International Journal of Scientific Research in Engineering and Management (IJSREM)
Volume: 05 Issue: 07 | July - 2021 ISSN: 2582-3930

Enhanced Security System for Society

Yash Tripathi, Subhash Tiwari, Nidhi Saxena

1 CSE & Shri Ramswaroop Memorial Group of Professional Colleges

2 CSE & Shri Ramswaroop Memorial Group of Professional Colleges

3 CSE & Shri Ramswaroop Memorial Group of Professional Colleges

Abstract:

In Today's scenario, Public Security represents one of basic foundations of comprehensive security in any social system. Security improvisation leads to healthy and calm environment in any society and results in the foundation for all types of success and progress. Any society needs public protection for its features due to the fact new situations in Societies resulting from urbanization growth and dwindled social family members. The problem definition is the unauthorised access of any person in the society.

In this paper, we proposed a system which improves the security of a society. This system uses facial recognition using Machine Learning which amplifies the security system of a society. In this system, person face & vehicle will be recognised and stored in a database which later on can be used to detect fake or culprits in the society and will somehow reduce the entry of unwanted person in the society. We have also used database for storing the images of a person which can be later on use for recognition purpose. To achieve our aim in security improvisation, we have used some of the best algorithms of Machine Learning which helps in facial recognition and gives best results as much as possible. In general facial recognition includes three things which are face detection, feature extraction, and lastly training a model and all these things are included in our system which sums up the quality of a system.

Keywords: Security, Society, Facial Recognition, Machine Learning.

1. Introduction

Systems and techniques of face recognition and detection are subset of an area related to information security, and information security is concerned with the assurance of confidentiality, integrity and availability of information in all forms. Face recognition techniques work in ungoverned acquisition conditions and has the great advantage of being able to work in places with large populations of unaware visitors. Face recognition nowadays has become a very popular topic of research recently due to growing demand for security as well as the rapid development of mobile devices. There are many applications in which face recognition can be applied to such as access control, identity validation, security control systems, surveillance systems, and social media networks.

In this paper, face recognition is used as security control systems where the society's security is enhanced with the use of Machine Learning algorithms which helps in face detection and recognition of people in the society and also reduce any unwanted visitor in the society. Moreover, the security control of this model is divided into three parts which somehow helps in building the security

Robust. Face Recognition and detection is the core part of this model and helps in fulfilling the objective of the model. The main advantage of this model is that it allows the identification process to be automated, thus saving time and increasing accuracy. The face recognition problem can be divided into two main phases: 1) face verification and 2) face analysis. For example, in real time system, face verification identifies the same person in the scene, and face analysis checks who is the person in that scene. In the first phase it identifies a face in an image. Similarly, in the second phase, it extracts features from an image for verification. After that the images are matched with images which are present already in the database. Below is the image showing the glimpse of face detection and recognition step by step process. It also gives an overview of the process which is applied on this model.

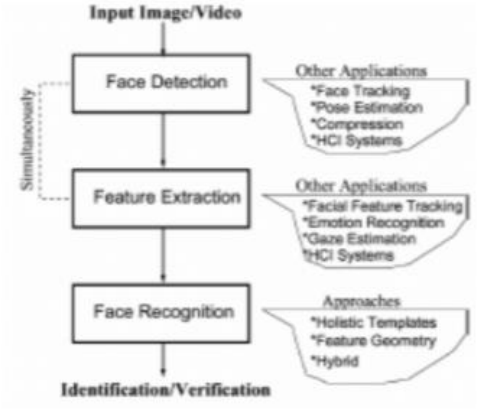

Figure 1. Configuration of a generic face recognition

2. Literature Review

The paper [1] discusses that when a person enters to the focused area, a series of snapshots are taken by the existing camera and sent to the software. Then the given data to be analysed and compared with the existing database of already confirmed trusted people. Then the administrator can identify strangers and outsiders automatically. It provides super easy high-security system.

Roy and Podder [6] discussed some important properties of face detection which is used to solve real-time problems such as facial expression recognition, face tracking, facial feature extraction, gender classification, identification system, document control, access control, clustering, bio-metric science, and Human-Computer Interaction (HCI) system.

The paper [2] proposes computer vision techniques that can be used to design a visual surveillance home

Security system to protect against intrusions and theft. The paper discusses about using the combination of motion detection and face recognition techniques to build the system.

Roy et al. [3] proposed a model for solving non-frontal face with variation in their alignment. For this purpose, they consider video streaming images Singh et al. [5]. The major problem of face detection while using a Haar cascade classifier is that the image contains both simple and complex background.

Tomas Markciniak et al. [4] used a continuous method to assess the efficiency of facial detection and recognition from low-resolution images.

In the year 2017, Souhail Guennouni [7] implement a face detection system by collating with Haar cascade classifiers and edge orientation matching. Edge orientation matching algorithm and Haar-like feature selection combined cascade classifiers are the two techniques used in this system. This algorithm produces a better matching but the detection speed is comparatively less.

3. Methodology

A. System implementation

The implementation is done on JUPYTER Notebook using Python and Machine Learning algorithms. The main objective of this model is to enhance the security of a society using face detection and recognition techniques in which society member's image and details will be stored in database which later on will be used for face matching purpose to detect non society member or unwanted visitor. For achieving our objective we have used *Open CV* and *Haar-Cascades.*

3.1 **Open CV**

Open CV is an open source computer vision and machine learning software library which is launched in 1999.It consists of many more optimized algorithms. [8]. We can take the use of these algorithms to perform detection and recognition of faces, identify the given objects, classify human actions in videos, camera movements tracking, track moving things, extract 3D models of objects, recognize scenery and establish markers to overlay it with augmented reality, etc. Open CV is written natively in C++ [9].

3.2 **Haar-Cascades**

Haar-Cascades are trained to detect certain type of objects. Haar wavelet is a mathematical fiction that produces square-shaped waves and used to create a box-shaped pattern to recognize signals. Face detection can be performed by combining several Haar-like-features. Several classifiers were combined together to create stronger classifier.

B. Block Diagram

Below is the diagram showing an idea of face recognition system in which image of the person is detected by camera first and then image will undergo for feature extraction

process and then image will be matched with those images which are already stored

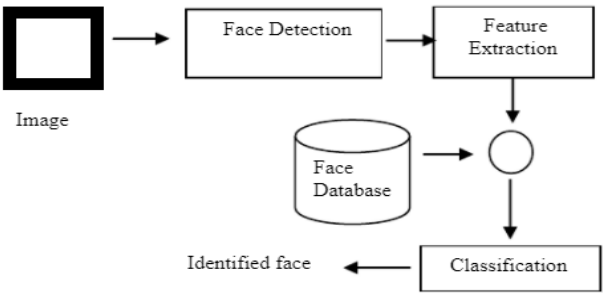

Fig. 3.1. Block diagram for face recognition process

in database and at last with classifier, image will be identified.

The data which we want to display on the screen should be pre-defined in the database in order to display the list of details in the screen. When a person enters into the society, a series of snapshots are taken by the existing camera and sent to the software. Then the given data to be analysed and compared with the existing database of already confirmed society members. Then the admin can identify strangers and outsiders automatically. It provides super easy high-security system.

4. Result and Discussion

The experiments have been performed on a manually created training data set. Based on the algorithm, the face image of an unknown person is compared with face images of known individuals from a large database and it produces the output. We successfully implemented the code for our project and it shows a good accuracy for different conditions we tested it for. The code makes use of laptop's webcam and detect the intruders and by this way it helps in enhancing the security of a society.

Fig 4 GUI of the model

5. Conclusion

Study of face recognition has remained a striving area for researchers for many years. This research has been done with the use of Open CV and Haar Cascade classifier. It consists of three phases, namely face identification, feature extraction, and classification. After extracting features this model finally matches the input with the most similar face in the database. In this whole model, we got to learn about various aspects of the field and its method of implementation. The model also shows the great potential in the field of image processing not just in the computer vision industry but in the field of intrusion detection which in future can be used for other purposes as well.

6. Challenges

There are many difficulties that we have faced when recognized face images from the database. Some of them are pose and lighting variations, expression variations, age variations, and facial occlusions. In the future to improve the quality of the camera, pose correction, quality-based frame selection, and mark based matching techniques can be combined to build a unified system for face recognition.

7. References

[1] W. Zhao, R. Chellappa, P.J. Phillips, and A. Rosenfeld, "Face recognition: A literature survey" ACM Computing Surveys (CSUR), 35(4):399{458, 2003.

[2] Shingne S. S., & Krishnamurthy V. Security System Design Based on Human Face Detection
And Recognition on Android Platform

[3]Roy, S., Roy, S., & Bandyopadhyay, S. K. (2012). A tutorial review on face detection. Intl. J. of engineering research & technology, 1(8), 10.

[4] Tomasz Marciniak, Agata Chielewska, Radoslaw Wechan, Mariana Parzych, Adam Dabrowski, "Influence of low resolution of images on reliability of face detection and recognition". DOI 10.1007/s11042 013 1568 8

[5] Singh, V., Shokeen, V., & Singh, B. (2013). Face detection by Haar cascade classifier with simple and complex backgrounds images using opencv implementation. International journal of advanced technology in engineering and science, 1(12), 33-38.

[6] Roy, S., & Podder, S. (2013). Face detection and its applications. International journal of research in engineering & advanced technology, 1(2), 1-10

[7] Souhail Guennouni, Anass Mansouri."Face Detection: Comparing Haar-like combined with Cascade Classifiers and Edge Orientation Matching", International Conference on Wireless Technologies, Embedded and Intelligent Systems (WITS), pp. 02-04, 2017.

[8] https://en.wikipedia.org/wiki/OpenCV[02-07-21]

[9] https://opencv.org/about/ [02-07-21]