Profile Identification through Face Recognition

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ABSTRACT

This project is Profile identification through facial recognition system using machine learning, based on K-neighbors algorithm. The K-neighbours algorithm has high detection rate and fast processing time. Once the face is detected, feature extraction on the face is performed using histogram of oriented gradients which essentially stores the edges of the face as well as the directionality of those edges. Histogram of oriented gradients is an effective form of feature extraction due its high performance in normalizing local contrast. Lastly, training and classification of the facial databases is done where each unique face in the facial database is a class. We attempt to use this facial recognition system on two sets of databases and will analyse the results and then provide the profile of an individual which is written in the Data base created in Firebase.

Motivation

The motivation behind this project is that facial detection has an amplitude of possible applications. From common household objects like digital cameras that automatically focus on human faces to security cameras that actually match a face to a person's identity. Sohow would it be if an individual's whole profile can be seen just by clicking his or her picture, this idea lead us to initiate and make this project. This can be very helpful in various areas to identify an individual and know his or her profile without any interrogation.

Existing system

As one of the most successful applications of image analysis and understanding, face recognition has recently received significant attention, especially during the past few years. This is evidenced by the emergence of face recognition conferences such as the International Conference on Audio and Video-Based Authentication (AVBA) since 1997 and the International Conference on Automatic Face and Gesture Recognition (AFGR) since 1995, systematic empirical evaluations of face recognition techniques (FRT), including the FERET, FRVT, FRVT, and XM2VTS protocols, and many commercially available systems. There are at least two reasons for this trend; the first is the wide range of commercial and law enforcement applications and the second is the availability of feasible technologies after 30 years of research. In addition, the problem of machine recognition of human faces continues to attract researchers from disciplines such as image processing, pattern recognition, neural networks, computer vision, computer graphics, and psychology. A general statement of the problem of machine recognition of faces can be formulated as follows: given still or video images of a scene, identify or verify one or more persons in the scene using a stored database of faces. Available collateral information such as race, age, gender, facial expression, or speech may be used in narrowing the search (enhancing recognition). The solution to the problem involves segmentation of faces (face detection) from cluttered scenes, feature extraction from the face regions, recognition, or verification. In identification problems, the input to the system is an unknown face, and the system reports back the determined identity from a database of known individuals, whereas in verification problems, the system needs to confirm or reject the claimed identity of the input face.

Proposed system

This project mainly works by face detection and recognition. This approach focuses on detecting individual features such as eyes, ears, head outline and mouth, and measuring different properties such as eyebrow thickness and their vertical position or nose position and width, in a feature vector that is used to represent a face. To recognize a face, first feature vectors of the test image and the images in the database are obtained. Second, a similarity measure between these vectors, most often a minimum distance criterion, is used to determine the identity of the face. In general, three different learning algorithms: k-nearest neighbour, artificial

neural networks and locally weighted linear regression were used. Here K-neighbors classifier is used as it is a simple statistical dimensionality reducing technique that has perhaps become the most popular and widely used method for representation and recognition of human faces. After identifying the face his or her profile is shown in a Tkinter window which is written in the database.
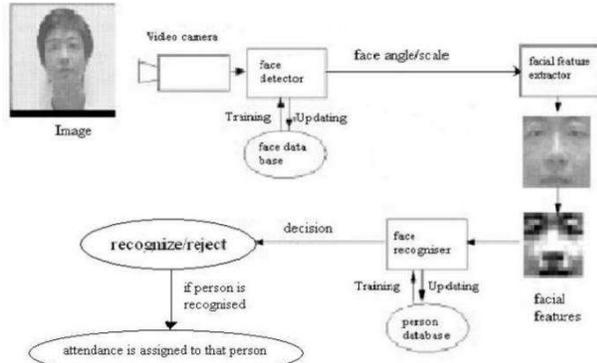
Architecture

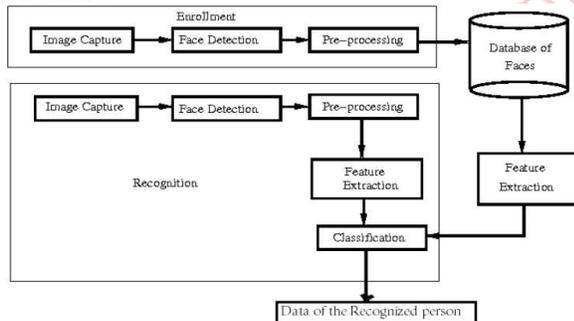**Figure1. Project Architecture**

Flow Chart

Figure2. Process flow

Methodology
This project is developed using K-neighbors algorithm, which identifies the indiviudal from the trained data set with the tested image. There are two different datasets namely, training dataset anad testing dataset. Few other libraries like pandas, scikit learn, dlib are also used to detect the face in an image and Firebase is used to create the database of individuals.

Advantages of System
As this project procures the whole profile of an individual just by capturing the image using webcam, its easy to identify a person even with the help of an ID card, passport size photo, image in the phone, any such source would help the user to identify an individual's profile in his or her absence too. This can be implemented in various places:
1. Educational institutions
2. Hospitals
3. Military
4. Prison visitor systems
5. Border control
6. Voting system
7. Computer security

Improvements
1. It can be trained with more datasets.
2. We can try to make this project work though there is no internet connection, so an alternate to firebase can be craeted.

3. GUI can be built.

Result and Analysis
The K-Neighbors algorithm is highly desirable due to its high detection rate and fast processing time. Training and classification of each unique face in the facial database will detect whose the image is and it analyses by comparing with the images in training dataset and testing dataset and the matched persons entire profile can be procured which is stored in the database created in Firebase. This is the final result we get when the code is executed.

Here is the final result

Figure3. Output

Conclusion
The proposed project localizes the face from the given input image using the skin color detection method where the skin regions are segmented and face is located using template matching. The detected face image is projected using Eigen face analysis and classified using the K nearest neighbor-hood (KNN) classifier. This algorithm is efficient as it can be integrated with the output from multi-modal sensors and thus can be used as part of multi-sensor data fusion. For implementations where the biometric system must verify and identify users reliably over time, facial scan can be a very difficult, but not impossible, technology to implement successfully. The K-Neighbors algorithm is highly desirable due to its high detection rate and fast processing time. Training and classification of each unique face in the facial database will detect whose the image is and it analyses by comparing with the images in training dataset and testing dataset and the matched persons entire profile can be procured which is stored in the database created in Firebase.

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