Age Estimation from face

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Abstract

Variation in age of person can be observed from face texture and voice. This project focuses on automatic age group detection by examining wrinkles on face images. This process involves four steps: Data Preprocessing, feature extraction, clustering, age estimation. Once parts having wrinkles on face are detected features are extracted from facial images. Feature values obtained are then clustered through fuzzy C-means clustering. Every facial images are assigned to one cluster based on maximum membership value. Age estimation is then carried out by average ages of each cluster.

Keywords—Age estimation, feature extraction, fuzzy C-means wrinkles feature;

I. INTRODUCTION

As each person unique biometric features and since information like gender, approximate age, ethnicity, mood can be extracted, automatic age detection from facial images has uses in soft-biometric application, video surveillance for secure network system. Face recognition is a feature used in identification of documents like passports verification, driving license or student identity card. Age estimation can be used in human computer interactive system, like providing advertising content based on recognizing age groups of clients or in field of entertainment to sort people by age groups.

Age estimation process involves four steps: Pre-processing, feature extraction, clustering and age estimation. Literature shows that there two feature extraction technique: Local (based on part of face) and global (focuses on whole human face). Here we have considered Local approach for feature extraction.

II. LITERATURE REVIEW

1. Age Estimation from Face Images: Human vs. Machine Performance[4]

   To lessen the influence of inconsistency facial images are converted to gray-scale. As there can be in-plane and out-of-plane face images non–reflective similarity transformation is done to normalize. Then images are cropped to same size and interpupillary distance. For facial component localization ASM (Active shape modal) is used to detect facial landmark. Pre-processing scaling is applied to compensate for differences in absolute component sizes. They have then extracted biologically inspired features from given images. Each facial component is then classified into four age group using SVM

2. Age Estimation from Face Images: Challenging Problem for Audience Measurement Systems[1]

   Once face detection is done color space transformation is done, image normalization is performed by histogram equalization and scaling is done then transformation to LBP feature space and SVM training is used for binary classification. Through binary output classifier direct age is detected. Metric like MAE (maximum absolute error), cumulative score (CS), probability density function for age estimation error is calculated.

3. Automatic Age Detection based on Facial Images[2]

   Images in database were converted to gray scale and then equalization. Parameterization was carried out by DWT (discrete wavelet transform), discrete cosine transform or local binary pattern (LBP). Here LBP shows good result in classifying other kind of samples by textures. The final step involves classifying, training, testing through SVM by inserting obtained parameters.

4. Automatic Age Estimation from Face Image[3]

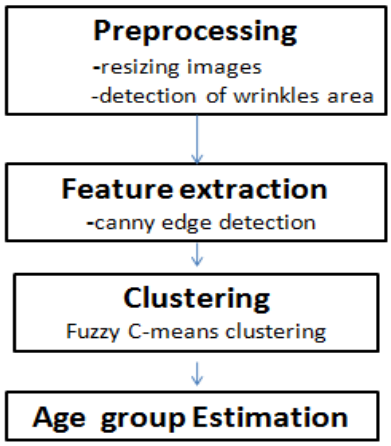
   This paper has implemented age estimation of a person by analyzing wrinkles part in face. From dataset face part is cropped and part of face like eye, mouth, and nose region is extracted. Similarly forehead, Mid-eyebrows and eyelids region is extracted. On this extracted region canny edge detection is applied so information about wrinkles can be known which will be edges in extracted region. Then feature value is calculated from faces and are classified using C-Means clustering algorithm. From this we get membership value through which age estimation is done.

5. Gender and age classification of human faces for automatic detection of anomalous human behavior[5]

   In this paper they used pre-trained CNN (convolutional neural network has 5 convolutional layers and 3 fully connected layers) as feature extraction and linear SVM (Support vector machine) as well as multi-layer neural network. This design contains 60 million parameters. Hence it is time-consuming and problematic.

III. Approach used(Algorithm)

This project involves four stages: pre-processing, feature extraction, clustering and age estimation.
Block diagram:



A. Preprocessing
Face is detected from given dataset and then are converted to same size that is 128x 128 pixels. Color transformation is done by RGB to grayscale transformation
Wrinkle area from are detected from face as shown below.

B. Feature extraction
To extract feature, through canny edge detection the wrinkles get detected in form of white pixels as canny edge detection gives binary image as output. Feature value is calculated as F= (number of white pixels in forehead area / number of pixels in forehead area) + (number of white pixels in left eyelid area / number of pixels in left eyelid area) + (number of white pixels in right eyelid area / number of pixels in right eyelid area) + (number of white pixels in mid eyebrow area / number of pixels in mid eyebrow area) [3]

C. Clustering
Using Fuzzy C-means clustering algorithm, wrinkle features are clustered. Each face image is assigned to a cluster based on maximum membership value. Then, estimated age is calculated from their membership values and average age of each cluster[3].

IV. Important Result and Discussion

- Preprocessing part: Detecting wrinkles part :
Figure1 shows Forehead, Mid-Eyebrows, and Eyelids Regions

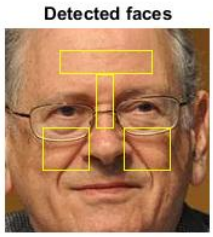


Figure 1. Forehead, Mid-Eyebrows, and Eyelids Regions

- Feature extraction part:

Figure 2. Wrinkle information is collected through canny edge detection.

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F =

    0.4827
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Figure 3. Feature Value

V. Conclusion

We are able to detect wrinkle part of face that is forehead, eye , mouth, nose region, Mid-eyebrows and Eyelids region. Through canny edge detection we are able to calculate feature value of each face.

Acknowledgment

Database used is obtained from wiki-dataset [6].

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