm. In this method, it has been observed that the orientation of the front face and the movement of facial gesture always lead to track fewer points or features than the same when the person is standing still in front of the camera. In the first step, the heads of the persons in the real time video are stayed still.

3.1 Video Acquisition in Real Time

Real time videos of group of persons are acquired of same time width in order to trace the face of the target person. The videos are obtained from an installed webcam in front of the persons. Proper coding is required in order to initialize the manual triggering as well as the number of frames to be acquired per each trigger. The interval between each frame acquisition has also been specified and it is kept to a small value. The videos are stored in mpeg-4 format. The videos are processed by a MATLAB code and they will compare the stored features with the real time video frames.

3.2 Recognition of Features from Real Time Video

The face has been recognized and it has been shown in Figure 3. The exposure and intensity of ambient light is remained constant and the background wall is chosen free from any scares. A snapshot from the recognized patterns in the real time video has been shown in Figure 3. The movement of face and change in gestures cause recognition of lesser number of pattern recognition. In this regard, variation of number of features detected with respect to time has been computed by keeping the head still while video recording. This variation is shown in Figure 4.

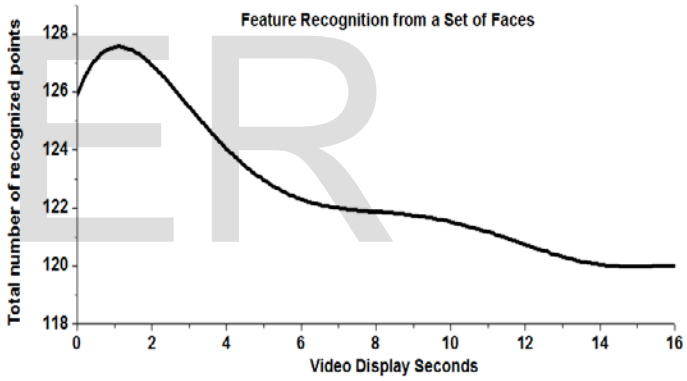


Fig. 3. Recognized face of the person from a group of persons.

Fig. 4. Computation of recognized features with respect to video displaying time.

From Figure 3, it can be assumed that the proposed method traces the desired face almost correctly with complete recognition of all the features or points stored in the system. For better recognition, persons with different complexion are used with light coloured background having no stray marks. After taking utmost care of prevention of any face orientation or gesture variation, the decay of features with respect to time is reduced to 6-7 points in a 16 second real time video. This can be demonstrated from Figure 4. A suitable value has to be chosen for the threshold limit for the number of featured points recognized in order to conclude whether the proper face has been recognized or not. This threshold value must e

selected after a series of experimentation with differerent position of faces. The change of faces with different complexion will be more useful in order to choose accurate threshold values. Ambient lights and the back wall must be same for better estimation of threshold values. Two snapshots of text messages about the successful recognition of the face of the desired person among more than one number of faces in a real time video has been shown in Figure 5. The proper date and time information also will be displayed with recognition alert in this proposed system.

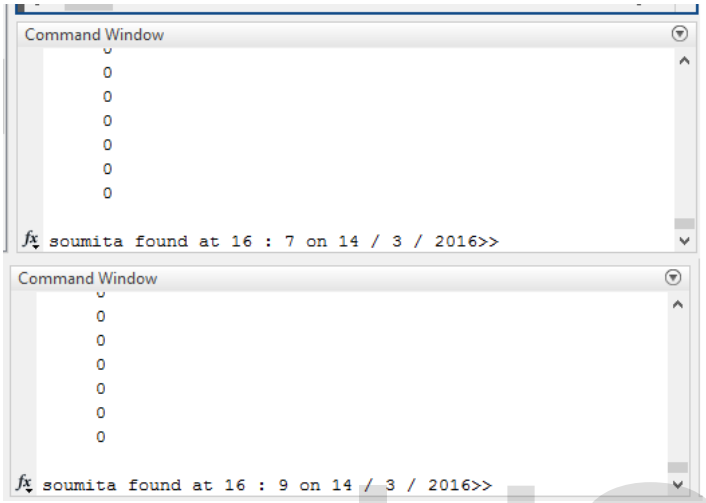


Fig. 5. Two snapshots of the displayed indication of the successful recognition of face with time and date information in run time.

4 Results and Discussions

The recognized facial information has been shown in Figure 3. The limit of the decaying speed of recognized points has been observed through Figure 4. Snapshots of successful recogntion stored face have been logged with proper date time information. Two snapshots among them are shown in Figure 5. These results have shown that with proper precaution of facial orientation and changes of gestures, the recognized points can be stabilized and confined in a threshold region. This number of threshold region has been used as the decision signal to determine whether the person is present or not. A proper text message with current time and date should be displayed on screen every time the particular person is tracked in the real time video. An alarm can be generated with every time the person is being traced. The amplitude and frequency of the alarm sound can be readjusted by the user. The intensity of the ambient light must be kept constant. The output decision signal can be vaired in different ambient color, brightness. The optimum result can be achieved by experimenting in different varying conditions.

5 Future Scopes

The possible future scopes for this work are summarized as follows.

1. Any message or call information may be transferred to another phone number after any valid rcognition of the preset face.

2. Multiple persons can be recognized in a same real time video and a text message including the name of every person (alongside the time and date) can be printed. This system can be useful for maintain student attendance in schools and colleges and employee presence or absence in a company automatically.

3. Eyes and other parts of the face can also be detected separately. This will be helpful towards recognizing the person wearing masks and other face covering arrangements.

6 Advantages of This System

The advantages of this system have been summarized below.

1. Cost effective solution of people locator from a real time video.

2. Easy to use.

3. Flexiblity of the system. The face information of the system can be changed by storing different image.

4. Applicable in various fields like attendance calculation, suspect person detection etc.

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References

[1] A. J. Goldstein, L. D. Harmon, and A. B. Lesk, “Identification of Human Faces,” Proc. IEEE, May 1971, Vol. 59, No. 5, 748-760.

[2] L. D. Bruce and T. Kanade. "An Iterative Image Registration Technique with an Application to Stereo Vision,"Proceedings of the 7th International Joint Conference on Artificial Intelligence, April, 1981, pp. 674–679.

[3] L. Sirovich and M. Kirby, "A Low-Dimensional Procedure for the Characterization of Human Faces," J. Optical Soc. Am. A, 1987, Vol. 4, No.3, 519-524.

[4] C. Tomasi and T. Kanade. “Detection and Tracking of Point Fea-

tures", Computer Science Department, Carnegie Mellon University, April, 1991.

[5] M. A. Turk and A. P. Pentland, "Face Recognition Using Eigenfaces," Proc. IEEE, 1991, 586-591.

[6] J. Shi and C. Tomasi, "Good Features to Track," Proceedings of the IEEE Conference on Computer Vision and Pattern Recognition, June 1994, pp. 593–600.

[7] Henry A. Rowley, Shumeet Baluja, and Takeo Kanade. "Neural network based face detection," IEEE Transactions on Pattern Analysis and Machine Intelligence, 20(I), pp.23-38, 1998.

[8] P. Viola and M. J. Jones, "Rapid Object Detection using a Boosted Cascade of Simple Features", Proceedings of the 2001 IEEE Computer Society Conference on Computer Vision and Pattern Recognition, 2001. Volume: 1, pp.511–518.