



Biometric Authentication Of A Person (Face Detection) Using Image Processing Technology

¹ Mr. Gouranga Bag

¹ Faculty in Computer Science

¹ Mangalore University,

Jnana Kaveri PG Centre,

¹ Kodagu, Karnataka, India

Abstract: The biometric identification systems is proposed for authentication and security purposes such as facial scanning techniques to improve accuracy and security. With the rapid development of artificial intelligence in recent years, facial recognition gives more attention. Compared with the traditional card recognition, fingerprint recognition and iris recognition, face recognition has many advantages, high concurrency, and user-friendly areas such as network security with the advancement of biometric authentication not only makes the hacker to virtually impossible to steal the password but also increases the user-friendliness in human computer-interaction.

This report presents biometric Authentication using facial images by extracting texture-based LBP features stores these faces based on a matrix form. LBP-based face detection, the purpose of face detection is to determine the locations and sizes of human faces in digital images. LBP-based Face recognition, aims to identify or verify a person from a digital image or a video sequence. The system deals with webcam to capture the images of our face and we use OpenCV for loading and analysis of images. And finally, we use LBP Machine Learning algorithm and classification to detect or recognize the images of our face.

Index Terms – authentication, biometric, image-processing, face recognition.

I. OVERVIEW

To understand how a machine can recognize faces, we can start with asking ourselves — how do we recognize a face? Most images of human faces have two eyes, a nose, lips, forehead, chin, ears, hair etc. How faces are different from each other and what makes them different? At the same time, face of the same person changes with emotion, expression, age... How do we identify a person with face? So, it is not so easy to logically identify these individual components. But, one can say that there are several overlapping components of the face — which are individually responsible for the perception of emotion, age and the person himself. Essentially, we know that there is “some relation that is too complex for logic” — that is why we use machine learning concept to recognise a face.

Biometric templates can be of many types like Fingerprints, Eye Iris, Face, Signature and voice. Our system uses the face recognition approach for the automatic verifying a face with human intervention. Face recognition consists of two steps, in first step faces are detected in the image and then these detected faces are trained with Machine Learning classification and algorithm to recognize for verification. A number of methods have been proposed for face detection the efficiency of face recognition algorithm can be increased with the fast face detection algorithm. Face recognition techniques can be divided into two types Appearance based which use texture features that is applied to whole face or some specific Regions.

II. STATEMENT OF THE PROBLEM

A complete face recognition system includes face detection, face pre-processing and face recognition processes. Therefore, it is necessary to extract the face region from the face detection process and separate the face from the background pattern, which provides the basis for the subsequent extraction of the face difference features. The recent rise of the face based on the depth of learning detection methods, compared to the traditional method not only shorten the time, and the accuracy is effectively improved. Face recognition of the separated faces is a process of feature extraction and contrast identification of the normalized face images in order to obtain the identity of human faces in the images.

2.1 Motivation

The primary motivation behind taking this project is to increase the demand of fast and accurate authentication and identification with low cost. When comparing the differences between different biometrics, we can see that the cost of facial recognition is low, the acceptance from user is easy, and the acquisition of information is easy. Facial recognition is the use of computer vision technology and related algorithms, from the pictures or videos to find faces, and then analysis of the identity. In addition, further analysis of the acquired face, may conduct some additional attributes of the individual, such as gender, age, emotion, and etc. As the digital world and real-world merge more and more together, how to accurately and effectively identify users and improve information security has become an important research topic. Different from the traditional identity recognition technology, biometrics is the use of the inherent characteristics of the body for identification, such as fingerprints, irises, face and so on.

2.2 Purpose

The purpose of this document (also called SRS) is to describe the features and behavior of a system and also the functional and non-functional requirements that our project need. This is to ensure that our product has the same requirements as the customer it to have, so there is no misinterpretation.

2.3 Merits

Compared with the traditional identity recognition technology, biological features have many advantages as:

- a. Reproducibility:** biological characteristics are born with, cannot be changed, so it is impossible to copy other people's biological characteristics.
- b. Availability:** biological features as part of the human body, readily available, and will never be forgotten.
- c. Easy to use:** with the rapid development of computer and artificial intelligence, biometrics technology is easy to cooperate with computers and networks to realize automation management, and is rapidly integrating into people's daily life.

2.4 Demerits

- a. Data Privacy Concern with Facial Recognition:** Face recognition data include millions of images and video files. Also, it consists of the "maps" created when systems scan people's faces. Ultimately, face recognition data gets stored in servers, usually accessible via the cloud. As with any other computer system, it is vulnerable to hackers.
- b. Facial Recognition and Racial Bias:** Another major disadvantage of facial recognition technology is the possibility of racial bias. Reports that facial recognition isn't as effective at identifying people of color and women have surfaced.
- c. Low Reliability:** At present development levels, some factors can throw off face recognition systems. For example, low illumination, image or video quality can lead to false positives.
- d. Lack of Regulation:** Governments around the world are yet to pass legislation around face recognition. As a result, there is no consistent framework for its use and limits.

III. LITERATURE REVIEW

Happy SL, Routray A (2015) Automatic facial expression recognition using features of salient facial patches.^[1]

"In this paper proposes a novel framework for expression recognition by using appearance features of selected facial patches. A few prominent facial patches, depending on the position of facial landmarks, are extracted which are active during emotion elicitation. These active patches are further processed to obtain the salient patches which contain discriminative features for classification of each pair of expressions, thereby selecting different facial patches as salient for different pair of expression classes. One-against-one classification method is adopted using these features. In addition, an automated learning-free facial landmark detection technique has been proposed, which achieves similar performances as that of other state-of-art landmark detection methods, yet requires significantly less execution time. The proposed method is found to perform well consistently in different resolutions, hence, providing a solution for expression recognition in low resolution images."

Ranade SK, Mangat AM (2016) Facial expression recognition based on local binary pattern (LBP).^[2]

"Facial expression recognition is the process of identifying the expression that is displayed by a person, and it has several applications in the fields of medicine, human-computer interaction others; where recognition of expressions displayed on a face is of vital. The process mainly comprises face detection and expression recognition using Haar classifier and using Fisherface based on Fisher's linear discriminant analysis (FLDA) for dimensionality reduction, respectively. The dataset from which the faces were presented to the classifiers yielded a precision of 96.3% with a recognition speed of 8.2 s. An improvement in recognition accuracy of 3.4% is observed by this algorithm from other algorithms, viz. eigenfaces, LBPH recognizer, and artificial neural network; although with a drawback of incorrect recognition in cases of uneven illumination or low-light conditions. This result may be considered as efficient both with respect to accuracy and speed of recognition of the facial expressions."

Dhavalikar A S, Kulkarni RK (2014) Face detection and facial expression recognition system.^[3]

"A human-computer interaction system for an automatic face recognition or facial expression recognition has attracted increasing attention from researchers in psychology, computer science, linguistics, neuroscience, and related disciplines. In this paper, an Automatic Facial Expression Recognition System (AFERS) has been proposed. The proposed method has three stages: (a) face detection, (b) feature extraction and (c) facial expression recognition. The first phase of face detection involves skin color detection using YCbCr color model, lighting compensation for getting uniformity on face and morphological operations for retaining the required face portion. The output of the first phase is used for extracting facial features like eyes, nose, and mouth using AAM (Active Appearance Model) method. The third stage, automatic facial expression recognition, involves simple Euclidean Distance method. In this method, the Euclidean distance between the feature points of the training images and that of the query image is compared. Based on minimum Euclidean distance, output image expression is decided. True recognition rate for this method is around 90% - 95%. Further modification of this method is done using Artificial Neuro-Fuzzy

Inference System (ANFIS). This non-linear recognition system gives recognition rate of around 100% which is acceptable compared to other methods.”

IV. RESULTS

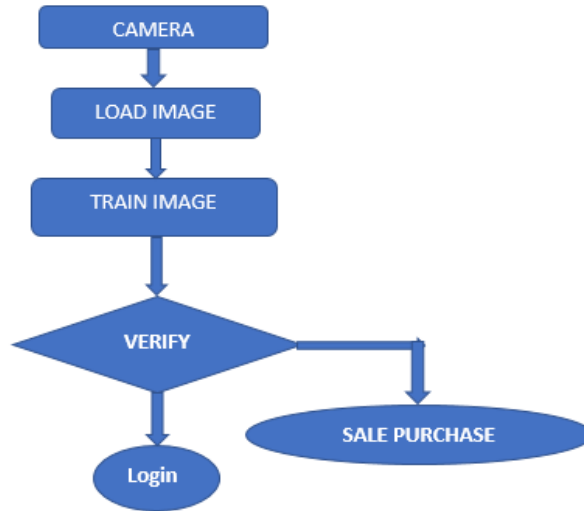


Figure 1: system design

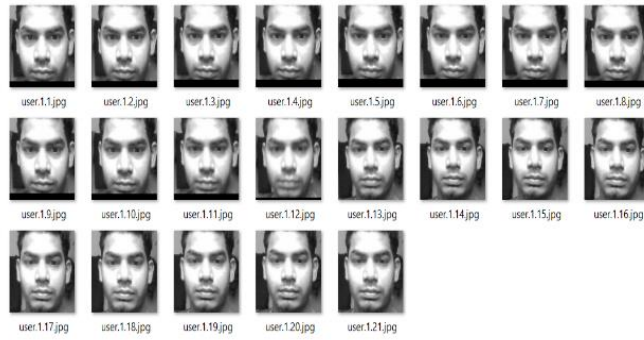
When we run the code, the main screen you can see **four** options:

1. **Add Face ID:** Click on this button you can add different face id of a person.
2. **Train the Model:** Click on this button to train your face ids.
3. **Verify:** Click on this button to verify whether a person is Authorize or not?
4. **Cancel:** Click on this button to cancel the application.

SCREENSHOTS



anga bag > gb project > dataset



CONCLUSION

We proposed to build a high performance, scalable, agile, and low cost face recognition system. We divide the proposed approach into several small sub projects. Then we examine and compare the available open source data set, we choose dataset and trained the model with GPU. The model will take a human face image and extract it into a vector. Then the distance between vectors are compared to determine if two faces on different picture belongs to the same person. By introducing the concept of **biometric model of authentication for a person-using face** can be used in the Field of the security we can make our personal details more safe and secure. Also, to protect from the outside environment. This system can be used in college, school, offices, railway station and commercial as well as personal used for security purposes. It also provides user authentication in order to avoid any misuse of proposed system.

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