

Human Age Detection Using Raspberry pi

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Abstract: There has been a growing interest in automatic age estimation from facial images due to a variety of potential applications in law enforcement, security control, and human computer interaction. It is rapidly entering in all the sectors and aspects of our life. In this work the estimation of exact human age is done using Raspberry pi. First we extract certain features from the input Face images, later using different method like data indexing, k-means theorem, learning neural network we get related databases. Comparing several trained databases, we get a specific range for younger images and older images. From the proposed range we can easily differentiate the faces of adult and juvenile in real time. Thus, this paper analysis the adult and juvenile by displaying their ages with a very high accuracy successfully.

Keywords: Raspberry Pi, Data Indexing, K-Means Theorem, Learning Neural Network, Databases, Detection.

I. INTRODUCTION

Humans can glean a wide variety of information from a face image, including identity, age, gender, and ethnicity[5]. The identification characteristic of face images has been well explored in real-world applications including passports and driver licenses. Face mug shot retrieval is also a powerful way for law enforcement agencies to identify potential suspects in criminal investigations. Despite the broad exploration of person identification from face images, there is only a limited amount of research on how to accurately estimate and use the demographic information contained in face images such as age, gender, and ethnicity. For many practical applications, relying on humans to supply demographic information[8] from images is not feasible. Hence, there has been a growing interest in automatic extraction of demographic information from face images. Here we focus on age estimation, thus the objective is to determine the specific age or age range of a subject based on a facial image and images in real time. Some of the potential applications of automatic age estimation are:

(i) Law enforcement[4]: An automatic age estimation system can help to determine the potential suspects more efficiently and accurately by filtering the gallery database using the estimated age of input mug shot.

(ii) Security control[4]: An automatic age estimation system can be used to prevent minors from purchasing alcohol or cigarette from vending machines or accessing inappropriate web pages

(iii) Human-computer interaction (HCI)[4]: The system can adjust the content presented to a user based on their ages. For example, a smart shopping chart can be designed to provide recommendation according to the age of customer. Unlike other sources of variation in facial appearance (lighting, pose, and expression) which can be controlled during face image acquisition, face aging is unavoidable natural process. Moreover, face aging is affected not only by internal factors, but external factors as well.

II. METHODS AND PROCEDURE

The project as titled as “Human Age Detection Using Raspberry Pi” has been undertaken with the aim of estimation of human age guiding by a program for Raspberry Pi to evaluate a person’s exact age or age group. For this paper we used the technique for age-group estimation which contains two main components facial feature extraction and estimator learning for building an efficient age estimator. The task of estimating exact human age adopts a dense representation of the age labels and the task of age-group estimation divides the labels only into rough groups (e.g., elder, adult, and teenage/children). [1]

Initially image is captured in real time using the USB camera and then the captured image is processed through Open Source Computer Vision which is a library of programming functions mainly aimed at real-time computer vision. In simple language it is a library used for Image Processing. It is mainly used for face detection stage and does all the operation related to Images. Local binary pattern method[3] which is most successful for face recognition is used for feature extraction for age estimation. After that extracted features is given to convolution neural network (CNN)[4] (as

shown in figure1) which is pre-trained model will find out whether the features extraction of an image in testing set are matching to the features extracted from the training set and accordingly gives the estimated age [8]. The working of our system can be summarized in the following steps

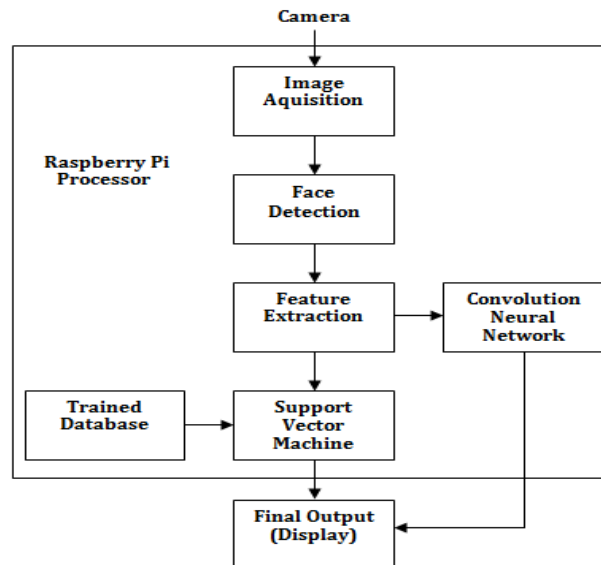


Fig 1: Flow Chart of Age Detection [1],[4],[6]

- Our project uses the Eigen faces algorithm in OpenCV to perform face recognition. To use this algorithm you'll need to create a set of training data with pictures of faces that are and are not allowed to open. Included in the project is a large set of face images that are tuned for training with the face recognition algorithm.
- To generate images of the person we use the included **capture-positives.py** script[2]. This script will take pictures with the hardware and write them to the **training/positive** sub-directory (which will be created by the script if it does not exist).
- To start the process of taking images, first assemble the hardware and powered up, connect to the Raspberry Pi in a terminal session and navigate to the directory with the project software. Execute the following command to run the capture positive script: `sudo python capture-positives.py`
- After waiting a few moments for the script to load, you should see the following instructions:
 - Capturing positive training images.
 - Type command and then press enter to capture an image.
 - Press Q to quit.
- The script is now ready to capture images for training. If you see an error message, make sure Open CV and the software dependencies from the previous step are installed and try again.
- Point the camera at your face and follow the same command as above and press enter on the keyboard to take a picture. If the script detects a single face, it will crop and save the image in the positive training images sub-directory. If the script can't detect a face or detects multiple faces, an error message will be displayed.

III. RESULTS AND OBSERVATION

We proposed a new age estimation method based on a combination of Data Indexing, K-Means theorem, and Neural Networks. The experimental results showed that the proposed age estimation method produces better estimation result. Using the proposed age estimation method, we investigated the effects of facial expression on estimation performance. We confirmed that facial expression affects age estimation only if the system can be trained adequately with a large number of images.

• Face Detection

Python codes were developed for face detection from a given image, from a folder of images and for real time face detection [2]. Detected face from a USB camera in real time is shown in figure 2. Two types of noises, namely Median noise and Intensity noise were introduced to all the face datasets. Further, two types of Blurring effects, namely Motion blur and Gaussian blur were added to the face datasets.

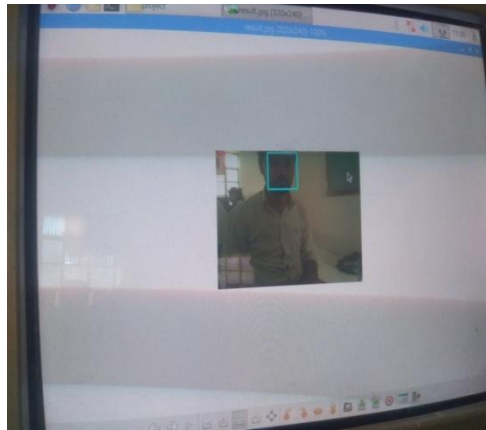


Fig 2: Image capturing

• Age Estimation

The system is able to calculate human age and multiple number of human age in real time. We can get the result from face image, result obtained from this system is more efficient than previous one because in this system we are using raspberry pi as operating system. Some changes in values are attributed to measurement conditions brightness, darkness face image distance from camera takes major role during the whole process. Estimated age of human in real time is obtained on the screen



Fig 3: Image of age estimation

IV. CONCLUSION

A face detection, tracking and age estimation system using Raspberry Pi 3 model B processor was developed. The system was programmed using Python programming language. Both Real time face detection and face detection from specific images, i.e. object recognition, was carried out. The efficiency of the system was analysed in terms of face detection rate. Currently in our system we are just accessing the system from local PC system. In future we can implement a system with video database storage for reference even which we can use single RAM for different system like servers in companies. Currently, we focus on age estimation from faces of nearly neutral facial expressions, and evaluate our methods on the datasets without serious facial expression variations. However, expression changes could affect the age estimation results. Estimating both the age rank and facial expression intensity rank is a possible way to solve this problem

REFERENCES

- [1] Mr. Sarang C. Zamwar.et.al.Int. Journal of Engineering Research and Application ISSN: 2248-9622, Vol. 7, Issue 5, (Part -I), pp.16-21. *May 2017*
- [2] Ravi Subban1, Dattatreya Mankame2, Sadique Nayeem1, P. Pasupathi3 and S. Muthukumar3 Proc. of Int. Conf. on Advances in Communication, Network, and Computing. *2014*
- [3] Ms.Drashti H. Bhatt , Mr.Kirit R. Rathod , Mr.Shardul J. Agravat. "Article: A Study of Local Binary Pattern Method for Facial Expression Detection", International Journal of Computer Trends and Technology (IJCTT) 7(3):151-153, Published by Seventh Sense Research Group. *January 2014*



- [4] Yogachandran Rahulamathavan, Raphael C.W. Phan, Jonathon A. Chambers, and David J. Parish, Facial Expression Recognition in the Encrypted Domain Based on Local Fisher Discriminant Analysis. *IEEE Transactions On Affective Computing, January-March 2013*
- [5] S. Sankarakumar, Dr.A. Kumaravel & Dr.S.R. Suresh, "Face Detection through Fuzzy Grammar", *International Journal of Advanced Research in Computer Science and Software Engineering, Vol. 3, No. 2 2013*
- [6] Faizan Ahmad, Aaima Najam & Zeeshan Ahmed, "Image-based Face Detection and Recognition: State of the Art", *IJCSI International Journal of Computer Science Issues, Vol. 9, Issue. 6, No. 1. 2013*
- [7] Di Huang, Mohsen Ardabilian, Yunhong Wang, and Liming Chen: 3-D Face Recognition Using eLBP-Based Facial Description and Local Feature Hybrid Matching. *IEEE Transactions On Information Forensics And Security, October 2012.*
- [8] Sarala A. Dabhade & Mrunal S. Bewoor, "Real Time Face Detection and Recognition using Haar -based Cascade Classifier and Principal Component Analysis", *International Journal of Computer Science and Management Research, Vol. 1, No. 1 2012*