© 2017 IJSRSET | Volume 3 | Issue 8 | Print ISSN: 2395-1990 | Online ISSN : 2394-4099
Themed Section : Engineering and Technology

Wrinkle Feature Based Age Estimation of Facial Images

Gaurav Rajabhau Patel[1], Soniya Daulatrao Wawhal[2], Lekhashri Hemchandra Mahajan[3], Nikita S. Wani[4]

[1]Assistant Professor, Department of Electronics and Telecommunication, SITRC Sandip Foundation, Nashik, Maharashtra, India

[2]Assistant Professor, Department of Electronics and communication, Gangamai College of Engineering,Nagaon, Dhule, Maharashtra, India

[3]Assistant Professor, Department of Electronics and Telecommunication, Gangamai College of Engineering,Nagaon, Dhule, Maharashtra, India

[4]ME, Department of Electronics and communication, D.N.PATEL College of Engineering, Shahada, Maharashtra, India.

ABSTRACT

These paper based on wrinkle feature based age estimation of face images. Age succession of human being is indicated by skin texture, face structure, skin color. The face features changes with age sequence of a human. This paper estimate regarding to the real age of a human being by analyze wrinkle area of face images Wrinkle natural features areas are detected and wrinkle features are extracted from face image. Depend on wrinkle features; each face image is classifying using SVM algorithm via facial feature extraction followed. Then, estimated age is calculated using their clustering membership value and average age of each cluster. The obtained results are significant and remarkable.

Keywords: Facial Feature Extraction and Facial Edge Estimation, SVM and Filters, MATLAB

I. INTRODUCTION

Age evaluation is the determination of a person's age based on biometric features. Although age estimation can be accomplished using different biometric traits, this article is focused on facial age estimation that relies on biometric features extracted from a person's face. The main issues presented in the article involve typical applications where facial age estimation can be used, problem and challenges associated with facial age estimation, typical approaches reported in the literature and future research directions. The biometric features of the human being are unique for each of them. Identification and verification is becoming interesting area of research. Face recognition is one useful method to identify any person by features of the face. Fingerprint, face, voice, iris, retina are vastly used for authentication. For a long time research work has been carried out in these areas. In old days, face recognition was used for identification of documents such as land registration, passports and identification of a person in high security zone. But with age progression, the face features changes as shown in Figure 1.

Figure 1. Face Wrinkle changes as per Age

Database should be updated regularly, which is a tedious task. So it is required to handle this issue of facial aging and try to find a method that identifies a person in spite of the changes in facial image. Age progression is generally indicated by the skin texture, face structure, skin color. The face features changes with age progression of a human. The biometric features of the human being are unique for each of them. Identification and verification is becoming interesting area of research. Face recognition is one useful method to identify any person by features of the face. Fingerprint, face, voice, iris, retina are vastly used for

authentication. For a long time research work has been carried out in these areas. In old days, face recognition was used for identification of documents such as land registration, passports and identification of a person in high security zone. But with age progression, the face features changes as shown in Fig. 1 and the database should be updated regularly, which is a tedious task. So it is required to handle this issue of facial aging and try to find a method that identifies a person in spite of the changes in facial image. Age progression is generally indicated by the skin texture, face structure, skin color. The face features changes with age progression of a human.

II. HISTORY

In this paper, it is focused on age estimation, where the objective is to estimate the correct age or age range of a face. Existing researches for age estimation is classified into two main parts as: growth of the child and age of the adult. Many of the very old research studies utilized the coordinates of the facial feature points. the coordinates transformations and deformation of the facial features through landmark point. Some of the researches used face verification using progression, component based age estimation KPCA for estimating the age. One of the main models is Anthropometric model based age estimation, uses the development theory of the facial skin wrinkle analysis. Aging pattern is defined for a sequence of age based facial images stored in ascending order in terms of age. Some of the algorithms utilized in earlier researches are estimating the age using aging patterns according to the positioning of the images. 4AGES, AGESLDA, age and gender classification using the ethnicity feature estimation, AAM, DCT the algorithms which estimates the ages accurately. Regression model using discriminative subspace based age estimation. where the age is represented by a set of parameters. The contour of the skull is approximated to estimate the age in facial image. The ratio of the child face and adult face is computed for estimating the age. Neural network based age estimation is also applied in the earlier studies. Child, young adults and senior adults based ages are classified and matched for age estimation. A hierarchical classifier (combination of Gabor Filter, LBP, SVR, and SVM) is used to estimate the face. From the above mentioned literature survey, it is understood and clear that it is necessary to develop a hybrid approach to estimate the age. An age estimator helps in labeling the test faces based on the extracted features of the face images. The age group of same range faces are similar in shape, texture and in appearance. Most of the existing age estimators tries to concentrate on facial textures and shapes which are not static while aging process. In this paper a sequence of image processing steps is concerned to estimate the age accurately than the existing approaches. Transformation, multiple linear regression analysis are Principal component analysis (PCA), linear discriminate analysis (LDA) was used in face recognition previously 1, 2. These methods detect facial features from a face image and search the face database for images with similar features. A skin texture analysis technique containing visual information like unique lines, patterns, and spots of a person's skin into a mathematical model is done. Effect of age of a human face has been analyzed for two main reasons: Automatic age prediction from face image, and Automatic age progression for face identification. To cluster face images three different age groups are considered: infants, young adults and senior adults5 and significant face points were identified from face images and distances between those face points are calculated. Then infants or adults were classified using those distances ratios. This paper describes a method for wrinkle identification in specified areas in face images for classifying adults into young and senior. The first real human age estimation theory was proposed using aging function. Those used a quadratic function for performing the task of automatic age prediction. 3-D sensors are used in 3-D technique to gather information about the structure of a face.To find unique features in a face, region of the eye, nose and chin were used. A Bayesian age difference classifier classifies face images of a person depending on age differences and verifies faces along with age progression. Coordinate transformation and deformation of local facial feature were the tools for those methods. But according to gender, human may have various face patterns. The Aging pattern Sub-space method for automatic age estimation is proposed . It describes the age pattern in a 2 dimensional sub-space and then the same is used for determining the age. A 3 dimensional age structure is proposed to generate some missing images of different age13. Feature extraction depending on face identification, sex and age grouping is proposed . Frontal view of face generates an isosceles triangle that is a combination of the two eyes and mouth. This triangle is very useful for face identification and age group estimation. The mentioned triangle is unique for each human and can be used for face identification with

age. Based on the geometric features of a human face, age range classification is made using K-Means clustering algorithm . Age groups are classified depending on number of groups taken from user.

III. PROPOSED METHOD AND FLOW

Firstly sequences of some images are goes through processing steps. Images are pre-processed and enhanced for improving the quality of the images in terms of texture, histogram, contrast and brightness to extract the features correctly. Initially, the face image is applied to a Gaussian filter for de-noise the image where it makes the face image as noise free image, ready for image processing. Second, the orientation and the scaling features are extracted using Gabor filter. The filtered features are reduced in terms of dimension by computing the μ and SD of the feature for easy classification. Third, the wrinkle based minutiae points are extracted using a hybrid filter to compute the facial texture structure. Finally the extracted features are classified separately using multi-SVM classifier and the age of the human is estimated according to a prefixed threshold value and based on the extracted feature values. The complete functionality of the proposed approach is shown in Figure 1. Slack of the facial muscular creates the wrinkles in forehead, eye-corner end of the mouth and chin of the facial images. In general Sobel filter is applied to extract the wrinkle features. The average and deflection of the strength of the edges in facial regions is determined as wrinkle features. In this paper, the appropriate age features are selected using hybrid filters. Comparing with the existing age estimation techniques, our approach encounters some unique challenges.

1. The texture and shape variations are high for long periods like 20 y to 50 y, it is hard to describe these variations.
2. Some of the non-facial features considered for age estimation is hair color, boldness, forehead and hair-style.
3. Collecting same person's face image with different ages is difficult and not available publicly.

There are no quantitative measurements for evaluating age results. All the above characteristics need a state-of-the-art age estimation method to account rich face details associated to age perception, intrinsic uncertainty in aging process and a criteria for evaluating the aging simulation results. From the above discussion it is clear that the relevant feature values used to estimate the age cannot be obtained using single filter or methods. Thus, a hybrid filter in our proposed approach is used to extract most relevant features for age estimation.

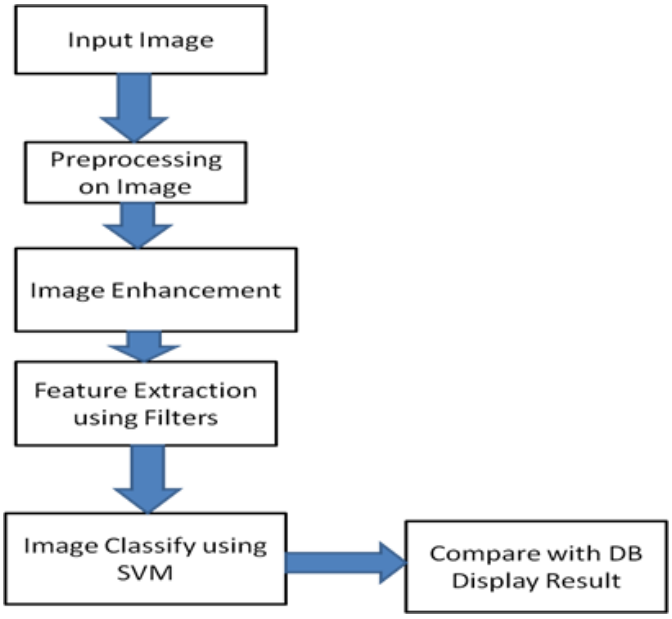

Figure 3. Flow Diagram of Proposed System

Gabor filter

The Gabor filter is used to extract the features to determine the age from the face images. The Gabor filter feature extraction method converts original image into its various zones at first, second and third level. Finally, the Gabor features are extracted from each sub image of various sub-zones of the images.

Hybrid filter

MATLAB software is used for implementing our proposed approach. A sequence of image processing steps is applied before feature extraction in order to improve the accuracy and image enhancement process. The input image is converted into a binary image using morphological filters. It gives more elasticity to do more images processing on the binary images such as structuring the element, dilating and extracting a portion of the image. Converting the binary image from gray level to binary level makes the pixel values as 0 or 1. All the wrinkle points termed as minutiae can be extracted from binary images where the black level pixels represent the edges and the white pixels representing the valleys. It improves the contrast between the wrinkle lines and valleys in facial image. The number of wrinkle lines and the minutiae points helps to estimate the age of the person. The pixels can be classified by pixels 0 and 1.

Multi-SVM classification

SVM classifier is a popular machine learning method; it can be applied for classification and regression analysis in domain such as image processing, content retrieval, clustering and classification, data mining and so on. The main objective of SVM classifier is creating a model with a set of training data named as classes. By comparing the whole data group with the training models, it groups the new samples. It is considered that there are *n* number of training samples are taken. The comparison vector is called as support vectors and the overall functionality of the SVM classification can be shown in detail in Figure 3.1.

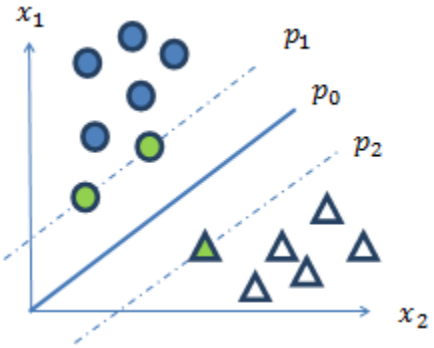

Figure 4. Support vector machine based classification.

In this paper all the simulation results are fed into multi-SVM classifier for estimating the age from facial image features. Multi-SVM classifier is another classifier which classifies the data in high dimensional space by mapping the data nonlinearly. The mapping function maps the kernels with the hyper plane. This feature searching and comparing process is repeated in the feature vector. The searching process is done in row wise, column wise and in orthogonal wise, etc. Original Multi-SVM proposed for more than 2-class problems by extending the SVM into multi-class problems by one-against one or one-against-all strategies. The entire functionality of the proposed approach is given by the following algorithm. In this scenario most of the features are taken to classify face images in terms of their ages. Multi-SVM classifier employed classifies the face images based on the wrinkle and minutiae points. The selected features into multi-SVM classifier and it classifies the age according to the minutiae pattern. Multi-SVM classifier utilizes Euclidean distance for classifying the image.

IV. APPLICATION

1. Domains like Security
2. User Authentications
3. Surveillance
4. Identification
5. Social Security

V. CONCLUSION

Derived the required features for estimate the age of a human being. It is presented as a new proposed approach to estimate the age in terms of various features obtained from the facial input images. All the proposals made here to the bio inspired models are very important in obtaining an age estimator which performs with high accuracy. This method utilizes the advantages of Gaussian filter; Gabor filter and Hybrid filter are the major evaluation. SVM helps to classify and display the resulted image via feature extraction method respectively.

VI. REFERENCES

[1]. Lanitis A, Draganova C, Christodoulou C. Comparing different classifiers for automatic age estimation. IEEE Trans System Man Cybern B 2004; 34: 621-628.

[2]. Yun F, Thomas SH. Human age estimation with regression on discriminative aging manifold. IEEE Trans Multimed 2008; 10: 4.

[3]. Todd JT, Mark LS, Shaw RE, Pittenger JB. The perception of human growth. Sci Am Percep 1980; 242: 106-114.

[4]. Mark LS, Pittenger JB, Hines H, Carello C, Shaw RE, Todd JT. Wrinkling and head shape as coordinated sources of age-level information. Percep Psychophys 1980; 27: 117-124.

[5]. Yamaguchi MK, Kato T, Akamatsu S. Relationship between physical traits and subjective impressions of the face-age and sex information. IEICE Trans 1996; 79: 279-287.

[6]. Kanno T, Akiba M, Teramachi Y, Nagahashi H, Agui T. Classification of age group based on facial images of young males by using neural networks. IEICE Trans Inf Sys 2001; 8: 1094-1101.

[7]. Kwon YH, Lobo NDV. Age classification from facial images. CVPR94 Seattle US 1994; 762-767. 20.Sung EC, Youn JL, Sung JL, Kang RP, Jaihie K. Age estimation using a hierarchical classifier based on global and local facial features. Patt Recogn Elsevier 2011; 44.