

SMART SURVEILLANCE SYSTEM USING FACE RECOGNITION

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Abstract - - Nowadays, the security forms the most important section of our lives. Security of the house or the near and dear ones is important to everybody smart surveillance used to detected unknown person using face recognition so it helps to monitor and get notifications when unauthorized person is identified, captures the image and detect the faces, then sends images to a Smartphone application.

1. INTRODUCTION

This field has enhanced with new technologies such Internet of things. Every gadget behaves as a little part of an internet node and every node interacts and communicates. Security cameras are utilized in order to build safety in homes, and cities.

The Internet of Things is joined with computer vision in order to detect the faces of people. So it helps to monitor and get notifications when unauthorized person is identified, captures the image and detect the faces, then sends images to a Smartphone application. The existing surveillance system lacks features like cloud storage and low energy and some additional feature like intruder alerting with image and also other feature added to Smartphone application. As show in the figure 1 working principle

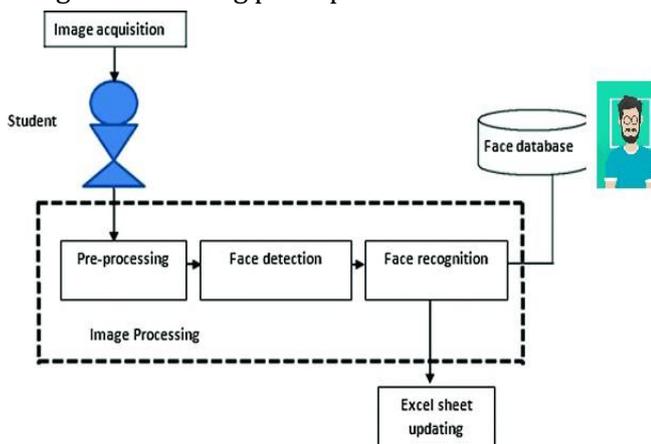


Fig 1. Working Principle

1.1 PROPOSED SYSTEM

In the proposed system, we use the camera to accomplish the pictures when a motion detect via PIR sensor. After detection the face capture it

will send to Smartphone application the application can be divided into two parts which are motion detection and face detection. The after detecting the face only the motion detected. . But, if a movement has detected, then the detected movement of the current frame will be processed by the cascade (algorithm of face detection). We used the following hardware's to develop the application: Raspberry Pi 3, PIR Sensor, Raspberry Pi Camera, Smart Phone, cloud and Power Supply. We connected the camera with Bluetooth without using the wife. Via the PIR motion sensor; the system has the capability to identify motion of things.

1.2 FACE DETECTION ALGORITHM

Object Detection using Haar feature-based cascade classifiers is an effective object detection method proposed by Paul Viola and Michael Jones in their paper, "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001. It is a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in other images. The System Design for surveillance system is as show in below figure, basic aim of this system design is to continuously capture the surveillance and if any government is noticed and the message send to the user notifying him is as show in above figure of system designs. system design for surveillance system. Once the training is complete you should see the message 'training data saved to training.py'.

The training data is now stored in the file training.py, png, positive_eigenface.png, and negative_eigenface.png files in an image viewer. And also we used they face recognizing for attendance when all database and trained face are saved if they trained face not registered for particular time automatically it will send message

Here we will work with face detection. Initially, the algorithm needs a lot of positive images (images of faces) and negative images (images without faces) to

Train the classifier. Then we need to extract features from it. For this, here features shown in below image are used. They are just like our convolutional kernel. Each feature is a single value obtained by subtracting sum of pixels under white rectangle from sum of pixels under black rectangle. As show in figure 4 image pixels features

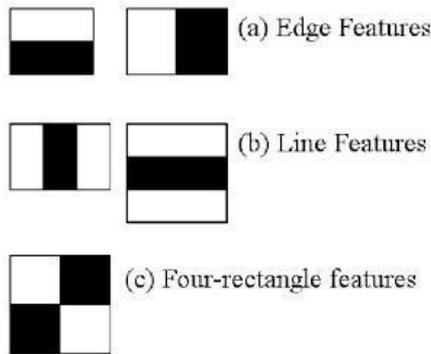


Fig 2 Image Pixels Features

2 SYSTEM DESIGN

The System Design for surveillance system is as show in below figure, basic aim of this system design is to continuously capture the surveillance and if any government is noticed and the message send to the user notifying him is as show in above figure of system designs. Shown in figure 3 system design for surveillance system

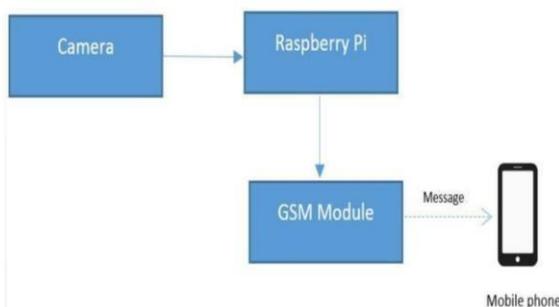


Fig 3 System Design for Surveillance System

2.1 GSM MODULE SERIAL PORT

The message send to user via GSM module short message service (SMS) it is connected to raspberry pi through serial port of rs 232.the program is written in programming language and capturing surroundings using camera and comparing them with the image frame. System design is first capture the image then send the raspberry pi the raspberry pi process on that image and send to GSM module.

The surveillance system uses mpeg streamer to stream live video on screen connected to raspberry pi

Via HDMI port and we can connect one or more computer or monitors at a time using HDMI (high-definition multimedia interface) switch. Raspberry pi uses Raspbian operating system. raspberry pi supporting many programming language such as python,html5, JavaScript, c etc. the surveillance system python language is used because this language is easy to communicate with serial port, simple cv, open cv modules.as shoe in Figure 4 GSM Board



Fig 4 GSM Board

The Raspberry Pi written program in python programming language using simple CV module the raspberry pi reads the data and capture the image by using simple CV then comparing the image to detect the Face and send the SMS (short message service) form GSM module via serial communication link. If detect the face then that data is store on database else ignore of that data and if not compare the image then send to the surveillance system of Raspberry Pi This system is as show in figure of workflow algorithm for Surveillance system

2.2 RASPBERRY PI

The Raspberry Pi is a credit card-sized chip or minicomputer developed in the United Kingdom. There are various types like A, B and B+.it is advanced RISC machine processed lightweight computer minimized onto a single board. RISC (Reduced instruction set computing) is a microprocessor designed to perform a smaller number of types of computer instruction so it can operate at a higher speed. ARM (Advanced RISC machines). ARM processors are extensively used in consumer electronic devices like smartphones, tablets, multimedia players and other mobile devices, like wearable. This technology used on the board reduces cost, heat. The B+ is the latest version of Raspberry pi and it is most widely used of these days, its runs on ARM11 processor with 512mb RAM operate at 700 MHz frequency. As show in above fig of Raspberry pi B+ board, there are many slots of that board including SD card slot, HDMI Port, Audio/Video jack,are show in figure 4 hardware connection

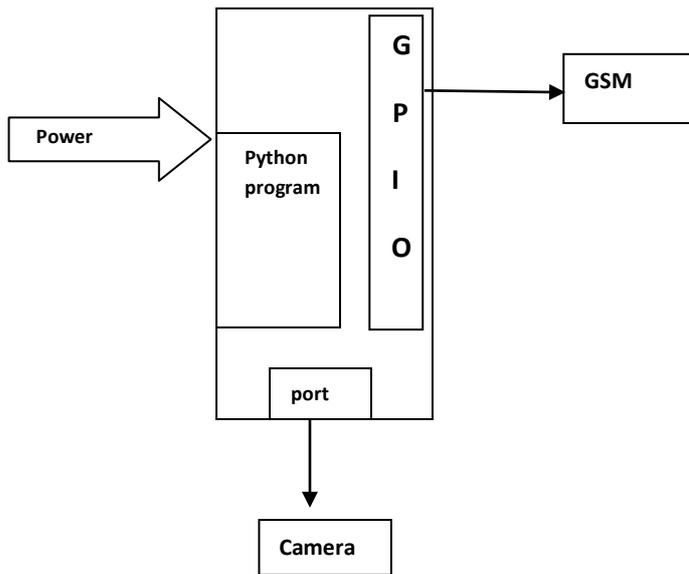


Fig 4 Hardware Kit

3 RESULT AND DISCUSSION

3.1 Detecting Face

Python codes were developed for face detection from a given image, from a folder of images and for real time face detection. Sample input image and the detected image and sub faces are shown. In figure 5.detecting face

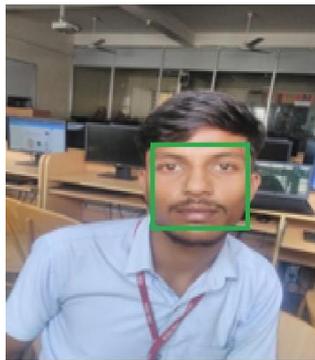


Fig 5 Detecting Face

For face detection from a folder of images, the proposed face detection method was applied to various face datasets, namely Face 1, Face 2, Face 3, Face 4, Face 5,etc..., ATT Face database. Two types of noises, namely Median noise and Intensity noise were introduced to all the face datasets. Further, two types of Blurring effects, namely Motion blur and Gaussian blur were added to the face datasets. Face detection rate was calculated for all the face datasets, with and without noise and blurring effects.

3.2 TRAINING FACE

Once captured a number of positive training images, you can run the train.py script to perform the

Training. If it's still running, exit the capture-positives.py script by pressing ctrl-c in the terminal session. Run the following python script to train the face recognition model.as show in figure 6 raining face Python train.py



Fig 6 Training Face

This command does not need to be run as root with sudo because none of the pi GPIO/hardware is accessed. You should see a message that the training images were loaded, and the text training model.to indicate the training calculations are being performed Training the face recognition model on the pi will take about 10 minutes. Once the training is complete you should see the message 'training data saved to training.py'. The training data is now stored in the file training .py, png, positive_eigenface.png, and negative_eig enface.png files in an image viewer. And also we used they face recognizing for attendance when all database and trained face are saved if they trained face not registered for particular time automatically it will send message

3.3 Face Recognition

Facial embedding's on your training set of images. From there we'll review source code that can be used to perform face recognition on the raspberry pi, including a number of different optimizations. Finally, I'll provide a demo of using my raspberry pi to recognize faces in stream.as show in figure 7 face recognition



Fig 7 Face recognition

In the Face recognition not saved into database or they not trained face it will indicated unknown face and will send alert message to owner

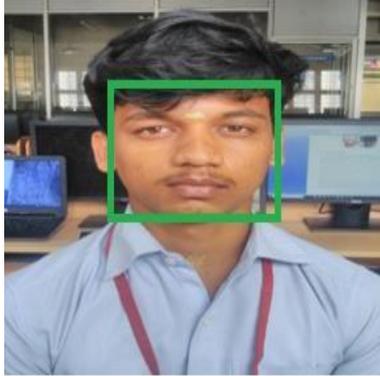


Fig 8 Unknown Face

3.4 Alert Message Sending



Fig 9 Alert Message

4 CONCLUSIONS

The security system, proposed, is low cost, low power consuming system. This system can easily provide high level of security as it combines two modern technologies together i.e. Face recognition and IoT. These are rapidly growing technologies in industries and scientists are still researching on them. Therefore these two have made a significant impact on security system development. Due to these, the security will almost double. Remote controlling and monitoring is possible because of using IoT and Face recognition has made it almost impossible to hack.

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