INTERNATIONAL JOURNAL OF ADVANCE RESEARCH, IDEAS AND INNOVATIONS IN TECHNOLOGY

ISSN: 2454-132X
Impact factor: 4.295
(Volume 4, Issue 1)
Available online at www.ijariit.com

Implementation of Advance PCA Algorithm for Security System using Raspberry Pi

Saurabh K. Patil
patilsaurabh449@gmail.com
Rajiv Gandhi College of Engineering and Research, Nagpur

Narendra G. Narole
naren.narole@gmail.com
Rajiv Gandhi College of Engineering and Research, Nagpur

ABSTRACT

As the human life goes on improving, there arise many security issues which sometimes are life risky also. Hence, there comes the need for the security system. As the earlier security system were based on the human inspections that creates the faults in the securities. Hence there comes the security systems based on the various controllers, latest techniques, etc. but, still the optimum security is not achieved. Thus, the new eras of the face detection security system arise and all the way new technique of security comes. Even though face detection is difficult task to make but still the advancing image processing algorithms makes it look so simple. The various image processing algorithms are HAAR, PCA, Eigen Face, Viola-Jones, etc. which have their own limitations. Hence, there comes the advance algorithms and hence for achieving the optimum security and higher efficiency, we come with the advance PCA based security system. This algorithm can be compatible on the automation instrument. The automation instruments are of various types such as, microcontroller, arduino, raspberry pi, etc. thus for the best result along with the cost effectiveness, we are using the raspberry pi as a controlling instrument. This instrument provides the ability of the storage in the form of database. Thus, database helps to detect the face and allow the recognised person only. Thus this will helps to improve the security. Thus, this paper consists of the report of working comparison of the various face detection projects based on the raspberry pi module with our project.

Keywords: *Raspberry Pi Module, GSM Module, USB Camera, Numerical Keypad, Relay, etc.*

1. INTRODUCTION

The need of optimized security system which will restrict the entry of unknown intruder is comes to end with the evolution of face detection based security system. There were so many research was come out like door intercoms but the security was still the question of matter as it is not that much compact and have no storage. So to improve the existing security and reduce the risks we come with this advance PCA algorithm for face detection based security.

A Face detection System is a system which usually automatically identifies or verifies the identity of a person from digital images or a video frames from a video source and allow the user to interface with scenario. The OPEN CV library that will help to detect captured images of a scene to identify or verify one or more persons in the scene using a stored database. The basic work structure of the face recognition system is: - the image is captured by camera. After this, on the basis of advance PCA algorithm, system matches the captured images with data base images which provide the result as image matched or not. Based on result SIM300 GSM module sends a security alert to the authorised person which is 'entry successful or unauthorised person trying to unlock, take action'. But, if the unknown person is in knowledge with authorized user then he can get entry just by entering the password which the authorised owner will provide.

2. LITERATURE REVIEW

The author Akshay N. Patil and et al. [1] Describes the working of the face recognized door unlocking system in which they use the raspberry pi along with the GSM module. This module contains a secured face recognizer for automatic door opening. In this project they have the facility of the informing to the user regarding the door unlocking. But, this system lags the feature of making the door

unlocking for known persons to the user. This system uses the basic PCA algorithm to execute the process, but still lacks in many feature; hence need to improve.

The author Sarath Chandu Gaddam and etl. [2] Describes the working of face recognized attendance system in which they use raspberry pi along with GSM module and Ethernet cable. In this project the automatic attendance of the students can be possible without wasting the time and send the attendance to the respective student after 24 hours. But, this system lags the feature of making the latecomers attendance available. In this system they have used the Eigen algorithm to execute the system, but due to huge mathematical calculation there may be chance of failure. Hence need to improve.

The author K.Shiva Prasd [3] describes the working of the technique for real time human face detection and tracking using a modified version of the algorithm by using the raspberry pi module along with USB camera. In this project Simulation results of this developed algorithm shows the Real time human face detection and tracking supporting up to 50 human faces. This lags the feature of the making more than 50 faces storage in the database. This system uses the viola jones algorithm for the execution but this system lacks the efficiency in the harsh backlighting and occlusions.

The author Mr. Ashwin K Kashyap and etl. [4] Describes the working of face recognition using raspberry pi module by using the python language. In this project the saved faces are detected using OPEN CV simulation. But, this project lags the feature of informing the user regarding the any unknown intruder and hence any burglary. This system uses the HAAR algorithm for execution but this system to depend on the OPEN CV simulation.

The author Akshay Kumar C and etl. [5] Describes ORB-PCA based face extraction technique for face recognition to overcome the problems of SIFT-PCA and SURF-PCA techniques. It improves the efficiency in face detection and also reduces the face detection time in comparison to other PCA techniques. But this technique is very much complex and much may produce the errors while combining the results of ORB and PCA techniques. Hence need to improve.

The author Hemant Makwana and etl. [6] Describes comparisons in various types of face detection algorithms such as geometry based and face appearance based algorithms. This kind of comparison will be helpful in the construction of this project.

The author Sungyoung Lee and etl. [7] Describes improvement in the PCA algorithm for face recognition which shows that the PCA algorithm can be improved and some of this improved features will be used for our project.

The author Ms. Varsha Gupta and etl. [8] Describes a study of various face detection methods which focuses on the adaptations in various face detection algorithms such as Viola-Jones, LPB, Adaboost, and SQMT. This kind of literature will be helpful.

The author Liton Chandra Paul and etl. [9] Describes face recognition using principle component analysis method which shows the statistical approach to reduce the variable based on the eigen values. This paper shows the image identification along with changes in poses. This system will help to produce a good face detection result. But this system only deals with the eigen values and if this values may get a mismatch for a huge amount of images hence need to improve.

The author Santosh Kumar and etl. [10] Describes advance approach for faced detection using PCA algorithm and region based color segmentation which Eigen values and noise removal in the image. This system may get failed if there may have any noise disturbance. Practically this system is for testing captured images with stored images in the database and based on that it will give the result. This technique achieves much higher efficiency and execution time reduces but doesn't have the ability to provide self-storage as well as a reduction in errors. Hence need to improve.

3. PROPOSED SYSTEM

- **Proposed Architecture**

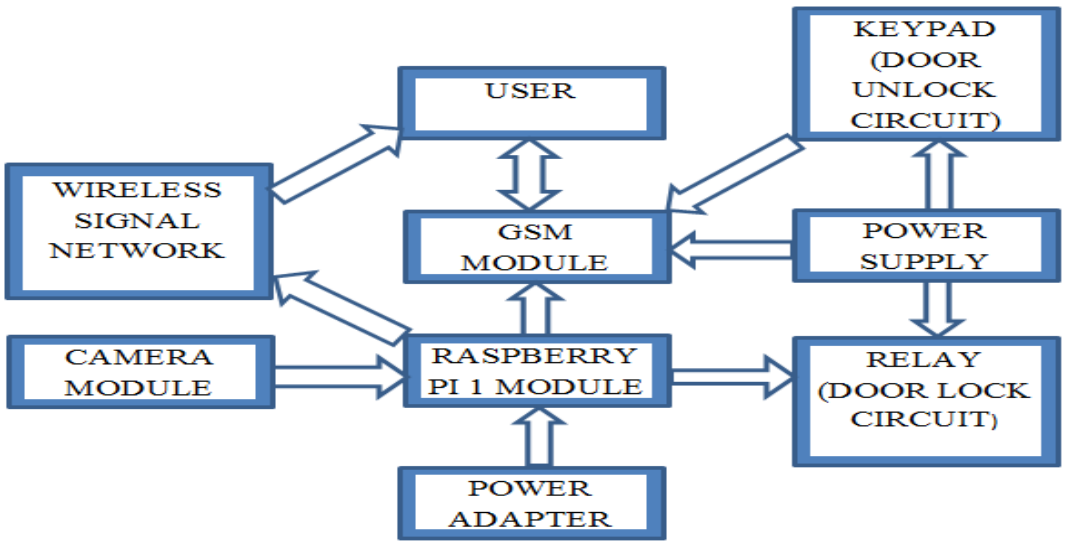

Figure 1: Block Diagram of implementation of Advance PCA Algorithm for Security System using Raspberry Pi.

- **Working**

In above figure 1 shows the basic block diagram of "Implementation of advance PCA algorithm for security system using raspberry pi". Our project system will operate in three different sections, i.e. one for capturing and creating a data base and the second section is to capture the image and which is used for identifying or comparing the images in the database and third section is to provide the intruders report to authorised user and allow him to take actions over the network. Based on the result of advance PCA algorithm and user interface, the system will take appropriate action. The working of each component is specified as follows: -

Camera module: Camera module is USB camera interface to the raspberry pi module. It is used for captures an image and sends captured image to the Raspberry pi module.

Raspberry Pi module: Raspberry Pi module is a small board having the ability to act like a controller. When image provided by camera module to pi module, the raspberry pi compares it with stored face image. At the first time, we capture the image to create a data base for the raspberry pi modules storage system and this data base is compared with the live captured image. After comparing two images output is considered to be positive/negative as this controller is digital; and based on the output response, it gives commands to GSM module.

GSM module: GSM module is used to sending a message to the authorities after comparing the captured image with the stored images and based on whether the output is positive or negative. If output comes out positive then "Person Identified!! DOOR OPENS!!" message sends to the authority person otherwise send "unknown person is trying to unlock the door, take action". If the unauthorized person is detected then the relay will block the door. If the unknown person is known to the authorized user, the user will provide a password to that person and after inserting password the door will open and will be informed to the owner.

Relay: It will block the door as soon as any unauthorized person attempts to open the door.

Keypad: The keypad will allow the person to insert the password allotted to him and resets the system by unlocking the door.

Wireless signal network: This network is basically an Ethernet cable which stores the data automatically to the database and sends the data to the authorized user over the wireless network.
Once the door gets unlocked, the system will get reset and starts from initialization.

4. APPLICATIONS

The " Implementation of advance PCA algorithm for security system using raspberry pi" is basically based on embedded security system; the applications of this project are not limited as each application gives rise to the new applications. so it can be implemented in the following area of securities; for example,

- In car security.
- In-home security.
- In budgeted industries.
- In surveillance from a remote place(depending on the communication network).
- In the office cabins.
- In the shopping malls, etc.

5. REFERENCES

[1] Akshay N. Patil, Rohit B. Ranavare, Dayasagar V. Ballal: "*raspberry pi based face recognition system for door unlocking"*, International journal of innovative research in science and engineering vol.no.2, issue 3 March 2016.
[2] Sarath Chandu Gaddam, N. V. K. Ramesh and Hema dhanekula: "face *recognition based attendance management system with raspberry pi 2 using eigen faces algorithm*", ARPN Journal of Engineering and Applied Sciences vol. 11, no. 13, July 2016 ISSN 1819-6608
[3] K.Shiva Prasd: "*Human Face Detection and Tracking Using Raspberry PI processor"* International Journal & Magazine of Engineering, Technology, Management and Research", Volume No: 2 (2015), Issue No: 8 (August)
[4**]** Mr. Ashwin K Kashyap, Mr. Abhishek S, Mr. Abhishek S A, Ms. Ratnakumari. C: "**Face** *Detection using Raspberry Pi and Python"***,** National Conference on Product Design (NCPD 2016), July 2016.

[5] Vinat A., Akshay Kumar C., Gaurav Shenoy, K.N. Balasubramanayam Murthy, S. Natarajan: "*ORB-PCA based features extraction technique for face recognition*", a second international symposium on computer vision and internet-2015.
[6] Hemant Makwana & Taranpreet Singh: "*Comparison of Different Algorithm for Face Recognition*", Global Journal of Computer Science and Technology Graphics & Vision Volume 13 Issue 9 Version 1.0 Year 2013
[7] Vo Dinh Minh Nhat and Sungyoung Lee: "**An** *Improvement on PCA Algorithm for Face Recognition"***,** J. Wang, X. Liao, and Z. Yi (Eds.): ISNN 2005, LNCS 3496, pp. 1016.1021, 2005. © Springer-Verlag Berlin Heidelberg 2005
[8] Ms. Varsha Gupta, Mr. Dipesh Sharma: "*A Study of Various Face Detection Methods*", International Journal of Advanced Research in Computer and Communication Engineering *Vol. 3, Issue 5, May 2014*
[9] Liton Chandra Paul1, Abdulla Al Sumam2*: "Face Recognition Using Principal Component Analysis Method*", International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 1, Issue 9, November 2012
[10] Santosh Kumar, Ajmer Manish Mathuria, Atul Chaudhary, and Ajmer Kailash Rathore: "
An Advance Approach of Face Recognition using PCA and Region Base Color Segmentation", International Journal of Computer Applications (0975 – 8887) Volume 89 – No 17, March 2014

