

Real-Time Face Detection and Tracking for Surveillance System Using Raspberry Pi

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Abstract- The goal of this paper is to design and implement a security system by integrating Camera. The device records and sends the CCTV of the visitor to the user. Our system provides a convenient user interface for the user to know the surrounding and take appropriate action accordingly. Here we are using datasets to save the images of the persons. This is implemented by interlocking with the real time SMS server that sends warning message to user when the camera detects an unknown person. Raspberry pi supports video and saving images, text and GUI features. Our project supports the video, saving images, warning notice, other features. So using open cv we are detecting the face of the person and sending warning message if necessary using IOT.

Keywords- Open cv, IOT

I. INTRODUCTION

Computer vision focuses on duplication or emulation of human vision. Therefore, it includes many methods that used to acquire, process, analyze, and understand images, and it uses a camera to analyze and understand scenes in the real world. Human face is the most object got the interest of the researchers because of the various critical applications related to the human face ranging from surveillance systems to entertainment applications. Face detection achieves a real-time performance through Viola-Jones framework where its detection rates are competitive with some of the best methods to date in terms of both performance and running time. Face tracking provides a solution to handle the real-time conditions and video attributes as a temporal continuity attribute, but the time consuming of the most tracking algorithms makes tracking problem an open area of research. The recent research seeks to take a benefit of AdaBoost approach to set an initial window of a target object for a tracking method. Then, the tracking method is responsible for tracking the face by distinctive features, but in a fast manner. Optical flow is used to track objects, it is an adaptive algorithm based on the result of the previous frame. Optical flow method gets current key points and a homography transformation between the previous and the current frames. In the technical context, Android developers tend to support Android mobile devices by biometric applications including face tracking. Face tracking using a hand-held camera of a mobile device must

consider both the motion of the camera and the face object, and must be able relatively to handle the blurring resulting from shaking or significant displacement of the face to keep the tracking accuracy as high as possible [5]. In addition, mobile devices also have many limitations in hardware resources like computing resources. These limitations make tracking problem on mobile devices an open area of research. Android platform has the ability to get benefits of Open Computer Vision library (OpenCV). It is a programming library mainly aimed a real-time computer vision. OpenCV provides Viola-Jones detector for detecting multiple faces under the real-time conditions. In this paper a criminal detection framework is proposed. This framework, as shown in fig. 1, is a client-server video based face recognition surveillance in the real-time. The framework scenario is as following: the policeman capture a video for a criminal or a suspect using his Smartphone camera, a real time face detection and tracking is done at the client side. Then the video frames containing the detected and tracked face are sent to the server where a video based face recognition is done at the server side. The personal information record for the recognized person is sent back from the server to the policeman mobile phone. This paper focuses on the development of the face detect-track system on Android platform at the client side. The face detection stage uses ViolaJones detector supported by OpenCV. The face tracking stage is based on Optical Flow algorithm, which is implemented using java. The performance of the proposed face detect-track system is compared using two feature extraction methods, Fast Corner Features, and Regular Features with Optical Flow algorithm.

II. PROPOSED SYSTEM

Computer Vision and Internet of thing (IOT) is the emerging technologies now a days. To reduce the man power for security aspects in this project a Surveillance system has been implemented using a single board computer i.e. Raspberry Pi 3 which will act as the CPU in which we will do the coding part using Python and a module named Open Source Computer Vision (OpenCV). A local database of the authorized person is been made which has the images of all the persons who are authorized to enter that area. Using Python-OpenCV module in that Frontal-Face HaarCascade

algorithm the face of the person will be captured and matched with the database it will display the name of the person if the person is not their in the database and automatically it will capture the image attache to the mail and send using SMTP and also SMS will be sent.

III. BLOCK DIAGRAM

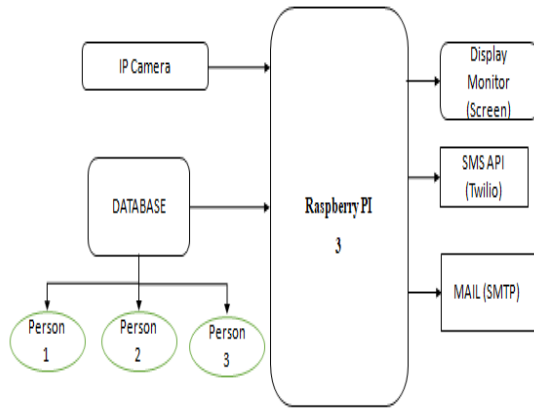


Fig.1: Block Diagram Of face tracking camera

BLOCK DIAGRAM DESCRIPTION

Initially in data base known person images are saved. If known persons comes in front of the camera then it will not respond and if it recognizes any unknown person then camera will automatically capture the image of the particular person and send that particular image to register mail id and send the message to the particular register mail id using Twilio.

IV.HARDWARE TOOLS

4.1.Raspberry-pi

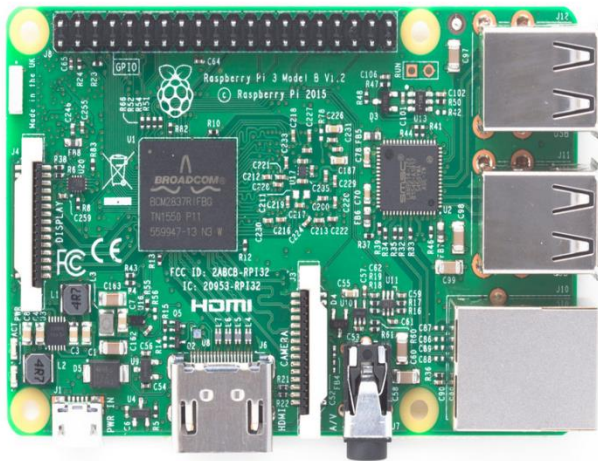


Fig.2: Raspberry-Pi

The Raspberry Pi 3 Model B is the third generation Raspberry Pi. This powerful credit-card sized single board computer can be used for many applications and supersedes the original Raspberry Pi Model B+ and Raspberry Pi 2 Model B. Whilst maintaining the popular board format the Raspberry Pi 3 Model B brings you a more powerful processor, 10x faster than the first generation Raspberry Pi. Additionally it adds wireless LAN & Bluetooth connectivity making it the ideal solution for powerful connected designs.

V. SOFTWARE TOOLS

5.1.Linux

Linux is a free open source working framework and it has a place with the Unix working frameworks. In reality Linux implies the piece itself which is the core of the working framework and handles the correspondence between the client and equipment. Regularly Linux is utilized to allude to the entire Linux dispersion.

Linux appropriation is a gathering of programming in view of the Linux Kernel. It comprises of the GNU-task's parts and applications. Since Linux is an open source venture, anybody can alter and circulate it.

5.2 Raspbian Wheezy

Raspbian Wheezy is a free working framework in view of Debian appropriation. It is made by a little group of designers who are enthusiasts of Raspberry Pi. Raspbian is improved for the Raspberry Pi's equipment and it accompanies more than 35 000 packag-es and pre-incorporated programming. Raspbian is still under dynamic advancement and it intends to enhance the solidness and execution of the Debian bundles

5.3.Python

Python is a multi-worldview programming dialect: protest arranged programming and organized writing computer programs are completely upheld, and there are various dialect highlights which bolster practical programming and viewpoint situated programming (counting by meta programming and by enchantment strategies). Numerous different standards are bolstered utilizing expansions, including configuration by contract and rationale programming.

5.4.Open-cv

OpenCV-Python is the Python API of OpenCV. It joins the best characteristics of OpenCV C++ API and Python dialect. OpenCV Python is a universally useful programming dialect begun by Guido van Rossum, which turned out to be extremely mainstream in brief time fundamentally due to its effortlessness and code lucidness. It empowers the software engineer to express his thoughts in less lines of code without decreasing any clarity. Contrasted with different dialects like C/C++, Python is slower. In any case, another vital component of Python is that it tends to be effectively reached out with C/C++. This component causes us to compose computationally concentrated codes in C/C++ and make a Python wrapper for it so we can utilize these wrappers as

Python modules. This gives us two favourable circumstances: first, our code is as quick as unique C/C++ code (since it is the real C++ code working in foundation) and second, it is anything but difficult to code in Python. This is the manner by which OpenCV-Python works, it is a Python wrapper around unique C++ execution. Furthermore, the help of Numpy makes the errand more less demanding. Numpy is an exceedingly upgraded library for numerical tasks.

VI. RESULT

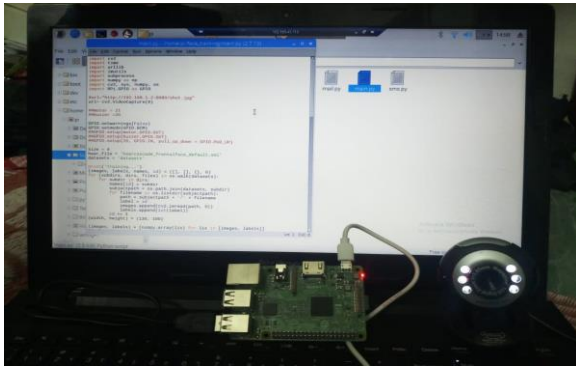


Fig.3: Hardware Design

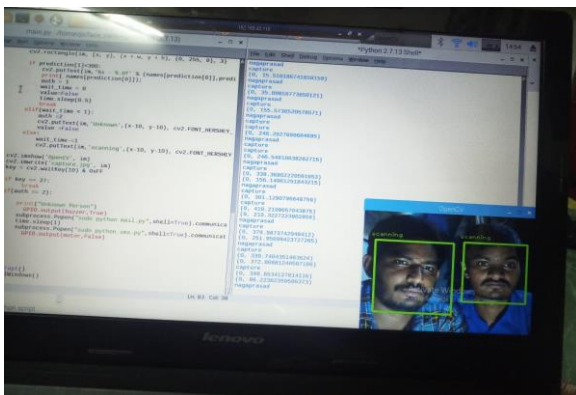


Fig.4: Capture the frame when tracking the face, and run the tracker

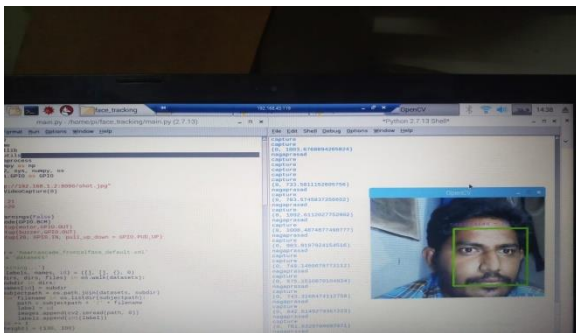


Fig.5: Result of the system shows the first frame when detecting the face, and run the tracker and show the result of the tracker on same frame

VII. CONCLUSION

Raspberry pi module is a credit card sized single board computer, by using this there is no need of using the sensors, which is totally computer vision we can detect and identify the person with his name. So it can reduce the complexity of system and cost also reduced. Such human creation put us spell bound that's why a topic of invention is taken robotics design.

The project "REAL-TIME FACE DETECTION AND TRACKING FOR SURVEILLANCE SYSTEM USING RASPBERRY PI" has been successfully designed and tested. It has been developed by integrating features of all the hardware components used. Presence of every module has been reasoned out and placed carefully. Secondly, using more accuracy Haarcascade frontal face algorithms with the help of growing technologies the project has been successfully implemented. Finally we conclude that "REAL-TIME FACE DETECTION AND TRACKING FOR SURVEILLANCE SYSTEM USING RASPBERRY PI" is an emerging field and there is huge scope for research and development.

VIII. REFERENCES

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