FACE DETECTION AND TRACKING USING VIOLA-JONES ALGORITHM

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Abstract-*In our day-to-day life, tracking process of desired person has high scope and it is used in various applications. In real time, it is highly useful to find the lost child, person and wanted criminals in a busy crowd. The location of the person can be tracked under the surveillance of the digital camera. Till date, the person is tracked by using internet which may fails when the network is hacked, so it is less secured. In this paper, the tracking of a person using unique code under live stream of a surveillance camera without using internet is proposed. This paper also includes GSM module which is used to send the location of the desired person as a text message to the authorized person. The accuracy of tracking the desired person is attained by using Viola-Jones algorithm and verified the same by using the MATLAB (R2010a) tool.*

Keyword - *Face detection, Digital Image Processing, Tracking, GSM, GPS, Viola-Jones algorithm*

I. INTRODUCTION

Recently tracking system is getting vast popularity because of the rising problems. A tracking system is observing persons or objects on the move and supplying a timely ordered sequence of location data for further processing. Tracking has various applications such as vehicle tracking, GPS tracking, post tracking, mobile tracking, train tracking, solar tracking, LBS tracking. In this proposal person is identified using face detection by interfacing with the hardware .The hardware consist of controller, GSM, transformer, web camera. It is interfaced with the laptop. The face recognition will directly capture information about the shapes of faces. Face Detection Algorithm is used to detect the face. A database is created and the pictures of all the criminals are fed. A minimum of photos of each criminal photo member is taken; this captured image is compared with the already present database using algorithm. Once the captured face matches with the already present database a message is sent to the authorized person with the unique identity code of a person with the location where the target is found through GSM module.

A. Micro controller

The PIC microcontroller PIC16F877A is one of the most renowned microcontrollers in the industry. This controller is very convenient to use, the coding or programming of this controller is also easier. One of the main advantages is that it can be write-erase as many times as possible because it use FLASH memory technology. It has a total number of 40 pins and there are 33 pins for input and output as shown in [figure1.1b]. PIC microcontroller is shown in [figure1.1a].In our proposed work the micro controller is used to store the database of a person and to communicate the location of a target person through GPS and GSM. It has a special feature to identify the analog signals.
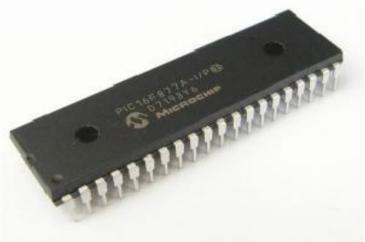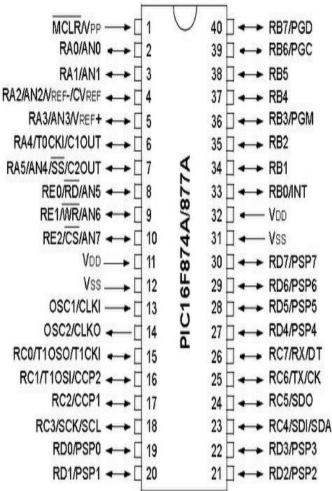

Figure1.1a: PIC microcontroller

Figure1.1b: Pin diagram

B. GSM

It digitizes and compresses data, then sends it down a channel with two other streams of user data, each in its own time slot. GSM is an open and digital cellular technology used for transmitting mobile voice and data services operates at the 850MHz, 900MHz, 1800MHz and 1900MHz frequency bands. GSM system was developed as a digital system using time division multiple access (TDMA) technique for communication purpose. This is mainly used for communication purposes; in our paper it sends the location via GSM. The GSM module is shown in the figure1.1c.

Figure1.1c: GSM module

C. MAX 232(A)

It has two receivers that convert from RS-232 to TTL voltage levels, and two drivers that convert from TTL logic to RS-232 voltage levels. As a result, only two out of all RS-232 signals can be converted in each direction. Typically, the first driver/receiver pair of the MAX232 is used for TX and RX signals, and the second one for CTS and RTS signals. There are not enough drivers/receivers in the MAX232 to also connect the DTR, DSR, and DCD signals. Usually, these signals can be omitted when, communicating with a PC's serial interface.

D. Digital image processing

It is the use of computer algorithms to perform image processing on digital images. As a subcategory or field of digital signal processing, digital image processing has many advantages over analog image processing. It allows a much wider range of algorithms to be applied to the input data and can avoid problems such as the build-up of noise and signal distortion during processing. Since images are defined over two dimensions (perhaps more) digital image processing may be modelled in the form of multidimensional systems. We use Digital Image Processing for video processing. MATLAB is a software platform used for digital image processing. Face detection in web camera video recording can be performed using mat lab. An image from database is matched with the captured image then a location of a person is send to the authorized person.

II.   PROPOSED WORK

The Viola–Jones object detection framework is the first object detection framework to provide competitive object detection rates in real-time proposed in 2001 by Paul Viola and Michael Jones. Although it can be trained to detect a variety of object classes, it was motivated primarily by the problem of detection. There are four stages: Haar selection of characteristics, creation of images that are integral, training of adaboost, classifiers that cascade. Human faces have some common characteristics. For example, eye regions are darker than cheek regions. Also, nose region is brighter than eyes. The algorithm is explained using flow chart [figure2.1]
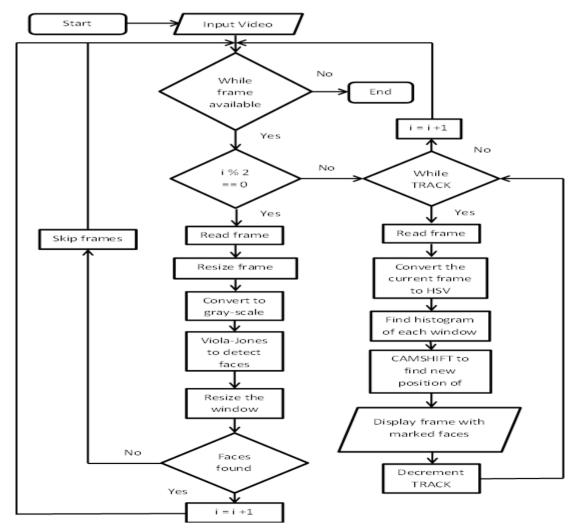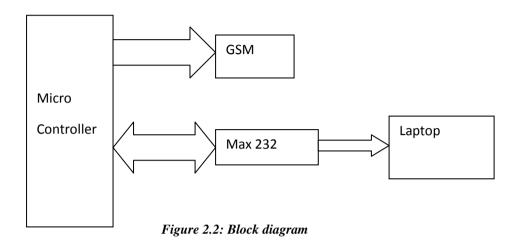

Figure2.1: Flow chart for Viola-Jones algorithm

Our proposed method is based on detection and tracking the image without using the internet. The targeted person databases are stored in the controller. The live web camera is interfaced with the controller and placed in certain places. The captured and the stored images are compared if the compared databases matches up to 80 percent then it will start tracking the person. For comparing, Vio-la Jones algorithm is used. The Viola-Jones algorithm is the most widely used face detection algorithm. It is used in most digital cameras and mobile phones to detect faces. It uses cascades to detect edges like the nose, the ears etc. Finally it will send the text message with vibration to the authorized person and hardware setup is shown in ^{figure2.2.} It can compare the recorded image with database within fraction of seconds.

Figure 2.2: Block diagram

III.   LITERATURE REVIEW

A system of transmission line tower anti-theft monitoring based on video difference analysis is designed [1]. GMM is firstly used to create dynamic background model. Then the moving objects can be extracted effectively with the background subtraction. SVM is used to detect moving targets on the quick identification. Finally, based on regions and characteristics method, the targets of moving are tracked so as to achieve the goal of monitoring and guarding. Experimental results show that this method is accurate in detecting, tracking and recognition of pedestrians about the video monitoring, which will timely warn the monitoring center for the suspected pedestrian to provide security for the power systems. The drawbacks are controlling power flow in such systems requires continuous communication between all terminals as power flow must be active regulated by the control system instead of by the inherent properties of transmission line the power fault occur in transmission system for the duration of short circuit

 Computer vision and pattern recognition systems play an important role in our life by means of an automated face detection, face and gesture recognition, and estimation of gender and age. In [2] proposed face detection and gender identification task of discriminating between images of faces of men and women from face images under non-uniform background. This is done by detecting the human face area in image given and detecting facial features based on the measurements in pixels. We preprocess the facial region by convolving with Gabor filters at five scales and eight orientations. We sample these responses and use them to form a feature vector. We use a classifier based on an additive sum of nonlinear functions. The drawbacks are it requires that each data point be independent of all other data points. From that independent variables don't have to be normally distributed, or have equal variances in each group so it is more robust.

IV.   EXISTING METHOD

The existing journal [3] detects human presence and movement with a low error rate in a controlled environment for security purposes. Here a light weight algorithm has been presented that generates alert on detection of human presence and its movement towards a certain direction. The algorithm uses fixed angle CCTV camera images taken over time and relies upon skeleton transformation of successive images and calculation of difference in their coordinates are seen in figure (3)
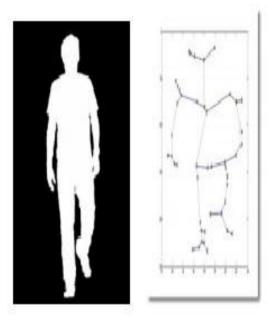
Figure3: Block diagram

V.   RESULT AND DISCUSSION

The existing and proposed algorithms are executed. By comparing Viola-Jones has a great detection rate in every scenario and is better than the Kanade-Lucas-Tomasi in every scenario.PIC controller is used for accurate analog signal detection. By Viola-Jones algorithm it can detect the face in less time.

	Viola-Jones	Kanade-Lucas-Tomasi
Looking front	97	90
Looking left	90	85
Looking right	88	83
Looking up	80	80
Looking down	80	80
Total	87	84

VI.   Conclusion

In real time it can be used to find the lost people and the wanted criminals. A person identification and tracking in an area is implemented and output is executed using hardware and software. Further it can be enhanced looping many CCTV cameras. Artificial intelligence can be used for detecting and matching
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VII.   ACKNOWLEDGEMENT

VIII.   REFERENCES

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