International Journal For Technological Research In Engineering
Volume 4, Issue 10, June-2017 *ISSN (Online): 2347 - 4718*

A NOVEL TECHNIQUE FOR ENHANCING THE FACE RECOGNITION AND AGE PROGRESSION

Mannu Nandal
M.TECH (ECE), Dept of Electronics Engineering, GITAM, KABLANA

ABSTRACT: Human age, as an important personal trait, can be directly inferred by distinct patterns emerging from the facial appearance. Computer-based age synthesis and estimation via faces have become particularly prevalent to picsy because of their explosively emerging real world applications, such as forensic art, electronic customer relationship management, security control and surveillance monitoring, biometrics, entertainment, and cosmetology. Our objective in this thesis is to develop a human face detection and age progression from face images. Given a face image of the person, we label it with an estimated age. Aging is non-reversible process. Human face characteristics change with time which reflects major variations in appearance. The age progression signs displayed on faces are uncontrollable and personalized such as hair whitening, muscles dropping and wrinkles. The shape and appearance of a baby's face and variety of expressions often change drastically by adulthood, making it hard to model and predict that change. This technique leverages the average of thousands of faces of the same age and gender, then calculates the visual changes between groups as they age to apply those changes to a new person's face. In an experiment asking random users to identify the correct aged photo for each example, they found that users picked the automatically rendered photos about as often as the real-life ones.

Key Word: Age Progression, face Recognition, SAD, MaxAD.

I. INTRODUCTION

The human face holds important amount of information and attributes such as expression, gender and age. The vast majority of people are able to easily recognize human traits like emotional states, where they can tell if the person is happy, sad or angry from the face. Likewise, it is easy to determine the gender of the person. However, knowing person's age just by looking at old or recent pictures for them is often a bigger challenge. Our objective in this thesis is to develop a human face detection and age progression from face images. Given a face image of the person, we label it with an estimated age. Aging is non-reversible process. Human face characteristics change with time which reflects major variations in appearance. The age progression signs displayed on faces are uncontrollable and personalized such as hair whitening, muscles dropping and wrinkles. The aging signs depend on many external factors such as life style and degree of stress. For instance smoking causes several facial characteristics changes. A 30 years old person who smokes a box of cigarettes each day will look like a 42 years old one. We have to distinguish between two computer vision problems. Age synthesis which aim at simulating the aging effects on human faces (i.e. simulate how the face would look like at a certain age) with customized single or mixed facial attributes (identity, expression, gender, age, ethnicity, pose, etc.) which is the inverse procedure of Face detections shown in Figure 1.1. While, Face detection and time domain analysis over time aims at labeling a face image automatically with the exact age (year) or the age group (year range) of the individual face.

Figure 1.1: Age synthesis

1.1 Motivation

Automatic Face detection and it progression in time domain from facial images has recently emerged as a technology with multiple interesting applications. The following examples demonstrate some beneficial uses of the software.

- ✓ Electronic Customer Relationship Management (ECRM)
- ✓ Security Control and Surveillance Monitoring
- ✓ Information retrieval
- ✓ Challenges

1.2 Application module

After building the core system and enhancement modules, we demonstrate the application module that has several components:

- ✓ Image collector that crawls images from the internet using human age related text queries with several conditions such as image quality, different poses, expressions, multiple faces in the same image and single face image. This lead to a large database for the purpose of having more training images
- ✓ The crawled images suffer from different problems such as face misalignment and multi-instance faces in the same image with possibly incorrect label of the image faces. This motivated us to propose different solutions to overcome the above mentioned problems.

II. LITERATURE SURVEY

[1] Mr. Dinesh Chandra Jain Dr. V. P. Pawar proposed a new way to recognize the face using facial recognition software and using neural network methods. That makes a facial recognition system to protect frauds and terrorists. The Face recognition is an important and secured way to protect the

frauds at everywhere like government agencies are investing a considerable amount of resources into improving security systems as result of recent terrorist events that dangerously exposed flaws and weaknesses in today's safety mechanisms. Badge or password-based authentication procedures are too easy to hack.

[2] Sujata G. Bhele and V. H. Mankar proposed an attempt is made to review a wide range of methods used for face recognition comprehensively. This include PCA, LDA, ICA, SVM, Gabor wavelet soft computing tool like ANN for recognition and various hybrid combination of this techniques. This review investigates all these methods with parameters that challenges face recognition like illumination, pose variation, facial expressions.

[3] Mamta Dhanda Seth Jai Prakash Mukund Lal Institute of Engineering and Technology proposed The design of the face recognition system is based upon "eigen faces". The original images of the training set are transformed into a set of eigenfaces E. Then, the weights are calculated for each image of the training set and stored in the set W. Upon observing an unknown image Y, the weights are calculated for that particular image and stored in the vector WY. Afterwards, WY is compared with the weights of images, of which one knows for certain that they are facing.

[4] M.Nandini, P.Bhargavi, G.Raja Sekhar Department of EConE, Sree Vidyanikethan Engineering College Tirupathi proposed a novel approach for recognizing the human faces. The recognition is done by comparing the characteristics of the new face to that of known individuals. It has Face localization part, where mouth end point and eyeballs will be obtained. In feature Extraction, Distance between eyeballs and mouth end point will be calculated. The recognition is performed by Neural Network (NN) using Back Propagation Networks (BPN) and Radial Basis Function (RBF) networks.

[5] Michel F. Valstar, Timur Almaev, Jeffrey M. Girard, Gary McKeown, Marc Mehu, Lijun Yin, Maja Pantic and Jeffrey F. Cohn proposed the second such challenge in automatic recognition of facial expressions, to be held in conjunction with the 11 IEEE conference on Face and Gesture Recognition, May 2015, in Ljubljana, Slovenia. Three sub-challenges are defined: the detection of AU occurrence, the estimation of AU intensity for pre-segmented data, and fully automatic AU intensity estimation. In this work we outline the evaluation protocol, the data used, and the results of a baseline method for the three sub-challenges.

[6] Marian Stewart Bartlett, Member, IEEE, Javier R. Movellan, Member, IEEE, and Terrence J. Sejnowski, Fellow, IEEE proposed a basis images found by PCA depend only on pair wise relationships between pixels in the image database. In a task such as face recognition, in which important information may be contained in the high-order relationships among pixels, it seems reasonable to expect that better basis images may be found by methods sensitive to these high-order statistics. Independent component analysis (ICA), a generalization of PCA, is one such method.

III. PROPOSED WORK

To age progress we perform the following steps.

3.1Pose correction: the input face is warped to approximately frontal pose using the alignment pipeline of denote the aligned photo I.

3.2 Texture age progress: Relight the source and target age cluster averages to match the lighting of yielding AI s and AI t. Compute flow F source–input between AI s and I and warp AI s to the input image coordinate frame, and similarly for F target–input. This yields a pair of illumination matched projections, Js and Jt both warped to input. The texture difference Jt −Js is added to the input image I.

3.3 Flow age progress: Apply flow from source cluster to target cluster Ftarget–source mapped to the input image, i.e., apply F input–target ◦F target–source to the texture-modified image I + Jt − Js. For efficiency, we pre compute bidirectional flows from each age cluster to every other age cluster. Aspect ratio progress:

Apply change in aspect ratio, to account for variation in head shape over time. Per-cluster aspect ratios were computed as the ratio of distance between the left and right eye to the distance between the eyes and mouth, averaged over the fiducially point locations of images in each of the clusters. We also allow for differences in skin tone (albedo) by computing a separate rank-4 subspace and projection for each colour channel.

IV. SIMULATION UNDER MATLAB GUI

We encounter several problems in the downloaded images such as face misalignment, multiple faces and non-face images; these problems were solved using the Active Shape Model and Advance analysis of image processing algorithm. We use the core system module components to extract the aging information. The success of any Face detection frame work depends on the availability of the data. So, data collection is extremely laborious and important task. Ideal data set should cover a wide range of age Include many different subjects and contain at least one image for each age of each subject. For better Face detection results, facial attributes decomposition plays an important role, because a face image shows multiple facial attributes: identity, expression, gender, age, race, pose, etc. Decomposition of these facial attributes is essential to extract age-related features People rely on multiple cues to estimate other people's age such as face, voice, gait and hair. Combine face with one or more other cues for Face detection might remarkably improve the current performance

4.1 STEPS FOR FACE DETECTION

- ✓ Create a cascade detector object.
- ✓ Read a video frame and run the face detector.
- ✓ Draw the returned bounding box around the detected face.

- ✓ Convert the first box into a list of 4 points
- ✓ This is needed to be able to visualize the rotation of the object.
- ✓ Detect feature points in the face region.
- ✓ Display the detected points.
- ✓ Create a point tracker and enable the bidirectional error constraint to make it more robust in the presence of noise and clutter.
- ✓ Initialize the tracker with the initial point locations and the initial video frame.
- ✓ Make a copy of the points to be used for computing the geometric
- ✓ Transformation between the points in the previous and the current frames get the next frame Track the points. Note that some points may be lost.
- ✓ Estimate the geometric transformation between the old points and the new points and eliminate outliers
- ✓ Apply the transformation to the bounding box points
- ✓ Insert a bounding box around the object being tracked Display tracked points
- ✓ Reset the points
- ✓ Display the annotated video frame using the video player object
- ✓ Clean up

4.2 ALGORITHM FOR FACE RECOGNITION

The match metrics use a difference equation with general form:

l_n^p Denotes the metric space (R^n, d_p) for R^n $n > 1$.

$$d_p(x, y) = \left(\sum_{i=1}^{n} |x_i - y_i|^p\right)^{1/p}$$

4.2.1 Sum of Absolute Differences (SAD)

This metric is also known as the Taxicab or Manhattan Distance metric. It sums the absolute values of the differences between pixels in the original image and the corresponding pixels in the template image. This metric is the l1 norm of the difference image. The lowest SAD score estimates the best position of template within the search image. The general SAD distance metric becomes:

$$d_1(I_j, T) = \sum_{i=1}^{n} |I_{i,j} - T_i|$$

4.2.1Sum of Squared Differences (SSD)

This metric is also known as the *Euclidean Distance* metric. It sums the square of the absolute differences between pixels in the original image and the corresponding pixels in the template image. This metric is the square of the l^2 norm of the difference image. The general SSD distance metric becomes:

$$d_2(I_j, T) = \sum_{i=1}^{n} |I_{i,j} - T_i|^2$$

4.2.2 Maximum Absolute Difference (MaxAD)

This metric is also known as the *Uniform Distance* metric. It sums the maximum of absolute values of the differences between pixels in the original image and the corresponding pixels in the template image. This distance metric provides the l^∞ norm of the difference image. The general Max AD distance metric becomes:

$$d_\infty(I_j, T) = \lim_{x \to \infty} \sum_{i=1}^{n} |I_{i,j} - T_i|^p$$

Which is simplifies as below

$$d_\infty(I_j, T) = \max_{i}^{n} |I_{i,j} - T_i|^p$$

V. SIMULATION PROCESS WITH EXPLANATION

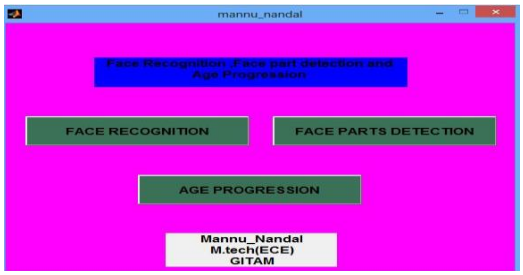

Fig5.1: Basic Layout designed in MATLAB

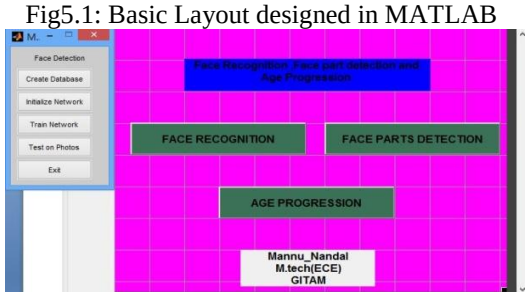

Fig 5.2: After the click button of face recognition a GUI come out which is the part of training set designed for face or non face images.

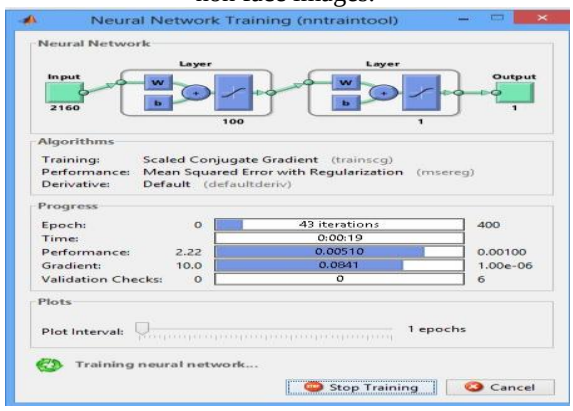

Fig 5.3: Training to Sample of different face and non face to distinguish

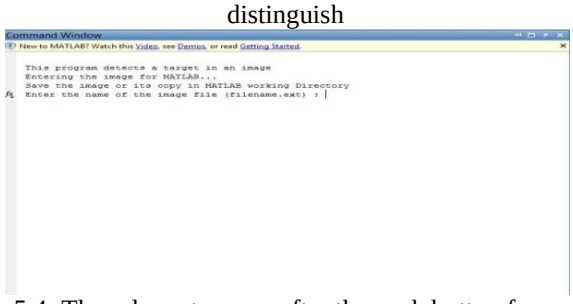

Fig 5.4: These layouts come after the push button face part detection has been pressed

This will need one picture having full face image and after it fetched it is been name with extension. Then put the target area which could extract from that image.

Fig 5.5: Test image

Fig5.6: Target image which is the part of above image

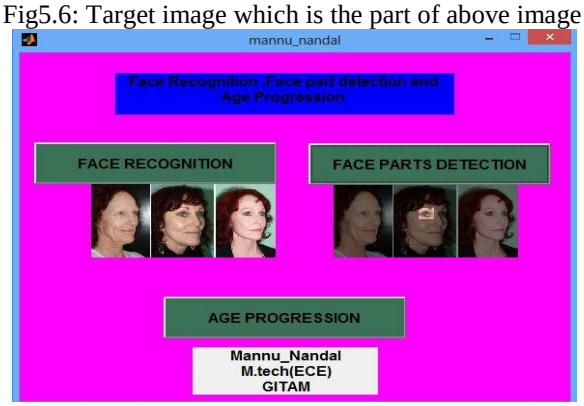

Fig 5.7: The Detected part after the execution

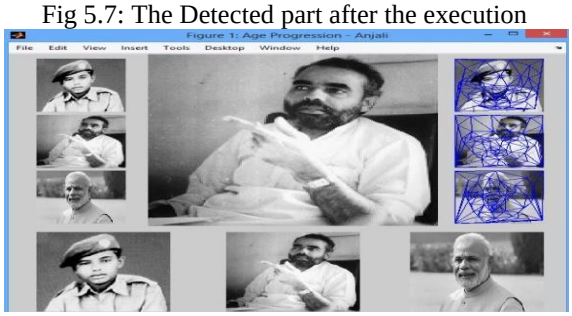

Fig 5.8: After the execution of Age Progression of PM Modi

Fig 5.9: It has the scroll button for the shape bend and color Bend that has main cause of aging sign for old age.

AGE PROGRESSION Test-1	FACE RECOGNITION	
No of images (group)	Detected images	Non detected images
7	7	0
15	13	2
8	5	3
62	52	10

(Ii)age progression Test -2	Face part detection	
Images	part detected (eye)	part not detected (eye)
1	Y	
2	y	
Images	part detected (nose)	part not detected (eye)
1	Y	
2	y	

AGE PROGRESSION-Test 3
When we slide shape Blend. It will change the shape of face. It indicates that age is processing in any face.
AGE PROGRESSION-Test 4
In this phase, Age is processing from child to old age hence age is processing.

VI. CONCLUSION AND FUTURE WORK

Face recognition systems used today work very well under constrained conditions, although all systems work much better with frontal mug-shot images and constant lighting. All current face recognition algorithms fail under the vastly varying conditions under which humans need to and are able to identify other people. Next generation person recognition systems will need to recognize people in real-time and in much less constrained situations. We believe that identification systems that are robust in natural environments, in the presence of noise and illumination changes, cannot rely on a single modality, so that fusion with other modalities is essential. Technology used in smart environments has to be unobtrusive and allow users to act freely. Wearable systems in particular require their sensing technology to be small, low powered and easily integral with the user's clothing. Considering all the requirements, identification systems that use face recognition and speaker identification seem to us to have the most potential for wide-spread application. Cameras and microphones today are very small, light-weight and have been successfully integrated with wearable systems. Audio and video based recognition systems have the critical advantage that they use the modalities humans use for recognition. Finally, researchers are beginning to demonstrate that unobtrusive audio-and-

video based person identification systems can achieve high recognition rates without requiring the user to be in highly controlled environments. Further, after the face recognition and its several parts using template matching algorithm. These researches enhance the module for age progression of face. At any stage of human face we can predict its future face and past face easily. In future this technique will be used for automatic update of passport photo at airport database and employee database of any government agencies or exam conducted for government sector.

REFERENCES

[1] Mr. Dinesh Chandra Jain Dr. V. P. Pawar Research Schoolar in Comp-Science Associate Professor , School of Comp- Science SRTM University – Nanded (M.S) SRTM University – Nanded (M.S) "A Novel Approach For Recognition Of Human Face Automatically Using Neural Network Method" Volume 2, Issue 1, January 2012 ISSN: 2277 128X.

[2] Sujata G. Bhele1 and V. H. Mankar2 "A Review Paper on Face Recognition Techniques" ISSN: 2278 – 1323 International Journal of Advanced Research in Computer Engineering & Technology (IJARCET) Volume 1, Issue 8, October 2012.

[3] [3] Mamta Dhanda Assist. Prof (Computer Department), Seth Jai Prakash Mukund Lal Institute of Engineering and Technology, Radaur "Face Recognition Using Eigenvectors From Principal Component Analysis" International Journal of Advanced Engineering Research and Studies E-ISSN2249–8974.

[4] M.Nandini, P.Bhargavi, G.Raja Sekhar Department of econe, Sree Vidyanikethan Engineering College "Face Recognition Using Neural Networks" International Journal of Scientific and Research Publications, Volume 3, Issue 3, March 2013 1 ISSN 2250-3153.

[5] Michel F. Valstar, Timur Almaev, Jeffrey M. Girard, Gary mckeown, Marc Mehu, Lijun Yin, Maja Pantic and Jeffrey F. Cohn: "FERA 2015 - Second Facial Expression Recognition and Analysis Challenge" 978-1-4799-6026-2/15/$31.00 ©2015 IEEE.

[6] Marian Stewart Bartlett, Member, IEEE, Javier R. Movellan, Member, IEEE, and Terrence J. Sejnowski, Fellow, IEEE: "Face Recognition by Independent Component Analysis" IEEE Transactions On Neural Networks, Vol. 13, No. 6, November 2002.

[7] Volker Blanz and Thomas Vetter, Member, IEEE "Face Recognition Based on Fitting a 3D Morphable Model" IEEE Transaction On Pattern Analysis And Machine Intelligence, Vol. 25, No. 9, September 2003.

[8] Juwei Lu, Student Member, IEEE, Konstantinos N. Plataniotis, Member, IEEE, and Anastasios N. Venetsanopoulos, Fellow, IEEE "Face Recognition Using Kernel Direct Discriminate Analysis Algorithms" IEEE Transactions On Neural Networks, Vol. 14, No. 1, January 2003.

[9] WU Xiao-Jun Josef Kittler YANG Jing-Yu Kieron Messer Wang Shi-Tong Department of Computer Science, Jiangsu University of Science and Technology, Zhenjiang, China: "A New Kernel Direct Discriminant Analysis (KDDA) Algorithm for Face Recognition" Win2PDF available at http://www.daneprairie.com.

[10] Juwei Lu, K.N. Plataniotis, A.N. Venetsanopoulos Bell Canada Multimedia Laboratory, The Edward S. Rogers Sr. Department of Electrical and Computer Engineering University of Toronto, Toronto, M5S 3G4, ONTARIO, CANADA: "Face Recognition Using Kernel Direct Discriminant Analysis Algorithms" IEEE Transactions on Neural Networks in December 12, 2001. Revised and re-submitted in July 16, 2002. Accepted for publication in August 1, 2002.

[11] Felix Juefei-Xu∗ 1, Khoa Luu∗1,2 , Marios Savvides1 , Tien D. Bui2 , and Ching Y. Suen2 "Investigating Age Invariant Face Recognition Based on Periocular Biometrics" 978-1-4577-1359-0/11/$26.00 ©2011 IEEE.

[12] Guodong Guo Guowang Mu Yun Fu BBN Technologies Thomas S. Huang UIUC "Human Age Estimation Using Bio-inspired Features" 978-1-4244-3991-1/09/$25.00 ©2009 IEEE.

[13] Thomas Serre Lior Wolf Tomaso Poggio "Object Recognition with Features Inspired by Visual Cortex" Brain and Cognitive Sciences Department Massachusetts Institute of Technology Cambridge, MA 02142 {serre, liorwolf} @ mit.edu, tp@ai.mit.edu.

