

Face Aging Effect Simulation Using Sparse Representation Result

Sonal Ajmire¹, Karuna Bagde², Prabhakar Ramteke³

M.E. Student, Department of Information Technology, HVPM Engineering College, Maharashtra, India¹

Associate Professor, Department of Information Technology, HVPM Engineering College, Maharashtra, India²

Head of Department, Department of Information Technology, HVPM Engineering College, Maharashtra, India³

ABSTRACT: The process of becoming older is called as Aging. In photography, the face aging simulation has received rising investigations nowadays, whereas it still remains a challenge to generate convincing and natural age-progressed face images. Here, we present a novel approach to such an issue using sparse representation. In contrast to the majority of tasks in the literature that integrally handle the facial texture, the proposed aging approach separately models the person specific facial properties that tend to be stable in a relatively long period and the age-specific clues that gradually change over time. It then transforms the age component to a target age group via sparse reconstruction, yielding aging effects, which is finally combined with the identity component to achieve the aged face. Thus, the simulator gives the face of the person with aging effects. It recognizes the face of the person with or without spectacles.

KEYWORDS: Aging, Sparse Representation.

I. INTRODUCTION

In recent years face recognition has received substantial attention from researchers in biometrics, pattern recognition, and computer vision communities. The machine learning and computer graphics communities are also increasingly involved in face recognition. This common interest among researchers working in diverse fields is motivated by our remarkable ability to recognize people and the fact that human activity is a primary concern both in everyday life and in cyberspace. Besides, there are a large number of commercial, securities, and forensic applications requiring the use of face recognition technologies. These applications include automated crowd surveillance, access control, mugshot identification (e.g., for issuing driver licenses), face reconstruction, design of human computer interface (HCI), multimedia communication (e.g., generation of synthetic faces), and content-based image database management [1]. The database used for this project has been taken from the ORL database. The ORL stands for Olivetti Research Laboratory. The ORL database contains a set of face images of people of particular age group from 30 to 40. There are ten different images of each of the 40 subjects or people. All the images were taken against a dark homogeneous background with the subjects in an upright, frontal position (with tolerance for some side movement). A preview image of the Database of Faces is available online [2]. The files are in PGM format, and can conveniently be viewed on UNIX (TM) systems using the 'xv' program. The size of each image is 92x112 pixels, with 256 grey levels per pixel. The images are organised in 40 directories (one for each subject), which have names of the form sX, where X indicates the subject number (between 1 and 40). In each of these directories, there are ten different images of that subject, which have names of the form Y.pgm, where Y is the image number for that subject (between 1 and 10). The PGM stands for portable gray map. This format has been used because it uses less memory space and it is readily available as the ORL database [3].

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

II. RELATED WORK

Face aging simulation and prediction is an interesting task with many applications in digital entertainment. In such applications, the objective is to synthesize aging effects that are visually plausible while preserving identity. This is distinguished from the task of face recognition in biometrics where two key considerations are to extract features stable over a long time span and learn the potential tendency of facial appearance in aging process [4]. Building face recognition systems robust to age related variations is a potential application. A hierarchical And-Or graph representation have been adopted to account for the rich information crucial for age perception and large diversity among faces in each age group. A specific face in this age group is a transverse of the And-Or graph, and is called parse graph. Aging process is modeled as a Markov chain to describe the evolution of parse graphs across age groups and to account for the intrinsic stochasticity of the face aging process. The accuracy of simulation (i.e. whether the synthetic images are perceived of the intended age group) and preservation of face identity (i.e. whether aged faces are perceived as the same person) are two criteria used to evaluate our modeling results in human experiments. Compared with other face modeling tasks, modeling face aging encounters some unique challenges. Compressive Sampling (CS) is one of the evolving techniques that can highly impact the frontiers of imaging science. Conventional approaches for image acquisition and reconstruction follow the basic principle of the Nyquist frequency sampling theory. However, the emerging theory of CS says that this conventional wisdom is inaccurate. Based on this new idea, which is supported by a strong mathematical foundation, it is possible to represent a signal (e.g., image) accurately and sometimes exactly from a number of samples far smaller than the desired resolution of the image. This sampling paradigm is also called Sparse Representation (SR) meaning that one can represent a signal using linear combination of only few nonzero coefficients taken nonadaptively from coefficients describing an image. In fact, SR theory states that an image can be represented by a sparse linear combination of some redundant basis, which constitutes a dictionary. Lately, the theory and applications of sparse representation attracted much attention in computer vision and pattern recognition literature. In particular, sparse representation has been applied to face recognition, facial expression recognition, object recognition, image denoising, super resolution image processing, and object tracking. Particularly related to this paper, Wright casted the problem of face recognition as a linear regression model using the new theory of sparse representation. They represented a facial image as sparse combination of multiple given facial images with known identities. They claimed that the face recognition problem under the effect of occlusion and image corruption can be addressed using the fact that these errors are often sparse with respect to the standard pixel basis [5] [6] [7] [8].

III. METHODOLOGY

The methodology used for face aging effect simulation is sparse representation. In this method, the sparse matrix is used to show the presence or absence of pixel value. There are different methods that are used for face recognition. Some of those methods are Sparse Representation, Principal Component Analysis, Linear Discriminant Analysis and Neural Network Approach. The Principal component analysis is a variable reduction procedure. It is useful when you have obtained data on a number of variables (possibly a large number of variables) believe that there is some redundancy in those variables. In this case, redundancy means that some of the variables are correlated with one another, possibly because they are measuring the same construct. Linear Discriminant Analysis is a well-known scheme for feature extraction and dimension reduction. It has been used widely in many applications such as face recognition etc. Artificial neural networks or connectionist systems is computational model used in machine learning, computer science and other research disciplines, which is based on a large collection of connected simple units called artificial neurons, loosely analogous to axons in a biological brain [9]. The method used here is that of the Sparse Representation. In this method, sparse matrix is generated from the available data. The sparse matrix is a matrix which contains more zero valued elements and less number of considerable non zero values.

International Journal of Innovative Research in Science, Engineering and Technology

(An ISO 3297: 2007 Certified Organization)

Website: www.ijirset.com

Vol. 6, Issue 7, July 2017

IV. EXPERIMENTAL RESULTS

Figure shows the results of face aging effect simulation using sparse representation in Matlab version R2015a. Fig. 1 shows the screenshot of the test image and the detected image. The test image is taken from the face database, ORL database that has been collected. Thereafter, the similar image is detected. This image is called the detected image. For the purpose of detecting the image, training of the images is done. The Fig. 1 below shows Graphical User Interface with label Sparse Face Recognition, Two option buttons train and test as well as the tested and detected image.

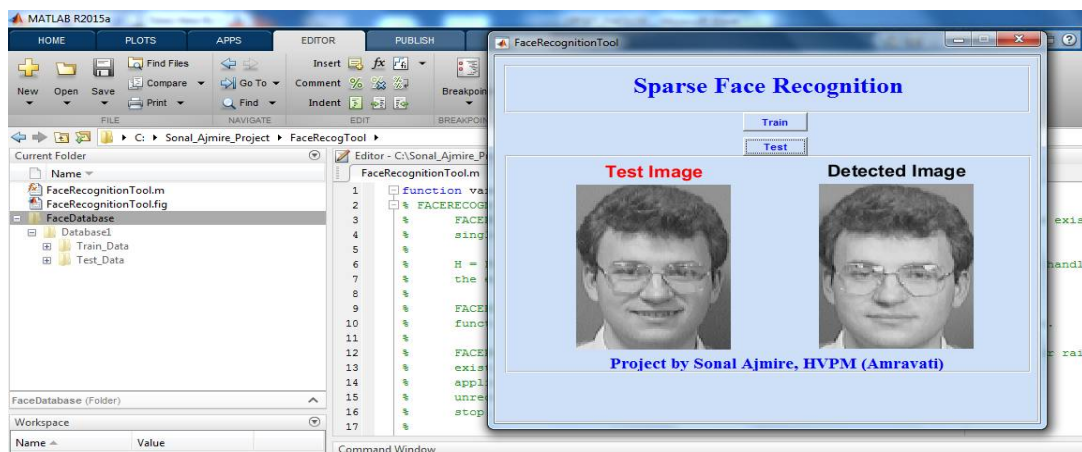


Fig.1. Test image and detected image

V. CONCLUSION

Thus, we have successfully implemented fast technique for face aging effect simulation.

REFERENCES

- [1] International Biometric Group, <<http://www.biometricgroup.com/>>.
- [2] www.cl.cam.ac.uk/research/dtg/attarchive/facedatabase.html.
- [3] www.netpbm.sourceforge.net/doc/pgm.html.
- [4] J. Suo, T. Wu, S. C. Zhu, S. Shan, X. Chen and W. Gao, "Design sparse features for age estimation using hierarchical face model," Proc. Automatic Face and Gesture Recognition, Eighth IEEE International Conference, pp. 1-6, 2008.
- [5] B. P. Tiddeman, M. R. Stirrat and D. I. Perrett, "Towards realism in facial prototyping: results of a wavelet MRF method", Proc. Twenty-fourth Theory and Practice of Computer Graphics, pp. 105- 111, 2006.
- [6] J. Wang and C. Ling, "Artificial aging of faces by support vector machines," Proc. Seventeenth Canadian Conference on Artificial Intelligence, pp. 499-503, 2004.
- [7] J. Wang, Y. Shang, G. Su and X. Lin, "Age simulation for face recognition," Proc. Eighteenth International Conference Pattern Recognition, vol. 3, pp. 913-916, 2006.
- [8] Z. Xu, H. Chen, S. C. Zhu and J. Luo, "A hierarchical compositional model for face representation and sketching," IEEE Transactions on Pattern Analysis and Machine Intelligence, vol. 30, no. 6, pp. 955-969, Jun. 2008.
- [9] www.ishwelt.com/.../cognitive-science-developed-deep-machine-learning-and-neural-networking.