

A Proposed Method for Age Detection of Person Based on the size of Face to the size of the Eye of a Face

Payal Bose^a, Prof Samir K. Bandhyopadhyay^b

^a Research Scholar, Lincoln University College, MALAYSIA

^b Distinguish Professor, Lincoln University College, MALAYSIA

Article History: Received: 11 January 2021; Revised: 12 February 2021; Accepted: 27 March 2021; Published online: 23 May 2021

Abstract: Age Detection scheme is to estimate and predict the real age or age group of a person. Facial expressions, emotions, posture, illumination, hair style and aging can be determined from facial appearance. A person at the age of 20 and at the age of 80 can never be identical in respect of facial expression. The structure of face is an important factor in determining age of a person. In this paper age detection technique has been presented with an aim to detect age of a person.

Keywords: Face Recognition; Feature Distances; Eye Distance; Facial Distance

1. Introduction

The primary component of human being and age, gender, ethnicity, emotions, etc. can identify an individual from face. It is required in many real life applications like identification of passport, driving license and voter identity card since human face is one of the key parameters for the verification and validation of a person's identity besides other parameters like fingerprint for authentication of a person. Thus analysis of facial image is a crucial task in the facial component analysis.

In different time periods of life of human ageing can be defined as changes over a period of time. Thus aging changes facial shape and texture. The reason for shape variation is due to the craniofacial growth.

Three stages in human life can be distinctively identified from a human face based on its various facial features and these are

- (1) Formative or childhood stage
- (2) Young adulthood stage and
- (3) Ageing adulthood stage.

Facial shape has an effect on aging in formative stage. The relatively larger texture variations have shown in adulthood stage since the face blemishes with the appearance of wrinkles, freckles and age spots. So the variations in shape and texture across ages can be modeled and used to automatically estimate a person's age. The aging process cannot be controlled and so it makes the automatic age estimation based on the ageing attributes a difficult and challenging task to accomplish. This paper determines the age of human from facial image.

2. Literature Review

It is not required to see the same face twice for remembering the face but it is not true when human is older. It is true since one person can not only see his/her face but also look after other several factors including pose, facial expression, head profile, illumination, aging, occlusion, mustache, beards, makeup (cosmetics), and hair style. Major factors that influence Ultraviolet (UV) rays from the sun influence the facial aging [1]. Face appearance is also changed due to other factors also. These variations could be learned and used to estimate facial age. It can help to find the perceptible information about one's age, gender, identity, ethnicity, and mood [2-4]. Research on human face plays significant attention in the facial image processing system [5-10]. This technique can find out automatically the human face with an exact age or age group. It can be either actual age, appearance age, perceived age, or estimated age [11]. Relatively little researches have been done on age and age-group estimation. The age estimation is not being a classical classification problem. It is also difficult to research on age estimation due to non-availability of actual database. The information conveyed by faces also make special attributes of aging variations not accurately captured [12].

3. Proposed Method

The technique for age detection of people comprising of both the genders i.e. male and female. The individual image in the input image set is considered. The method is based on the ratio of the size of face to the size of the eye of a face. Eyes are the primary features in a human face for finding age of a person. With the increase of age the size of the face increases and tends to get elongated in shape. The size of the eyes diminishes due to the change or degradation of facial structure as a result of aging. It is experimentally proved. The requisite

information for determination of age of human is shown Table 1. The figure-1 shows the entire process for age detection.

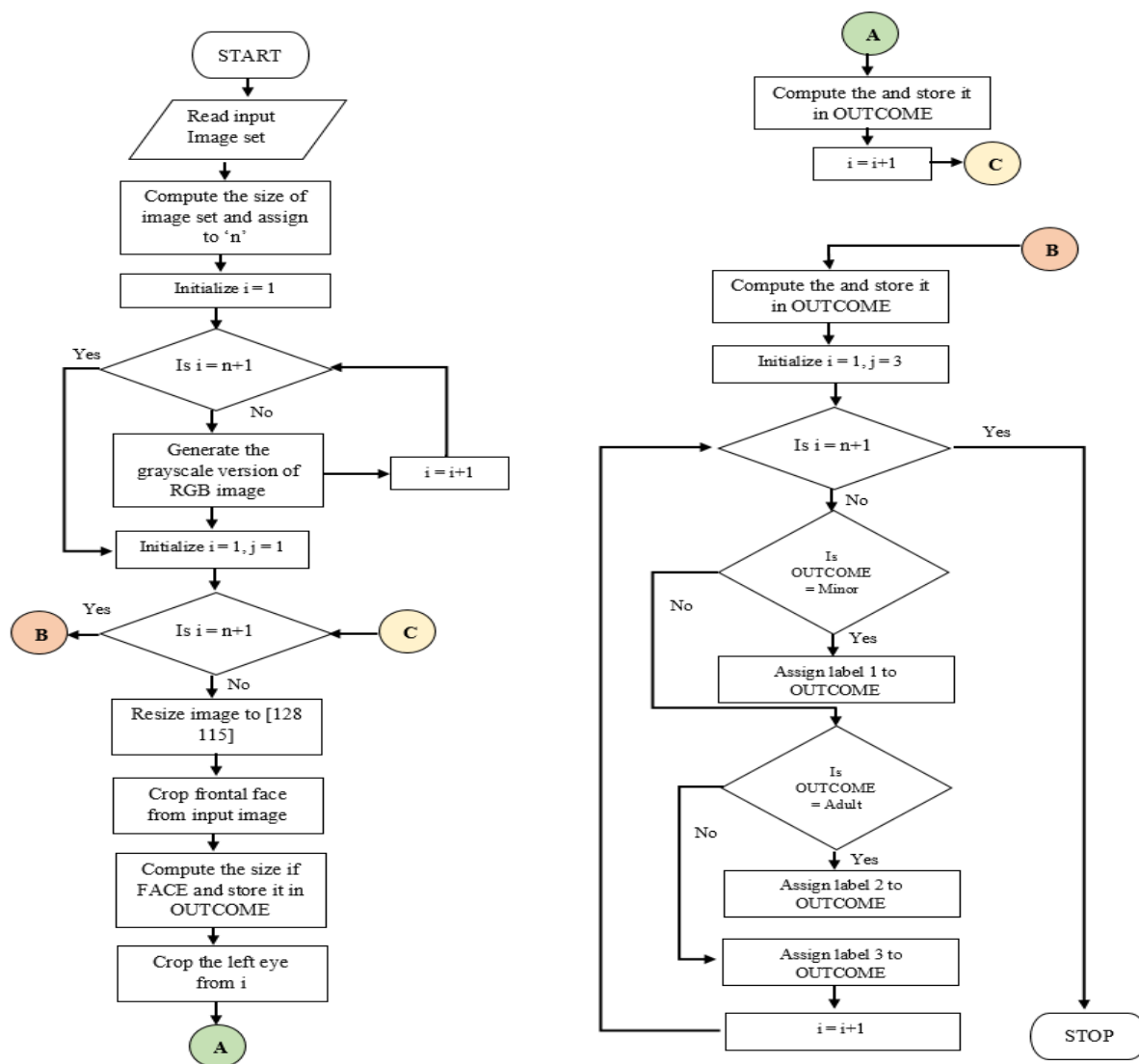


Fig. 1. Flow Diagram of the Age Estimation Method Based on Face Size to Eye Size Ratio in Human Being

Table 1. The Relation of Age Group with Considering Features

PARAMETERS	AGE GROUP		
	Minor	Adult	Old
Eye Size	Largest	Large & Constant	Smallest
Frontal Size	Smallest	Large	Largest

4.Results and Discussions

The propounded methodologies have been implemented on an input image set comprising of 3000 frontal facial images of human. It is implemented using Matlab version R2020a. The databases chosen are Yale face Database [13] and FERET Aging Database. Also images available in Web of Science have been referred for the experimentation. The image set comprises of 1000 images in each category i.e. minor age group, adult age group and old age groups. The results depicted below have been tested both visually and metrically using different functions of Matlab to perform the necessary computations. The figures represented underneath illustrate the functional steps of each proposed methodology. The input images are primarily RGB images. Figures 2a represent

the input images. Figures 2b shows the grayscale version of the input images. In the next pre-processing step the noise removal operation is performed using suitable filter like Gaussian filter. Then the image resize operation is performed. The input images have been resized into variable sizes in the three described methodologies to facilitate calculation, precision and representation of images. Finally, the feature detection and extraction are performed respectively. The results obtained after executing these operations are shown in figures Fig 2d and 2e. A specific window size is selected based on the size of the input image. It is then applied to the input image. The desired location is identified from where the requisite feature is extracted. Since the objective of the proposed techniques is to estimate the age group of a person based on facial age, the image belonging to each age category has been depicted pictorially.

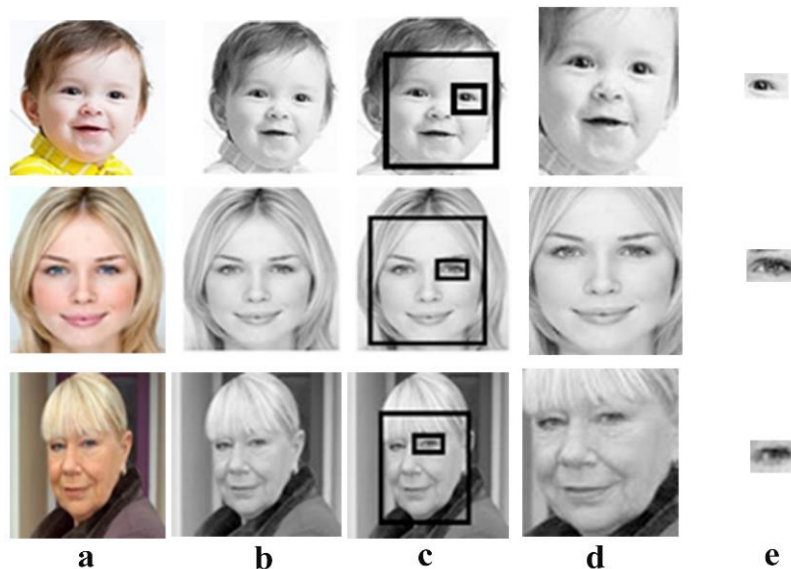


Fig. 2. Diagrammatic representation of age estimation technique based on Methodology I. (a) Represent the input images belonging to three different age groups. (b) Represent the grayscale images. (c) Represent the detected features in the facial image. (d, e) Represent the extracted features from a facial image

5. Conclusion

The proposed methodologies aim at determining the facial age of humans for both the genders i.e. male and female. The method shows that the estimated results are encouraging and entire detection part is implemented in Matlab.

References

1. MS Zimpler, MS Kokosa, JR Thomas, Anatomy and pathophysiology of facial aging. *Facial Plast. Surg. Clin. N. Am.* 9, 179–187 (2001).
2. R Alley, *Social and Applied Aspects of Perceiving Faces.* (Lawrence Erlbaum Associates, Inc, Hillsdale, 1998).
3. A Gallagher, T Chen, in *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition. Estimating age, gender and identity using first name priors (IEEE, Anchorage, 2008).*
4. A Gallagher, T Chen, in *Proceedings of IEEE Conference on Computer Vision and Pattern Recognition. Understanding images of groups of people, (2009).*
5. N Ramanathan, R Chellappa, S Biswas, Computational methods for modeling facial aging: a survey. *J. Vis. Lang. Comput.* 20, 131–144 (2009).
6. MJ Raval, P Shankar, Age invariant face recognition using artificial neural network. *Int. J. Advance Eng. Res. Dev.* 2, 121–128 (2015).
7. A Sonu, K Sushil, K Sanjay, A novel idea for age invariant face recognition. *Int. J. Innov. Res. Sci. Eng. Technol.* 3, 15618–15624 (2014).
8. SN Jyothi, M Indiramma, Stable local feature based age invariant face recognition. *Int. J. Appl. Innov. Eng. Manag.* 2, 366–371 (2013).
9. S Jinli, C Xilin, S Shiguang, G Wen, D Qionghai, A concatenational graph evolution aging model. *IEEE Trans. Pattern Anal. Mach. Intell.* 34, 2083–2096 (2012).
10. G Panis, A Lanitis, N Tsapatsoulis, TF Cootes, Overview of research on facial ageing using the FG-NET ageing database. *IET Biometrics.* 5, 37–46 (2016).

11. Y Fu, G Guo, T Huang, Age synthesis and estimation via faces: a survey. *IEEE Trans. Pattern Anal. Mach. Intell.* 32, 1955–1976 (2010).
12. Y Fu, TS Huang, Human age estimation with regression on discriminative aging manifold. *IEEE Trans. Multimedia.* 10, 578–584 (2008).
13. <http://vision.ucsd.edu/content/yale-face-database>