



FACE DETECTION & RECOGNITION FOR HOME SECURITY SYSTEM

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Abstract- Face Recognition and Detection home automation has received a lot of interest due to the great influence it has had on the control of home appliances and devices through the use of efficient sensor devices. One of the most populated biometric that is used in control automation is the recognition based faces. In the modern world security is one of the major issues. As technology is getting advanced many security issues are arising. The existed developed security methods have some flaws and they can be hacked. The face of a person is captured by the camera and compared with the acquired database. The authorized user can also utilize mobile application to give access to the premises to any unregistered person. In the case of unauthorized/unknown access, the face image of the person will be captured and notified to the concerned authorities through an email. An Alarm will be generated in the case of unauthorized access. The proposed system produced accurate results in both cases: authorized and unauthorized access

Keywords – Near Infrared Visible, Video Based Face Recognition, DWT, CCTV

I. INTRODUCTION

One of the most common biometric data used in control automation is the recognition-based face. the use of facial recognition-based personal identification in home automation is a new technology that allows managers to automatically, remotely, and manually control all access to resources through intelligent mobile application-based cloud services. Our new smart home system applies a two-dimensional discrete wavelet transform (DWT) during the face recognition phase to reduce dimensions and noise and extract member facial features. The wavelet transform of the face image captures only the approximate portion of the second dwt2 transform level and uses it as input for the next PCA face recognition processing stage. The 2D Discrete Wavelet Transform is a well-known image processing algorithm that divides an image into four blocks of wavelet coefficients. In a matched block, all coefficients are a copy of the original image pixel after the correlation between them has been reduced. Three blocks of detail. Principal component analysis (PCA) algorithms are considered to be very powerful techniques for feature extraction and dimensionality reduction in the field of biometrics

II. PROPOSED METHODOLOGY

In The purpose of this study is to use biometric technology to improve smart home control management based on member priorities and privileges. In addition, develop responsive web applications on cloud servers to make them available to administrators anytime, anywhere, improve security, make smart home use more convenient, and solve related problems. It also reduces the cost and security of member profiles. In the personal authentication database. There may be exceptions for the elderly and disabled. Paper standards focus on demonstrating that the proposed system is easy to use, inexpensive, reliable, and adaptable to the needs of home members.

2.1 BLOCK DIAGRAM-

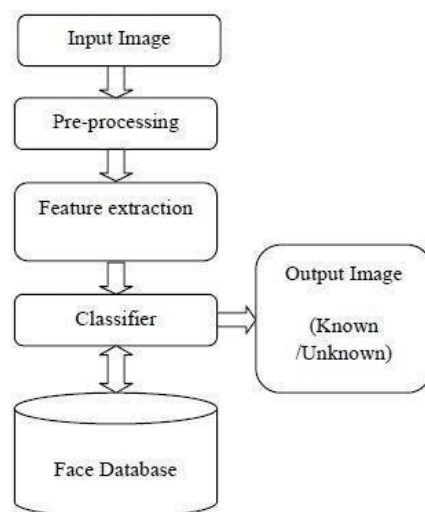


Figure 1. Block Diagram

2.2 The Acquisition Module

This is the entry point for the face recognition process. The user provides a face image as input to the face recognition system of this module

2.3 The Pre-Processing Module

This module normalizes the image to improve system awareness. The implemented preprocessing steps are:

- Image size normalization
- Background removal
- Translation and rotation normalization
- Lighting standardization

2.4 The Feature Extraction Module

After preprocessing, the normalized facial image is provided as input to the feature extraction module to search for the key features used for classification. This module creates enough feature vectors to represent an image of a face

2.5 The classification module

With the help of a pattern classifier, the extracted features of the face image are compared to those stored in the face database. The facial image is then classified as known or unknown

2.6 Face Database

This is used to compare the test image with the image of the train stored in the database. If the face is recognized as unknown, you can add the face image to the database for further comparison.

III. FACE RECOGNITION

Biometrics is becoming an important part of personal identification solutions. This is because you can't use a biometric ID or misplace it to represent your personal ID. Biometric refers to the use of irises, fingerprints, palms, and voice properties known as biometric identifiers. Face recognition has played an important role in intensive research over the past few years. In the light of the current global security situation, the government and private sector are accurately identifying individuals without overriding their right to data protection or requiring compliance from critically recognized individuals. increase. You need a reliable method. Many techniques are used for face recognition and can be classified as follows.

- Function-based
- Appearance base
- Knowledge base
- Template comparison

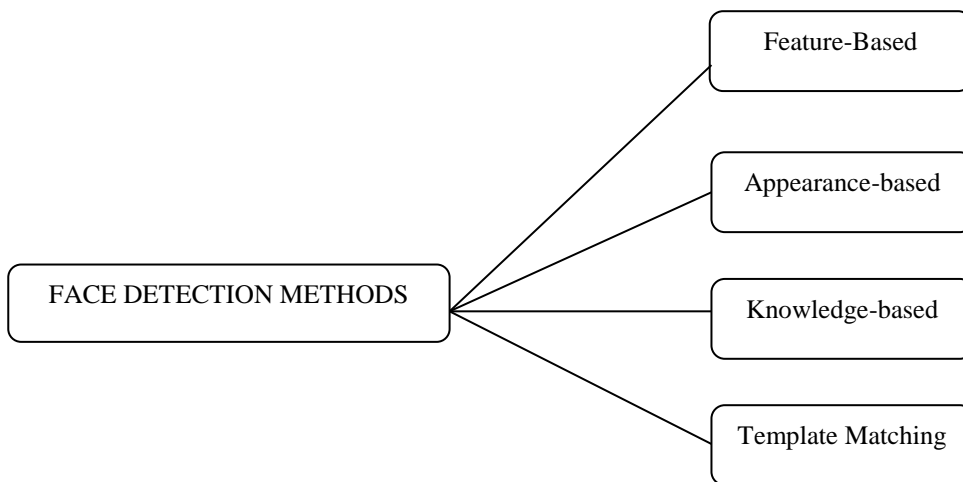


Figure 2: Face Recognition Methods

3.1. Feature-Based

The feature-based method is to find the face by extracting the structural features of the face. It is first trained as a classifier and then used to distinguish between facial and non-facial areas. The idea is to overcome the limits of our instinctive visual knowledge. Even this multi- step approach and many facial photographs report a 94% success rate.

3.2.Appearance-Based

Appearance-based methods rely on a set of facial images to train representatives to identify facial models. The appearance-based approach outperforms other types of performance. In general, appearance-based methods rely on statistical analysis and machine learning techniques to find relevant features of facial images. This method is also used for face recognition feature extraction.

3.3.Knowledge-Based

The knowledge-based method depends on the set of rules, and it is based on human knowledge to detect the faces. Ex- A face must have a nose, eyes, and mouth within certain distances and positions with each other. The big problem with these methods is the difficulty in building an appropriate set of rules. There could be many false positive if the rules were too general or too detailed. This approach alone is insufficient and unable to find many faces in multiple images

3.4.Template Matching

The template comparison method uses predefined or parameterized face templates to identify or recognize faces through the correlation between the template and the input image. For example, the human face can be divided into eyes, facial contours, nose, and mouth. You can also create face models through edges using only edge detection methods. This approach is easy to implement, but not enough for face recognition. However, deformable stencils have been proposed to solve these problems.

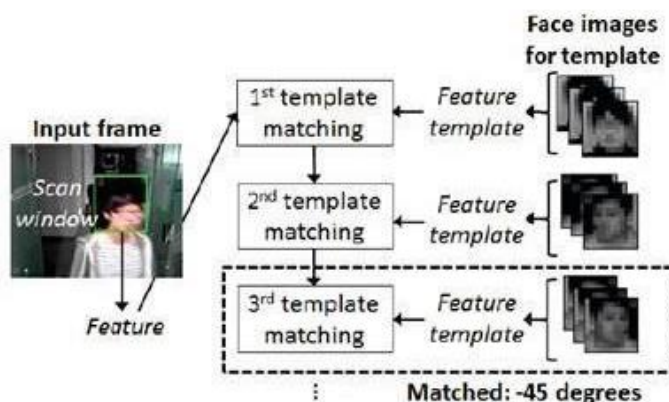


Figure 3: Template Matching

IV. EXPERIMENT AND RESULT

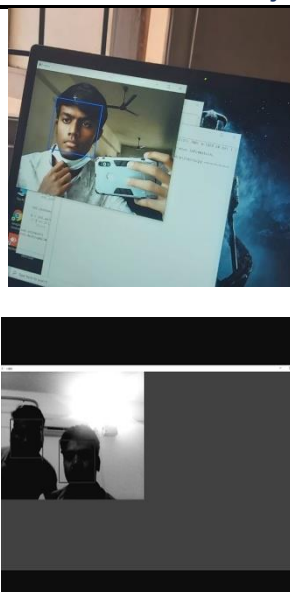


Figure 4: Images Stored in Database

The step-wise visual illustration of the proposed method is shown in Fig 5. The Images are stored in the database. The Images are then trained to detect the original image.

V. CONCLUSION

In this project work, the system went through its pace and various situations. It was simulated to make sure it works properly. Each subsystem is first implemented and tested individually. Since then, all features have been integrated into a single home automation system A system that guarantees resident comfort, safety, improved living standards and improved energy Efficiency and environmental conditions of the elderly persons. To During training, the face recognition module was able to recognize the members' faces. System Successfully implemented home automation and control management based on member ID Awareness level, member web application commands, and buttons or steps Smartphone via cloud server. Shows the features of the proposed smart home system

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