

---

## Gender and Age Estimation based on Facial Expression

***Madhu Ananta Naik\****

M Tech Student  
Deptt. of Information Science & Engineering  
New Horizon College of Engineering  
Bangalore, India

***Nandakumar A N***

Head  
Deptt. of Information Science & Engineering  
New Horizon College of Engineering  
Bangalore, India

### ***Abstract***

*In this project, a fast and efficient gender and age estimation system based on facial images is developed. There are many methods have been proposed in the literature for the age estimation and gender classification. However, all of them have still disadvantage such as not complete reflection about face structure, face texture. This technique applies to both face alignment and recognition and significantly improves three aspects. First, we introduce shape description for face model. Second, the feature extraction phase, two geometric features are evaluated as the ratios of the distances between eyes, noses, and mouths. Finally, we classified the gender and age based on the association of two methods: geometric feature based method and Principal Component Analysis (PCA) method for improving the efficiency of facial feature extraction stage.*

***Keywords:*** Gender estimation, Age estimation, Facial expression.

***\*Author for correspondence*** madhu.naik92@gmail.com

### **1. Introduction**

Accurate facial feature extraction is important for face alignment, which is an indispensable processing step between face detection and recognition. This paper is to build a feature-extraction system that can be used for face Recognition in embedded and/or consumer applications. This imposes specific requirements to the algorithm in addition to extraction accuracy, such as real-time performance under varying imaging conditions and robustness with low-cost imaging hardware. Human facial image processing has been an active and interesting research issue for years. Since human faces provide a lot of information, many topics have drawn lots of attentions and thus have been studied intensively. The most of these is face recognition. Other research topics include predicting feature faces, reconstructing faces from some prescribed features. There are 3 aspects:

- Shape description
- Feature extraction
- Gender classification

And we are using Geometric feature based method and Principal Component Analysis.

## 2. Existing System

There are many methods have been proposed for the age estimation and gender classification. They are support vector machine, ad boost algorithm artificial neural network and many more. All of them have still disadvantage such as not complete reflection about face structure.

*Disadvantages of existing system:*

- Outputs are not accurate.
- Some methods are difficult apply in real time.
- Age is only classified into young adult and old.

## 3. Proposed System

The extracted features of each face in database can be expressed in column matrix. And find the average face for same age group of face images. Matrix  $\Omega$  can be formed by the average face features of the thirteen age groups. Calculate the Covariance Matrix  $\text{Cov} = \Omega \Omega^t$ . Eigen vector represent the variation in faces. Finally, age is determined through the minimize face space.

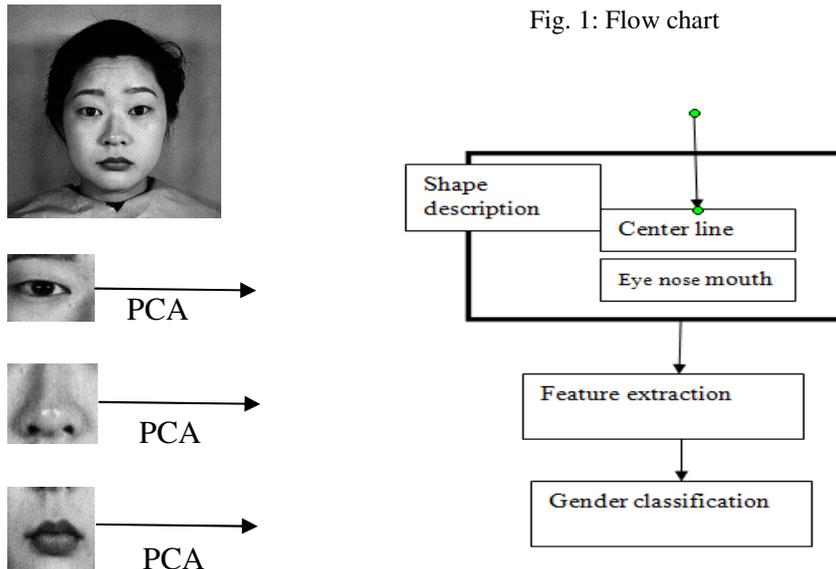


Fig. 1: Flow chart

The Principal Component Analysis (PCA) can do prediction, redundancy removal, feature extraction, data compression. Face image be represented as a two dimensional  $N$  by  $N$  array there will be a training set of  $M$  face images.  $K$  nearest neighbor classifier is used to classify the gender. And there is  $m$  number of training set for that we have to calculate Eigen face Euclidean distance and projection line and that will be stored in data base and once the image is detected again we have to calculate Eigen face Euclidean distance and projection line by using  $K$  nearest neighbor classifier we can classify the gender. The face space is computed from the Euclidean distance of feature points of two faces. The fundamental matrix  $A$  is constructed by the difference face space among the input and each face. Then, the matrix can be formed by the average face features of the thirteen age groups. The following steps are then used to classify new face images:

- a) Calculate a set of weights based on the input image and the M Eigen faces by projecting the input image onto each of the Eigen faces.
- b) Classify the weight pattern to classify the age.
- c) (Optional) Update the Eigen faces and/or weight patterns.

#### 4. Result

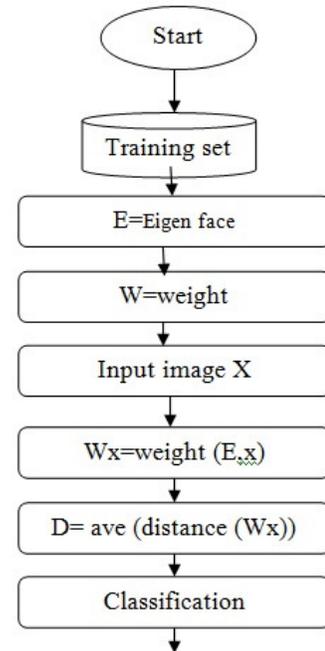
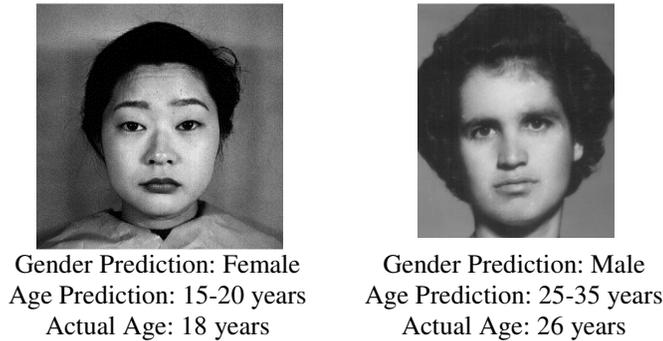


Fig. 2: Classification algorithm

#### 5. Conclusions

In this project, a fast and efficient gender classification and age estimation system based on facial features is proposed to classify the gender and age prediction. The process of the system is composed of three phases: shape description, feature extraction, and gender classification. The proposed technique has given good results when applied in a prototype real-time face recognition system for customized consumer applications. We have proposed a PCA algorithm and KNN classifier with automatic confidence and introduced a simple algorithm for calculating the label confidence value of each training sample. As future work, we would like to study the improvement on classification accuracy theoretically to other real-world pattern classification problems such as text classification, web page classification and age estimation.

#### References

- [1] Choi. (1999). Age change for predicting future faces. Proceedings of IEEE Int. Conf. on Fuzzy Systems. Vol. 3, pp.1603-1608.
- [2] Gutta, & Wechsler, H. (1999). Gender and ethnic classification of human faces using hybrid classifiers. Proc. Int. Joint Conference on Neural Networks. Vol. 6, pp.4084-4089.
- [3] Ji Zheng. A support vector machine classifier with automatic confidence and its application to Gender classification.
- [4] Changqin Huang, & Shu Lin. (2009). Gender Recognition with Face images based on PARCONE Mode. Proc. of the 2<sup>nd</sup> International Symposium on Computer Science and Computational Technology. pp. 222-226.
- [5] Kwon, YH, & da Vitoria Lobo, N. (1993). Locating Facial International Society for Optical Engineering Conference.