Published by :
http://www.ijert.org

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 7 Issue 05, May-2018

A Review on Age Group Classification using Facial Features

Rahul Kumar[1]
M.Tech CS-II[nd] year
ABES Engineering College Ghaziabad, India

Deepak KumarAgarwal[2]
M.Tech CS-II[nd] year
ABES Engineering College Ghaziabad, India

***Abstraction*— Recognition of face is one of the biometric methods which are used to identify individuals by features of the face. The biometric authentication techniques have a significant advantage over traditional authentication techniques as the biometric characteristics of the individual are unique for every person. A problem of personal verification and identification is an actively growing area of research. Face, voice, fingerprint, iris, ear, retina are the most commonly used authentication methods. Research in those areas has been conducted for more than 30 years. "Traditionally, face recognition uses for identification of documents such as land registration, passports, driver's licenses, and recognition of a human in a security area. Face images are being increasingly used as additional means of authentication in applications of high security zone. But with age progression the facial features changes and the database needs to be updated regularly which is a tedious task. So we need to address the issue of facial aging and come up with a mechanism that identifies a person in spite of aging. In my project, effective age group estimation using face features like texture and shape from human face image are proposed. For better performance, the geometric features of facial image like wrinkle geography, face angle, left to right eye distance, eye to nose distance, eye to chin distance and eye to lip distance are calculated. Based on the texture and shape information, age classification is done using KNN & SVM algorithm (Best algorithm according to many research paper during my research).**

Keywords*— *Spam-filtering, Support Vector Machine, Kernel-functions

I. INTRODUCTION

In the research of recognition, most facial variations such as identity, expression, emotions and gender has been extensively studied. Automatic age estimation has been rarely explored. With age progression of a human, the features of the face changes. This project is providing a new combine approach of feature selection for age group classification algorithms. This process mainly involves three stages: Pre-processing, Feature Extraction (Haar feature extraction), classification. In the case of feature extraction we used two techniques 1) Wrinkle features and 2) Geometrical features for the face pattern recognition. We know that Wrinkle features is well enough to differentiate between the adult and senior, Geometrical features is good to create difference between child and adult/senior. That is why we used a combine technique of wrinkle and geometrical so that they can solve each other problems and provide the best output. These two approach is define below:

1) Geometrical features (e.g. face angle, left eye to right eye distance, eyeball, eye to nose distance, eye to chin distance and eye to lip distance are calculated by using best feature selection algorithm)

2) Wrinkle features

Based on the texture and shape information age classification is done using proposed hybrid algorithm of Fuzzy logic and neural network. Age ranges are classified dynamically depending on a number of groups using hybridization algorithms independently.

II. LITERATURE SURVEY

Improvement of the strategies for fuzzy pattern recognition is always expanding for therapeutic analysis and visualization. A standout amongst the appropriate fields in all likelihood of fuzzy set hypothesis which Zadeh himself depicted was restorative diagnosis (Steimann,1997; Seising, 2006) and from that point forward a few systems in light of fuzzy learning and data has been created to recognize the maladies at its initial stageTorres et al. (2006) present a survey on the present uses of fuzzy logic in pharmaceutical and bioinformatics(Begum & Devi, 2011).

Rowley, Baluja and Kanade (1996) exhibited face detection framework in light of a retinal connected neural system (RCNN) that inspect little windows of an image to choose whether every window contains a face. The framework decides in between numerous systems to enhance execution in more than one system.

In 2013, a two stage DP acknowledgment methodology was proposed in light of ANFIS. The undertaking of the first stage is to perceive an arrangement of competitor classes for every parts in each DPs. The DPs are then perceived in the second stage. The fuzzy recognition guidelines are totally gained from preparing datasets and are not set taking into account DP hypothetical portrayals. The using so as to start FISs are developed subtractive bunching and after that prepared by ANFIS. To assess the proposed approach, an examination was led to perceive six DPs in an open source application. The outcomes accomplished were tantamount with different methodologies and now and again better. Some DPs were splendidly perceived and potential changes have been distinguished for others .

III. PROPOSED METHOLDOGY

BLOCK DIAGRAM OF PROPOSED WORK

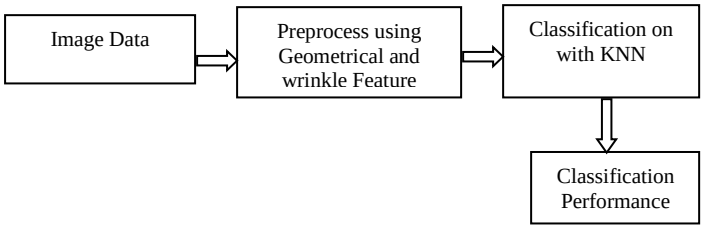

Figure1. Block diagram of proposed review work

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 7 Issue 05, May-2018

1.1 DATASET

For this research we used Dataset of University of Tuebingen, Germany as described by (KR muller et al, 1991). it contains data of 3 different classes (Van Heertum, et. Al 2011). Each subject corresponding represents a age group, as we already mentioned, Three dataset files are available for each subject: Training, testing and validation.

1.2 FEATURE EXTRACTION

One of the main key issue of any characterization frameworks is to locate an arrangement of reliable features as the basis for classification. In general these features cam be categorized into two categories. These are wrinkle features and geometric features. Let us discuss each one of them in detail.

1.2 WRINKLE FEATURES

One of the most important property of wrinkle features is that it determines the age of a person. Estimation of feature F5 can be done as follows :

F5= (sum of pixels in forehead region / number of pixels in forehead region) + (sum of pixels in left eyelid region / number of pixels in left eyelid region) + (sum of pixels in right eyelid region / number of pixels in right eyelid region) + (sum of pixels in left eye corner region / number of pixels in left eye corner region) + (sum of pixels in right eye corner region / number of pixels in right eye corner region).

F5 can be estimated by making use of the grid features of face image that is completely dependent on the wrinkle geography in face image.

For the estimation of F5 features, a few steps have to be followed as discussed below:

As the age keeps on increasing, wrinkles on face turn out to be clearer. Aged individuals regularly have clear wrinkles on the face in the following areas as mentioned below :

a) The forehead has horizontal furrows.

b) The eye corners have crow's feet.

c) The cheeks have clear cheekbones, sickle molded pouches, and profound lines between the cheeks and the upper lips.

Since there are evident changes in wrinkle intensities and even some form clear lines, thus in this Project we make use of Sobel edge magnitudes, approximating gradient magnitudes in order to judge the level of wrinkles. The Sobel edge magnitude is larger, if the pixel belongs to wrinkles. The reason behind the larger magnitude is that the difference of gray levels is self-evident. From this perspective, a pixel is named as a wrinkle pixel if its sobel edge size is bigger than some limit. Figure 7 (a) and (c) demonstrate a youthful grown up and an old grown up.

1.4 GEOMETRICAL FEATURES

As indicated by the investigations of facial representation and emotional cosmetics, there occurs a lot of change in the facial features as the age keeps on increasing. In this phase, global features in combination with the grid features are extracted from the face images. The global features include the distance between two eye balls, chin to eye, nose tip to eye and eye to lip.

By making use of four distance values, there occurs calculation of four features namely F1, F2, F3 and F4 as mentioned below:

F1 = (distance from left to right eye ball) / (distance from eye to nose).

F2 = (distance from left to right eye ball) / (distance from eye to lip).

F3 = (distance from eye to nose) / (distance from eye to chin).

F4 = (distance from eye to nose) / (distance from eye to lip).

It is clear that new born babies have a number of wrinkles on their faces. The head bone structure in new born ones is not fully grown. Moreover the ration of primary features is highly different from those in other life spans. Hence we can conclude that it is more reliable to use geometric features as compared to wrinkle features when it is to be judged that whether an image is a baby or not.

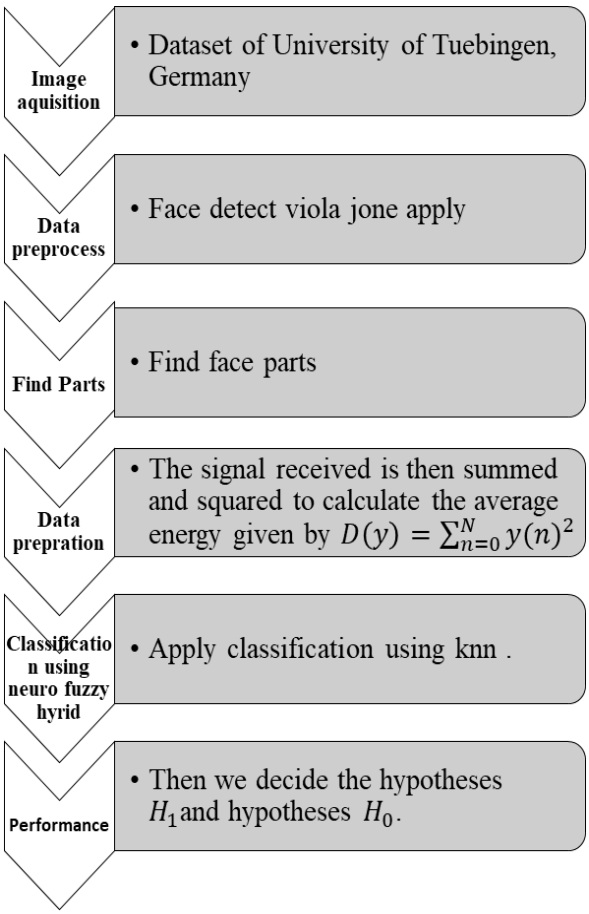

Figure 2: The brief description of each block is described below:

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 7 Issue 05, May-2018

IV. CLASSIFICATION

A. K- NEAREST NEIGHBORS (KNN) Classifier

The KNN is classifies an object where the majority of the neighbor belongs to. The choice of the number of neighbors is discretionary and up to the choice of the users. If k is 1 then it is classified [10] whichever class of neighbor is nearest.

result = knnclassify(Sample, Training, Group, k)

In, Matlab we need above parameter for KNN. In this Group can be define as the no of classes, k is the minimum distance between two neighbor. By default this algorithm is works on Euclidian distance.

B. Support Vector Machine Classification(SVM)

SVM classification is a non probabilistic linear binary classifier, which can analyze input data and predict which of two classes it belong to. In order to differentiate between two sample svm build a hyper plan for separating the two classes which is of higher dimension.

svmStruct = svmtrain(xdata,group,'ShowPlot',true);

result 2 = svmclassify(SVMStruct, Sample)

In SVM we need to prepare SVMStruct by using inbuilt matlab function that's svmtrain. After SVMStruct we pass sample to our main syntax for the prediction.

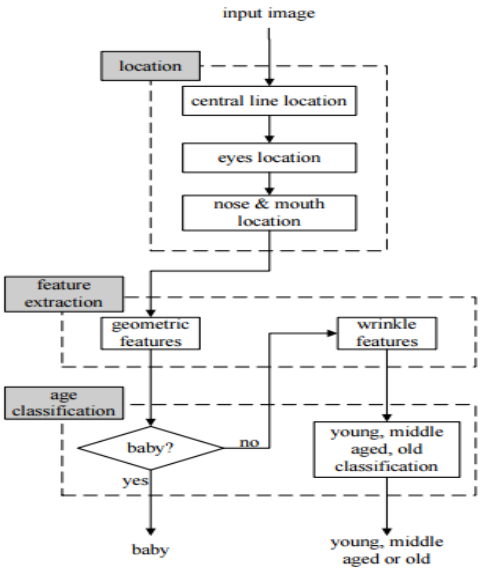

Figure 3: flow diagram

Table [1]

SNO	Method	Advantage	Disadvantage
1	KNN	• Euclidean distance based • Find nearest co-ordinate so, its work on every pattern.	Deep pattern is difficult to understand
2	SVM	• Differentiate data into hyper plan which is best on raw data	Deep pattern is difficult to understand.

V. CONCLUSION

In this thesis, a novel method for age group estimation is thoroughly described. So the proposed (Wrinkle and geometrical features) technique provides a robust method that verifies the age group of individuals from a set of different aged face images. Crucial features extracted such as distances between various parts of face, analysis of wrinkle geography and done calculation of face angle are calculated. All these ways are compared at last to find the best way to calculate age ranges of the face images in the database. After observing results of all features mentioned above, face images are into 3 groups which is classify using SVM and KNN algorithm. It is observed that wrinkle geography feature i.e., F5 gives the best result to predict human age range in compare to other features. The above discussion leads us to the conclusion that wrinkle geography Analysis has been the best procedure to estimate human age range of an individual. For proper eye and eyeball detection, face in the image should be without spectacle. As we know viola jone algorithm is worked on the front face that is why its compulsory that image should be of a straight frontal face. Image should contain single human face only as we are working on the individual face age group identification. This thesis works with 76% accuracy for two age group , 64% accuracy for three age group. The accuracy of classification is decreased when the numbers of group are increased for classification. So, it seems to be a definite possibility for further extension of the work which includes extracting more feature points those can improve accuracy of age group classification. By introducing more features the age range can be further narrowed.

REFERENCES

Books:

1. Jang, J.S.R., Sun, C.T. and Mizutani, E. (1997) Neuro Fuzzy and Soft Computing: A Computational Approach to Learning and Machine Intelligence. United States of America: Prentice-Hall.
2. Mitra, S.K. (2006) Digital Signal Processing: A Computer-Based Approach. New York:McGraw-Hill.
3. proaktis, J G. and Manolakis D.G. (2007) Digital Signal Processing: PrinciplesAlgorithms and Application, New Jersey: Prentice-Hall.Tournals and Conferences

REFERENCE

[1] A.Lanitis and C.J.Taylor, “Towards Automatic Face Identification Robust to Ageing Variation”, IEEE Trans. on Pattern Analysis and Machine Intelligence, vol.24, no.24, p.442-455, 2002.
[2] A.Lanitis, C.Draganova, and C.Christodoulou, “Comparing different classifiers for automatic age estimation”, IEEE Trans.Syst.Man, Cybern.B, Cybern, vol34, no.1, pp.621-628, Feb.2004.
[3] V. Blanz and T. Vetter, “Face recognition based on fitting a 3D morphable model”, IEEE Transactions on Pattern Analysis and Machine Intelligence, 25(9):1063 –1074, September 2003.
[4] R. Kimmel A. M. Bronstein, M. M. Bronstein, “Three-dimensional face recognition”, Intl. Journal of Computer Vision, 64(1):5–30, August 2005.
[5] N.Ramanathan and R. Chellappa, “Face verification across age progression”, in Proc. IEEE Conf. Computer Vision and Pattern Recognition, San Diego, CA, 2005, vol.2, pp.462-469.
[6] N.Ramanathan and R. Chellappa, “Modeling Age Progression in young faces”, in Proc. IEEE Conf. Computer Vision and Pattern Recognition (CVPR), vol.1, pp.387-394, 2006.
[7] G. Guo, A. Jain, W. Ma, and H. Zhang, “Learning similarity measure for natural image retrieval with relevance feedback,” IEEE Trans. Neural Netw., vol. 13, no. 4, pp. 811–820, Apr. 2002.

(This work is licensed under a Creative Commons Attribution 4.0 International License.)

International Journal of Engineering Research & Technology (IJERT)
ISSN: 2278-0181
Vol. 7 Issue 05, May-2018

[8] G. Guo and S. Li, "Content-based audio classification and retrieval by support vector machines," IEEE Trans. Neural Netw., vol. 14, no. 1,pp. 209–215, Jan. 2003.
[9] G. Guo, S. Li, and K. Chan, "Support vector machines for face recognition," Image Vis. Comput., vol. 19, no. 9-10, pp. 631–638, 2001.
[10] G. Guo, S. Li, and K. Chan, "Face recognition by support vector machines," in Proc. IEEE Conf. FG, 2000, pp. 196–201.
[11] X. F. He and P. Niyogi, "Locality preserving projections," presented at the NIPS, 2003.
[12] T. Joachims, "Making large-scale SVM learning practical," in Advances in Kernel Methods—Support Vector Learning, B. Schölkopf, C. Burges, and A. Smola, Eds. Cambridge, MA: MIT Press, 1999.
[13] Y. Kwon and N. Lobo, "Age classification from facial images," Comput. Vis. Image Understand., vol. 74, no. 1, pp. 1–21, 1999.
[14] A. Lanitis, C. Taylor, and T. Cootes, "Toward automatic simulation of aging effects on face images," IEEE Trans. Pattern Anal. Mach. Intell.,vol. 24, no. 4, pp. 442–455, Apr. 2002.

(This work is licensed under a Creative Commons Attribution 4.0 International License.)