

Face Recognition with age variations across different weight categories.

Girish Nalinde¹, Dr.A.S.Joshi²

P.G. Student, Department of Electronics and Telecommunication Engineering, SGBAU, Gangotri Colony, near Tapovan gate, Amravati, Maharashtra, India¹

Associate Professor, Department of Electronics and Telecommunication Engineering, Infront of Nemani Godown, Badnera road, Amravati, Maharashtra, India²

ABSTRACT: Facial appearances are difficult to recognize when ages and weight are changed in humans. Physiological studies have proven that the human visual system can recognize familiar faces at different ages from the face outline alone. Craniofacial growth is common during childhood years, but after the age of 18, the texture variations start to show as the effect of facial aging. The proposed algorithm utilizes neural network and random decision forest to encode age variations across different weight categories

KEYWORDS: Face Recognition, facial aging.

I. INTRODUCTION

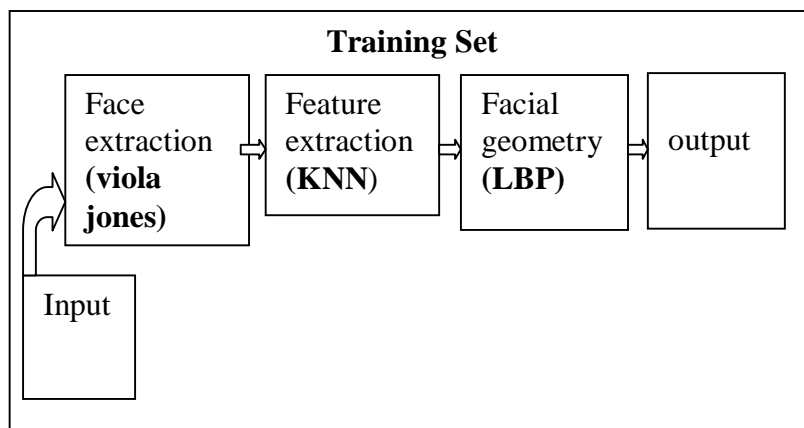
Facial image recognition plays an important role in the daily life like verification of passport, missing children, theft etc. It is often observed that with age variations, the weight of an individual also changes. Within a limited period of time, there can be significant weight changes and within a long period of time, the weight may not change. The studies concerning facial recognition under the aging effect have acquired a great deal of importance recently, mainly because of the challenging issues associated with the facial aging process, as well as the need for robust age-invariant facial recognition systems.

The process of facial aging is not uniform across time. During formative years of a person, the variations in the shape of a face are more prominent while in the later stages of life, texture variations such as wrinkles and pigmentation are more visible. Human Face Changes Remarkably with Time. Algorithms have focused on Pose, illumination, expression. But among all the face detection facial aging is the most fascinating and challenging ones. As we are human beings there are lots of factors which bring lots of changes in face. This is the natural process and is affected by several factors in our day to day life or we can say in our environment or our life style. And one cannot say that there is direct relationship between the two i.e. age and weight. Sometimes with few years of gap weight increases drastically and sometimes it's totally opposite as so many year gap there is few changes in face so improving performance of face recognition with age and weight is being incorporated recognition.

II. RELATED WORK

A. PROBLEM DEFINITION

As earlier, face recognition has been used in much application but with only the age factors but as body fat increases then it would be the real challenge to recognize so in this we identified that with the weight to recognize the face images.



Proposed system uses age and weight variations and FERET database for face recognition using 4 main techniques, namely

1. Viola Jones

This algorithm's basic principle is to detect faces from the given input image. Before this, there were many image processing approaches, but all of them were time-consuming due to making the entire image the fixed size and then running the image in the detector. Opposite of this is the Viola Jones algorithm where the detector rescales and whatever the size of the image would be.

2. KNN classifier

The purpose of the k-Nearest Neighbors (kNN) algorithm is to use a database in which the data points are separated into several separate classes to predict the classification of a new sample point. The way in which the algorithm decides which of the points from the training set are similar enough to be considered when choosing the class to predict for a new observation, and to take the most common class among these. This is why it is called the k-Nearest Neighbors algorithm.

3. Local Binary Patterns (LBP)

LBP is one of the binary patterns which is used for feature extraction. In this, the face image is first divided into small regions from which LBP features are extracted, giving the output in histogram. LBP is used because there are micro patterns which are invariant of monotonic grey scale transformation. Combining all this gives the face image. LBP is widely used in many applications due to its high tolerance against object recognition texture analysis and high discriminative power.

4. Support Vector Machines (SVM)

In support vector machine, it is used to analyze complex data and gives the result. SVM is very useful in finding patterns which are very useful and not complex.

International Journal of Innovative Research in Science, Engineering and Technology

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Vol. 6, Issue 3, March 2017

3. TOOLS USED

A. Matlab

As the project work is related to face recognition which falls under the domain of image processing, here MATLAB is used for the it's well adapted to numerical experiments property. It also helped to show the results in graphical output. It handles vector and matrices very nice. Quick plotting and analyze extensive documentation, along with so many built in functions.

B. FG-Net database

In automatic facial age estimation the aim is to use dedicated algorithms that enable the estimation of a person's age based on features derived from his/her face image. The facial age estimation problem shares several similarities with other typical face image interpretation tasks where the execution stage includes the process of face detection, location of facial characteristics, feature vector formulation and classification.

4. PROJECT DESIGN/MODULES

These are the two important modules where the entire task has been performed.

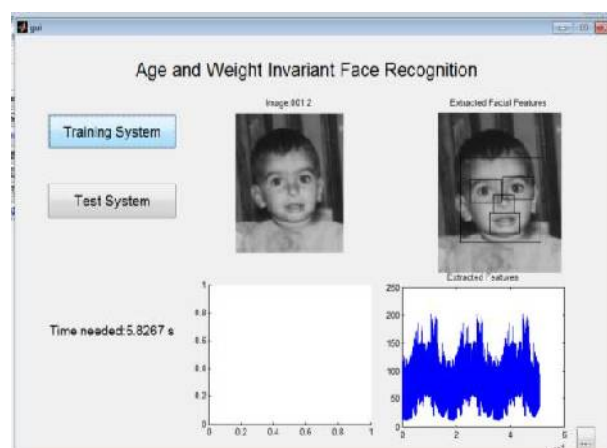
a. Training set (DB Creation)

In training set mainly input is being given and then with the help of the viola Jones algorithm with cascade object detection detects the image and facial geometry does the face extraction which includes of eyes, nose, mouth and face and with local binary patterns feature extraction is done so the name, age object is saved. All is done in database creation of training set.

b. Testing set (DB Evaluation)

In testing set mainly all the above steps are followed with SVM (support vector machine) which evaluates the matching of the image in testing set to the training set.

III. EXPERIMENTAL RESULTS



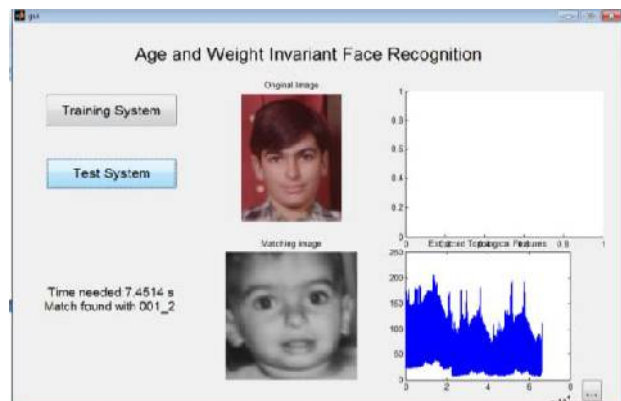
The above shown screenshot is from the training set where the image is given as input where feature is being extracted such as eyes, nose, mouth, and ear. The first block is the image taken from the training set and the second image is the image is extracted i.e. we can say which is eyes mouth nose ear face. The 4th block is the block of histogram where the LBP is used for feature extraction.

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Vol. 6, Issue 3, March 2017



Here the image is taken from the testing set where we have taken image as and now SVM works behind and gives the matching image from the training set. This is the way the output is shown. And the 4th block is the block of histogram.

IV. CONCLUSION

The system preserved the simplicity since it did not require building aging models or any pre-processing step prior to performing verification and identification. Such system is promising towards real-time applications that require high performance, and also relatively low processing time. In future orientations, the researchers have planned to facilitate the proposed system to work with large populations in real-time applications, specifically, detecting criminals and terrorists in public facilities, such as international airports. Such orientations may require improving the abilities of the system in discriminating among large number of classes (probably extending the feature sets without trading the computational complexity). In addition, the researchers have created a face database collected from the FBI records and other internet resources. The database encompasses a large number of terrorists, criminals and fugitives face images at different ages. Such database should assist in evaluating the ability of the proposed system in detecting violent elements in large populations.

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