Home Security Using Machine Learning

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ABSTRACT With the development of synthetic intelligence and computers vision, face recognition has become a hot topic for pattern recognition. Safety is a very important issue in today's world. Face recognition, or face recognition, is one of the major areas of research from the computer perspective. The development of face recognition systems has also improved and has taken place made plans to lock home doors and an option available is simple and easy to use and very accurate in detecting the face of homeowners. We can now use face recognition to turn on our cell phone phones, make sure to identify the security gates, and in some countries, do to buy. Although there has been a lot of progress made in the face detection and recognition of security, identification, and present objective, there are still problems that prevent progress from reaching or exceeding human-level accuracy. This paper contains image processing and that ML is a machine learning to detect an automatic criminal and detection Python libraries and CV libraries are used to implement the proposed program.

Keywords: - Face detection, image processing, security, machine Reading.

1. INTRODUCTION

Nowadays, face recognition technology is used by almost every organized organization/firm. This technology is able to identify anyone with their image from any available source. The goal behind its operation is to compare selected facial features from a site that contains these valuable pictures. Systematic and well-designed systems are installed in a variety of areas including public areas that can identify anyone in the crowd, without informing them. There are certain features such as angles statements that can affect the effect and performance of the System. Quality ratings are also very important as possible. Main purpose:

- Data representation is a system that can be easily translated and processed.

- Reducing the cost of Hardware

2. PRESENT SYSTEM

In our study we focus on the various paradigms, which are used in machine learning. Existing the books also evaluate comparative research of machine learning with the appropriate application environment. The current system contains a camera, connected to a screen and has a database for storing data, now the system can be manually monitored [1]. On the second page is a large number of applications for image processing in a different spectrum of human activities — from the interpretation of a scene that sounds far away biomedical image interpretation [2] [4]. Due to the number of images that include data, complex calculations, and large storage area and high processing capacity, meanwhile, most face recognition is visible only on PCs with high performance; so getting in and out of this process is very restricted. Currently, the embedded system [3] [9] is widely used in the front part of the door guard system and arrival system to collect facial images. The existing system contains static recognition that increases comprehension once it is complex and therefore difficult to use. It uses simple functions it uses to take a photo with the camera. More too much useful and unique features of the face image are extracted from the extraction element. [11]

3. MOTIVATION:

A very useful place where facial recognition is available what matters is the biometrics used to prove authenticity a process that simplifies the task. Face recognition is one of the most widely used technologies or systems out there has the ability to perform tasks such as having records which is provided by the database in many places such as the school and college travel plans, can also help catching thieves or terrorists, can be helpful in the safety of the common people and the much-needed security places in the country. Face recognition can be used by government verifies voter lists, finds missing people, find population or census, immigration process, and provide secure online scams that protect Ecommerce and is widely used in the field of medicine and health care. This brings the greatest need or real-time facial recognition a system of mass exploitation of people and governments.

4. PROPOSED SYSTEM

The proposed program focuses on identifying a person (object) image. Although there are exceptions a situation that makes it difficult to achieve. There are some disturbing situations: -

- Environment (Dim)

- Different things at the same time.

- A layer of the same color as the skin.

It is very important that the algorithm that determines the color should work correctly. Our proposed system is it can work for different skin tones and can work well in different light conditions. Can be easily integrated with the current system. The computer is a rapidly growing field, in part because of both The cameras are cheaper and more efficient, partly because of their affordable processing power, and also because of the visibility the algorithms begin to mature. OpenCV itself has contributed to the growth of computer vision by enabling thousands of people to do more productive work with vision. [10]

2.1. SYSTEM ARCHITECTURE

The structure of the proposed security system is represented in Figure1, which shows the exception functioning as a process.

DIFFERENT UNITS IN THE SYSTEM

- **Input unit**: Intruded images (Intruder) for face recognition.
- **Processing Unit**: Collected data or camera image captured on a processing unit in which processing or calculations are performed on a proposed project intruder detection and door lock module, here the processing unit says "Raspberry pi" and coding modules used.
- **Communication Interface**: Communication methods that include wireless internet communication devices associated with the criminal detection module used to send a warning such as E-mail over the Internet connection.

2.2. ALGORITHM

The program will find the image on the saved website. Now with the help of Eigenface, we can start using them Face recognition of new faces. This is done as follows. Popular face pictures (the ones you've seen again registered with the program, stored on the website) are stored as a set of weights that describe how much it costs Each Eigenface contributes to that facial image.

Let A= {a1, a2,.... , aN} be a random vector with observations a_i ὲ R^d.

$$\mu = {}^1/_{N} \, {}_{=1} \, a_i \qquad (1)$$

$$S = ({}^1/_{N} \, {}_{=1} i\text{-}\mu)(a_i - \mu)T \qquad (2)$$

$$S v_i = \lambda_i c_i, \, i = 1,2, \, \ldots., N \qquad (3)$$

Further, eigenvectors are ordered through their eigenvalue with descending.

$$b = W^T(a - \mu) \tag{4}$$

where $W = (c_1, c_2, \ldots, ck)$.

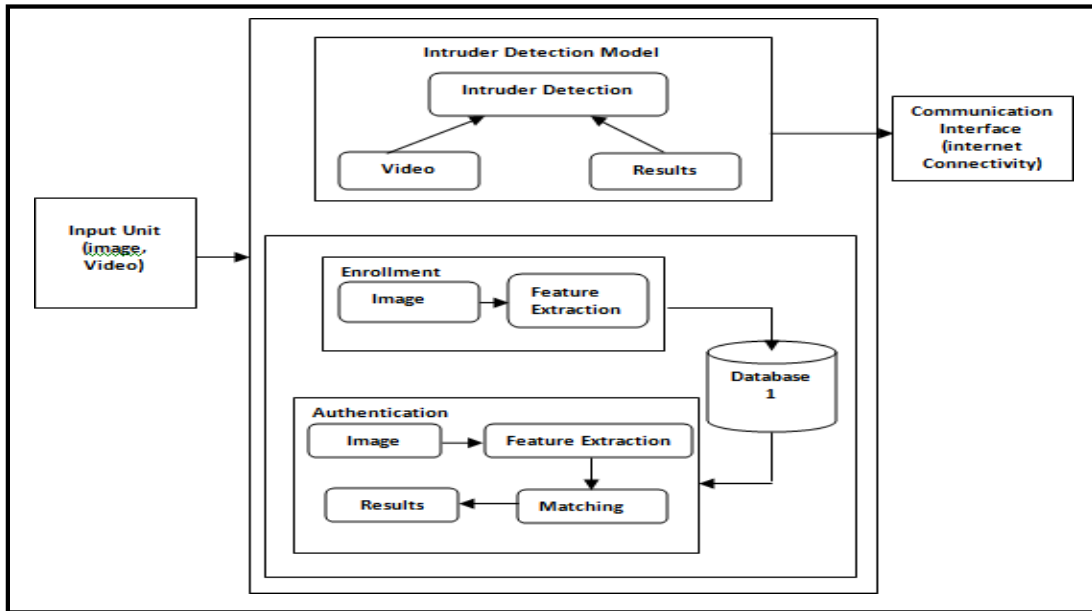Calculation of Reconstruction

$$a = Wb + \mu \tag{5}$$

Figure1: Architecture of Security System

Further, face recognition is performed by eigenfaces via projecting samples into PCA, and training and query image (both projected) nearest neighbor is found. Figure 2 depicts the working/processing of the proposed algorithm.
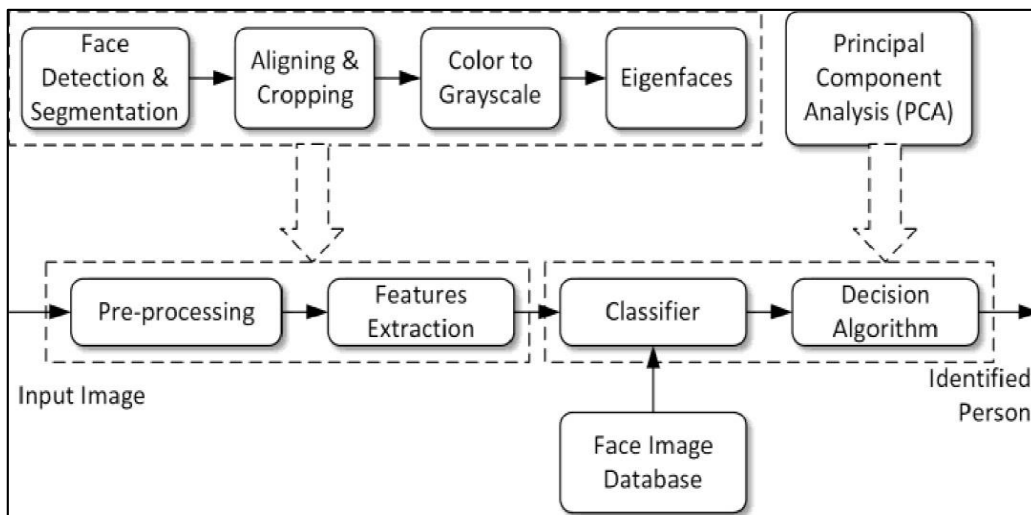

Figure2: Representation of the algorithm flow

5. IMPLEMENTATION

The implementation of this program is divided into two parts: -

    a) Face recognition
    b) Sending Automatic Notification

    a) **Implementing Face Recognition**:

The implementation took place using an algorithm known as the K-nearest algorithm and tracking python libraries are used.
- OpenCV
- NumPy
- matplotlib
- cv2

- **data_set_creator**: Input will be taken in the form of pictures. With outside help document, we have converted the image input into black. In addition, these are converted to NUMPY same members by EIGEN values.
- **Trainer**: To achieve the highest accuracy you train the Program, where the id already exists, otherwise a new user_id is taken and the new user data is created.
- **Face_detect**: Continue importing input (data) in real time.
- **Detector**: Data_set_creator will be called and make image data will be converted.

    b) **Implementation of Auto Alert Sending**:

Message notifications will be sent to the authorized user G-mail_id. These libraries are used:
- **SMTPLIB** (Simple Mail Transfer Protocol): -
  - Specifies the SMTP client time feature that can be used to send mail to any Internet device SMTP or ESMTP listener daemon.
  - An SMTP object has a protocol called Sendmail, which is usually used to perform the function of sending a message.
  - It takes three parameters

  Sender: A character unit with the sender's address.
  Recipients - A list of strings, one for each recipient.
  Message - Message is a formatted character unit as specified in various RFCs. Here's a simple syntax for building one SMTP object, which can be used later to send an email

  import smtplib

  smtpObj = smtplib.SMTP ([host [, port [, local_hostname]]])

- **MIME**:
  - Multi-Multimedia Mail Extensions (MIME) Internet standard that expands the format of email to support:-
  - **Text** with sets of characters other than ASCII - Non-text attachments: audio, video, images, application programs etc.
  - **Message bodies** - Subject information for non-ASCII characters sets.
  - You will need to import smtplib as expected but also with MIME submodules "MIMEMultipart" and "MIMEText":
  import smtplib

  from email.mime.multipart import MIMEMultipart
  from email.mime.text import

  - MIME allows you to send attachments that open all kinds of doors.

  After setting the system in order, it comes with the need to log in to the account, this is it the time when the ML (Machine Learning) will take effect. The algorithm builds a Mathematical model with expected inputs and outputs. Algorithm data will include some images.

Something very special might happen image status (input) can be partially available. Photo detection and criminal detection will be considered on SMTPLIB and KNN respectively and using the learning machine. The algorithm is allowed to take over decision to install using the correct function.

6. RESULT

    I.   Initialization of face detection

Figure 3: System Initialization

The above picture is showing the first step of working of the proposed System. This has referred as System Initialization.

    II.   Grayscale format images will be captured and stored.

Figure 4: Training images for Algorithm

    III.   Camera will be activated and further it connected to system in accordance of Proposed architecture of the System.
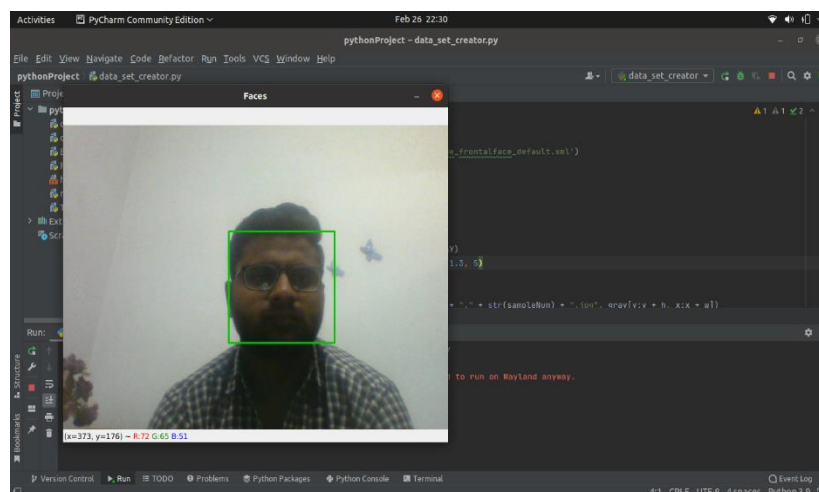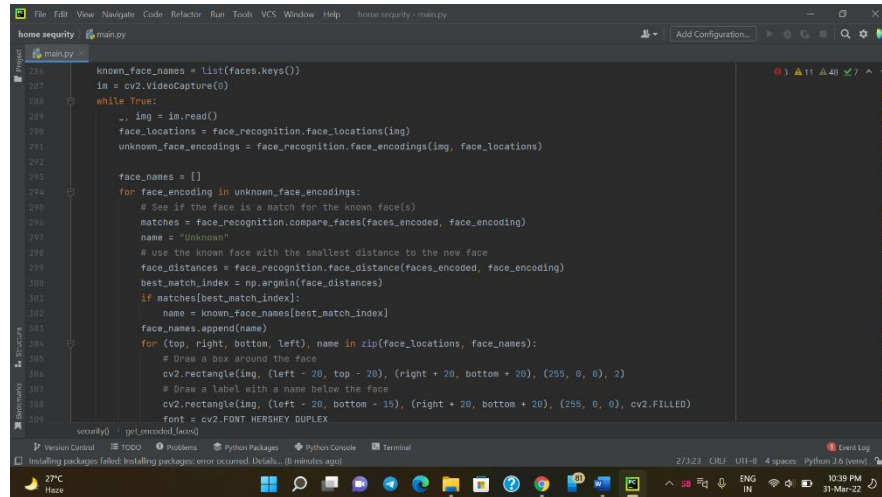
Figure 5: Activating Web camera

IV.   Machine Learning algorithm detecting object.

Figure6: Screenshot of object detection through algorithm

v.   In the database object activities are recorded and further stored and authorized individual/person will get message Alert. Activities are recorded and stored.
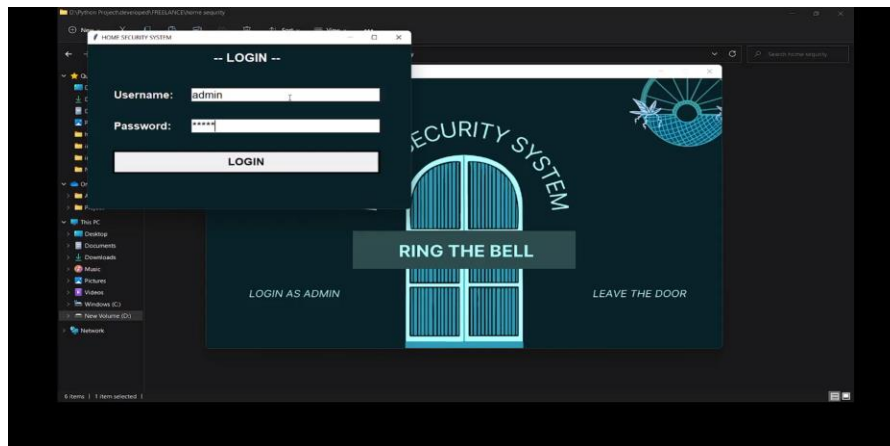

Figure7: Login As admin

7. ADVANTAGES AND DISADVANTAGES

The benefits of a face recognition system are immediate processing, identity theft, breach of privacy, greater data retention, better results, improved security, authenticity time is spent on student recognition in schools and colleges, employees in corporate offices, unlocking smartphones and much in everyday life. A few negatives in this program include costs, though support, excellent high-definition cameras are needed, low image quality may limit the performance of this program, image size will matter because it becomes difficult to see faces in small images, face angles can be limited fidelity of face recognition, large storage is required this application successfully.

8. CONCLUSION

Intrusion using Face-recognition has been designed within the type of Home Security. The proposed system is cost effective. It provides you tension free environment .It provides an AI system thus it reduces manual work and most of the work is automatically done. After applying multiple test cases, each time quite accurate results were achieved. Mail alerts to everyone whose data is savedis done thanks to which on entering of intruder makes owner of Home Secure and safe. With more enhancements this method are often employed in other securities like Child tracking ,Vehicle Airbags, Animal tracking etc.

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