

Implementation on Real Time Age Estimation with Gender Detection with Image Processing

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Abstract: Face recognition plays very important role in our day today life. And from several years it has been studying by various researchers which have focused on the posture enlightenment, appearance plastic surgery. Face recognition is very important because of the security purpose. With so many applications whether it may be small application or big application security is the major issue. Everyone wants their property to be secure so face recognition is the one which is used for security purpose. As it is very easy to recognize the face images of the famous personalities such as stars in various fields such as films, sports, politics, social workers etc. On the other hand the presentation of face recognition with age as consideration has been found but with incorporated in issued to give better efficiency. The comparison between existing and proposed algorithm on database shows that proposed algorithm performs significantly. In the proposed solution, two feature extraction algorithms, Histogram of Oriented Gradient (HOG), and Local Binary Pattern (LBP) are used as the feature extractors. In order to achieve effective methods of gender and age prediction, we joined both HOG and LBP features. In extensive and intensified experiments, Support Vector Machine (SVM) and Convolution Neural Network (CNN) are used for the classification process which is used for gender and age detection respectively.

Index Terms: Face Recognition, Histogram Oriented Gradients, CNN, LBP

I. INTRODUCTION

With growing numbers of face recognition applications in every day to day life has made face recognition very important research topic now a days. Face recognition has received significant attention in the past several years because of its usage in wide variety of applications such as identification and intrusion detection. In latest years face recognition has established extensive attention from both research societies and the market, but still keep on very interesting in real applications. A lot of face recognition algorithms, along with their alterations, have been developed through the past decades. A number of typical algorithms are presented, being characterized into appearance based and model-based systems.

The human face holds very important quantity of attributes and information about the person, such as expression, ethnic, gender, and age. Human beings can detect and analyse these information easily, for instance, the majority of people are able to recognize human traits like gender, where they can tell if the person is male or female by only seeing his/her face. Likewise, they can determine the age of the person and say whether this person is a child or an adult. On the other hand, constructing applications to identify the people from their face and extract their age and gender information is a challenging task for computer vision, which modern world going to depend on it in many important sides of our daily life, because of the necessity of creating a general model that works for all human subjects.

This deficiency extends due to the variation in illumination, resolution, expression, pose etc. Gender prediction from facial images in turn can enhance the performance of a large number of applications including human-computer interaction, customer information capacity, and access control.

On the other hand, the ability to predict a person's age from his/her facial image is more difficult than predicting his/her gender because of the large variation of face appearances like variety of human race, poses, and facial expressions. However, age prediction is particularly useful for many applications such as demographic profiling, forensic art, age-specific human-computer interfaces, security control, age-oriented advertisement systems, and Electronic Customer Relationship Management (ECRM).

II. LITERATURE REVIEW

Face detection is also being researched in the area of energy conservation [Energy Conservation]. Methodology for face recognition based on information theory approach of coding and decoding the face image is discussed in [Sarala A. Dabhade & Mrunal S. Bewoor, 2012] [1].

Proposed methodology is connection of two stages – Face detection using Haar Based Cascade classifier and recognition using Principle Component analysis. Various face detection and recognition methods have been evaluated [Faizan Ahmad et al., 2013] [2] and also solution for image detection and recognition is proposed as an initial step for video surveillance.

Implementation of face recognition using principal component analysis using 4 distance classifiers is proposed in [Hussein Rady, 2011][3]. A system that uses different distance measures for each image will perform better than a system that only uses one Geng et al. [4] modeled the aging process with AAM based on a sequence of age-ascending face images for the same individual. Hence, different aging models can be learnt for different persons. More specifically, Geng et al, introduced a personalized age estimation method that describes the long-term aging subspace of a person, called A Ging pattErn Subspace (AGES). AGES estimates his/her age by projecting the query face into the aging subspace that best reconstruct the face image.

Zhang et al. [5] formulated the inference of each person's age as a warped Gaussian process (WGP) estimation problem, and developed a multi-task extension of WGP to solve the problem. Since different individuals have different aging processes, personalization is beneficial for age estimation. Previous researches also show that personalization can improve the performance of age estimation. Nevertheless, methods for learning personalized aging processes are limited because sequences of facial images showing a single person aging are difficult to acquire.

Suo et al. [6] addressed the problem of the lack of long-term dense aging sequences by building long-term aging patterns from several short-term patterns since they are easier to procure. However, long-term or short term aging patterns may be insufficient when there are too few samples gathered from a single person. Hence, a lot of studies have focused on *non-personalized* approaches. For example, Yang lanning future idea.

Golomb [7], Cottrel and Metcalfe at 1990s. In both studies, images are aligned by hand and later run with the Multi-Layer Perceptron (MLP) directly. Thus, classify process is actualized. Not to be used Feature Extraction Methods, all pixels of images are adopted as feature and it has been obtained that classify achievement by 92%.

Mozaffari et al. have combined global and local feature in their study. It has been used Discrete Wavelet Transform (DWT) and Local Binary Pattern (LBP) for extract to Global Feature-based that obtained classify achievement by 85%. And concluded that female faces are extended and circular than male faces.

Han [8] used to 3D GavabDB for extracts to Geometric Feature-based which is belonging to face. It has been determined that male and female's basic and distinctive feature of faces. Man's eyebrow is straight and thick when it compares to female and female have smaller nose than male. GavabDB data set which consists of 427 images and SVM Classification are used, thus, it has been obtained classify achievement by 82%.

Rahman Khorsandi [9], studied on the 2D ears image that is the first study in the gender recognition fields. He used to Gabor filter for extract feature. In a study, Notre Dame University has obtained classify achievement by 89%. In which is used to J Data Group. In this study, aligned and cropped gender identify is processed. And creation of face database information will be given at next part. It has been mentioned that feature group in which obtained original photos in GLCM parameter. Extract feature is obtained from DWT outcomes as new images and considered at part.

Singh *et al* [10] were able to reach 95.56% success gender prediction by using "HOG + SVM", and accuracy of 89.43% by using "LBP + SVM"

Lin and Zhao [11] studied a gender recognition scheme based on colour information. They developed an eye detection algorithm by combining SVM with some color features. By combining SVM classifier with these features, they achieved an accuracy of gender prediction scheme with 80.7%.

The first paper in age estimation area was published by Kwon and Lobo in 1994 [12], and studied the classification of age by using Anthropometric Models (AM), to find the primary features of the face such as eyes, mouth, nose, and chin. In addition, an Appearance Model (APM) is also used to determine the density of wrinkles in each face using the snakelets.

III. PROPOSED SYSTEM

In the proposed system, we will study how to detect real time age and gender with image processing. To enhance the accuracy of detection system, we offered three fresh algorithms. One is Histogram Oriented Gradients for feature extraction from face, second is Convolution Neural Network (CNN) algorithm for age detection and third is Support Vector Machine for gender detection. Both CNN and SVM is pre-trained model. Our system will show more accurate result.

The main impact of this research includes,

- To detect the real time gender from image captured by the webcam
- To improve accuracy age and gender detection by image processing technique.

The working diagram of proposed system is as shown below. According to the working diagram 1st step of proposed system is read the image from webcam.

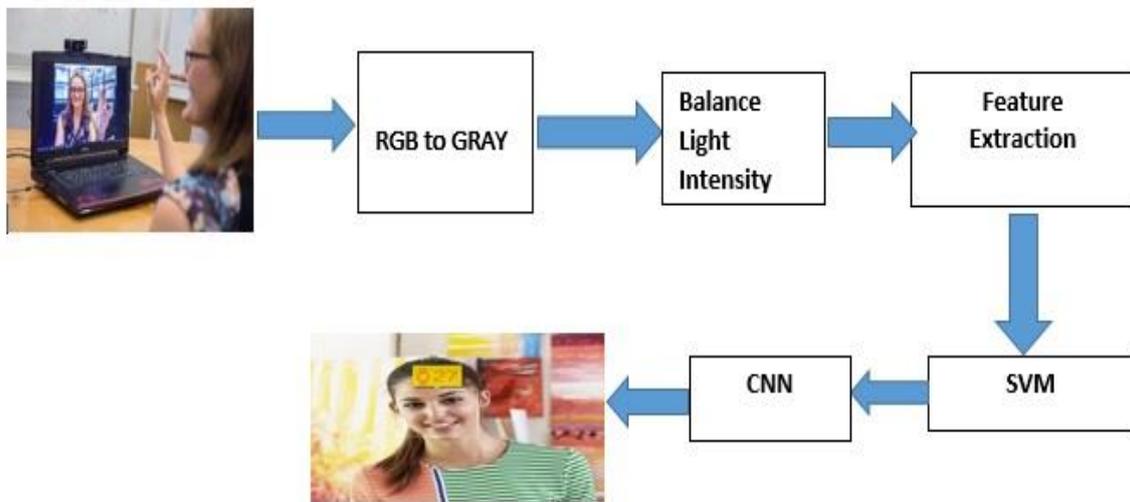


Figure: Architecture of Proposed System

After capturing image, system design of face recognition involves following steps as follows:

- Viola Jones
- CNN Classifier
- Local Binary Pattern
- Support Vector Machine
- **Viola Jones**

This algorithm's basic principle is to detect faces from a certain input image. In the past, there were numerous image processing approaches, but all of them were time-consuming due to resizing the entire image to a fixed size and then running it through a detector. The Viola Jones algorithm, however, uses a detector that rescales and adjusts the size of the image. Face detection determines if a human face is present in the image. If a face is detected, the algorithm finds the location and dimensions of each face in the image. Viola Jones relies on the Haar Classifier.

- **CNN classifier**

A convolutional neural network is a class of deep, feed-forward artificial neural networks, most commonly applied to analyzing visual imagery. Convolutional networks were inspired by biological processes in that the connectivity pattern between neurons resembles the organization of the animal visual cortex. Describing the process as a convolution in neural networks is by convention.

- **Local Binary Patterns (LBP)**

When LBP is combined with the Histogram of Oriented Gradients (HOG) descriptor, it improves detection performance significantly on some datasets. LBP is one of the binary patterns used for feature extraction. In this process, the face image is first divided into small regions from which LBP features are extracted, resulting in a histogram. LBP is used because it captures micro-patterns that are invariant to monotonic gray-scale transformations. Combining all these features gives the face image. LBP is widely used in many applications due to its high tolerance for object recognition, texture analysis, and high discriminative power. Python's Mahotas, an open-source computer vision package, includes an implementation of LBPs. OpenCV's Cascade Classifiers support LBPs as of version 3.0. The LBP Library is a collection of eleven Local Binary Pattern (LBP) algorithms developed for background subtraction problems.

- **Support Vector Machines (SVM)**

SVMs were introduced in COLT-92 by Boser, Guyon, and Vapnik. It is a well-motivated algorithm developed from Statistical Learning Theory (Vapnik & Chervonenkis) since the 1960s. Empirically, it has good performance in many successful applications. SVM is used to analyze complex data and produce results. SVM is very useful in finding patterns that are complex and not obvious. The SVM algorithm has been widely applied in biology and other sciences. They have been used to classify proteins with up to 90% of the compounds classified correctly. Permutation tests based on SVM weights have been suggested as a mechanism for interpreting SVM models. Support vector machine weights have also been used to interpret SVM models in the past.

IV. CONCLUSION

Lots of research has been done for age and gender detection. There are various methods available for detection of age and gender by using various methods or by using various databases for storing the images. The proposed system is used to improve the accuracy of age and gender detection system. These system works on real time images so there is no need to database.

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