Smart Face Recognition Using Machine Learning

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Abstract- in current trend, Biometric Identification (BI) is one of the most researched topics. Face recognition is most important techniques in biometric identification. Face recognition is the method to identifying individual face, enhanced at a faster rate. This system is an important field of Computer Vision. In this paper, FRS is proposed. For recognizing a face we are using machine learning for high accuracy. Fisher face algorithm is a popular algorithm for recognizing a face in machine learning. The purpose of this research is establish a program of face recognition application using fisher face algorithm by utilizing GUI applications and databases that are used in the facial image. This algorithm is based on the principle of LDA (Linear discriminate analysis).The feature of this algorithm is effective in the case of occlusion and multi pose.

Index Terms: Principal Component Analysis (PCA), Linear Discriminate Analysis (LDA), Biometric Identification (BI), Face Recognition System (FRS), Fisher linear discriminate (FLD).

I. INTRODUCTION

In this study, first we have to shape the model with local morphing and treatment and to considered the alignment standard to deal with all possible geometric distortion problems. In recognition phase, a proposed system is designed algorithm with morphing and the detection functions are both utilized. Then we can use negative effects of various poses within yaw and in pitch[1],Face detection algorithm is used for extracting faces from video frames (training videos) and generating a database of a face. Also it is used to filtering and pre-processing that are applied to face images. Finally the classifiers are used to classify faces obtained from frames of the video[2],Face local regions are detected by part-based face detector and then the results of the detection face are feed to deep model, It is defines the correlations of different regions. According to the correlations finally the face detection is completed [3],This paper demonstrates the process of detection of faces of the individuals through a live monitoring camera using mat lab and also aids in tracking them. The tracking of individuals can be achieved by capturing their images while on the move and comparing them with the values stored in the databases. The detection of facial structure is done with Viola-Jone algorithm which through older is easy and efficient to use [4], The purpose of this short review paper is to present categorize and evaluate some new face detection techniques using four conventional machine learning. The evaluation parameters and other performance of these methods compare with each other in order to introduce significant techniques and also to state advantages and disadvantages of related works [5], Automatic recognition of facial expression can be addressed by face positions, removal of facial features and learning methods. This paper demonstrates the use of SVM in facial image recognition and produces performance equal to that of neural networks [6], the whole process covers there stages face detection, feature extraction and recognition and various techniques are needed according to the requirements. Various techniques have been proposed and much work has been done in recognizing face under small variations in face orientation, expression, lightning back-ground. This paper contains the complete study of various techniques used at different stages under different condition [7].

II. LITERATURE SURVEY

1. Panoramic Face Recognition (Author- Yun-Fu Liu, Jing MingGuo, PoHsein Liu and Chen-Chieh Yao)

In this paper, a simple and fully automatic panoramic image based pose-invariant face recognition method is proposed. In this study, first it is shaped to the model with local morphing and treatment and to considered the alignment standard to deal with all possible geometric distortion problems. In recognition phase, a proposed system is designed algorithm with morphing and the detection function is both utilized. Then we can use negative effects of various poses within yaw and in pitch.

2. Evaluation of Machine Learning Techniques for Face detection and Recognition (Author- E. Garcia Amaro, M. A. Nuno-Maganda and M. Morales-Sandoval)

In this paper, a face recognition system is proposed. In this first step, a face detection algorithm is used for extracting faces from video frames (training videos) and generating a database of a face. Also it is used to filtering and pre-processing that are applied to face images. Finally the classifiers are used to classify faces obtained from frames of the video.

3. A Face Detection Algorithm Based On Deep Learning (Author- Ming Li, Chengyang Yu, FuzhongNian and Xiaoxu Li)

Face local regions are detected by part-based face detector and then the results of the detection face are feed to deep model, It is defines the correlations of different regions. According to the correlations finally the face detection is completed. That the proposed algorithm is effective in the case of occlusion.

III. PROPOSED SYSTEM

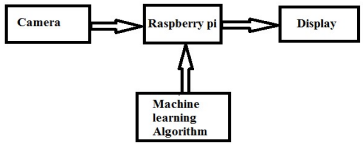

Fig. 1 Block of the proposed system

1. HARDWARE IMPLEMENTATION

The block diagram in Figure 1 consists of a camera that will capture frames and forward the frames to the Raspberry Pi, the Raspberry Pi then it will detect and crop the faces in this frame and the resulting face image transmit over the network to one of the available computers to recognize the received faces and the results are displayed.

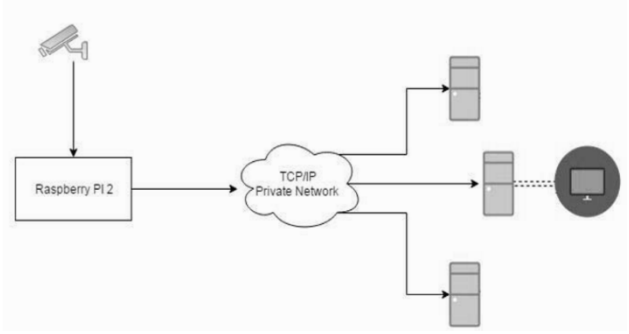

Fig. 2: General System Block Diagram

The system works as follows:

- A camera is connected to the Raspberry Pi will stream live video.
- Selected people faces should be detected, and cropped to transmit them to one of the connected personal computer via the networks. It is all done by implementing detection algorithm on the Raspberry Pi.
- The connection between the Raspberry Pi and the computers is the Wi-Fi connection.
- The cropped face images received by a selected computer and forward it to the "face recognizer algorithm" to recognize the face stored in the database.
- If the face is unknown, and the system cannot recognize it, a notification message would appear over the computer screen or send elsewhere.

2. SOFWARE IMPLEMENTATION

The following steps are followed by software implementation:

- The Raspberry Pi will be programmed to stream video. While each frame is detect the faces in this frame. If any appears, the program which is Python-based will crop the face, saves it on the Raspberry Pi and immediately forward it to the available server.
- The servers are all Linux-based. Whenever an image arrives, the server will initiate fisher faces algorithm on this face, and compare the resulted fisher faces from this face to the pre-saved fisher faces in the database.
- The servers are familiar with the known faces stored in the database. A stage prior to the system initialization will run each known face

into the fisher faces algorithm to generate the raw values, used in the previous step.

- The detection algorithm stated earlier, will take care of framing the live video, detect the face, crop it and forward it to the available computers.
- The recognition algorithm which will be implemented on the computers servers will receive the cropped picture from the detection phase and process it using the fisher faces algorithm which will compare each detected face with the faces in the database.
- The databases of external contain the known faces and names. If this database contains same person's number of images are many, it will recognize it with a percentage in a better correlation, but will consume more time to recognize and process.9,

3. SYSTEM IMPLEMENTATION

Multiple tests were conducted to measure the performance in order to test the system capabilities for improving its detection/recognition rates. The first test specifically is the first component of the system; that is Camera. The test determined various parameters related to the camera, these parameters were used in the face detection algorithm to help detect people faces with the less percentage of error. The test investigates three main parameters of captured frame, these parameters are:

1. Windows Size: the size of the rectangle drawn around the detected area and its divided into: x Minimum Size x Maximum Size, Window size will decide the minimum detection distance after which, no detection is valid.
2. Scale Factor (SF): This parameter specifies how much the image size is reduced at each image scale.
3. Minimum Neighbors (MN): The minimum number of applied windows that each candidate rectangle should contain. The test will run with the following conditions:
    - The camera will take a 100 image (on each run. x Random movement will be in front of the camera, some people are closer and some are further away.
    - On each camera run, one of the previous parameters (Window size, SF, MN) was under test to observe the number of wrongly detected faces.

IV. FISHERFACE ALGORITHM

A key problem in computer vision, pattern recognition and machine learning is to define an appropriate data representation for the task at hand. One way to represent the input data is by finding a subspace which represents most of the data variance. This can be obtained with the use of Principal Components Analysis (PCA). When applied to face images, PCA yields a set of eigenfaces. These eigenfaces are the eigenvectors associated to the largest eigenvalues of the covariance matrix of the training data. The eigenvectors thus found correspond to the least-squares (LS) solution. This is indeed a powerful way to represent the data because it ensures the data variance is maintained while eliminating unnecessary existing correlations among the original features (dimensions) in the sample vectors. When the goal is classification rather than representation, the LS solution may not yield the most desirable results. In such cases, one wishes to find a subspace that maps the sample vectors of the same class in a single spot of the feature representation and those of different classes as far apart from each other as possible. The techniques derived to achieve this goal are known as discriminate analysis (DA). The most known DA is Linear Discriminate Analysis (LDA), which can be derived from an idea suggested by R.A. Fisher in 1936. When LDA is used to find the subspace representation of a set of face images, the resulting basis vectors defining that space are known as Fisher faces.

V. CONCLUSION

The proposed system was designed to process images from capturing, until face recognition using one microcomputer and number of supporting computers. The utilization computers to support the microcomputer in face recognition would speed up processing, but the cost is to distribute the database on different machines, and the security between these machines should be considered. Increases in the error rate will increase the window size. When the scale factor increases, the average error rate will increase,

because image size reduction will decrease the quality of the image and consequently increase the error rate. Also, more images for the same person will enhance the correlation rate. Results vary depending on lighting, distance, and the resolution of the camera. Adding more computer as recognition servers will speed up processing especially for large number of images compared with one server.

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