

Human identification with age and gender prediction

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Abstract —The face recognition system provides good accuracy in Biometric identification. We are using Advanced Biometric Identification on Face, Gender and Age Recognition (ABIFGAR). It gives good results for face recognition by doing only small training set and it works even with a training set as small as one image per person. The process is divided into three phases: Pre-processing, face detection, Feature Extraction and Classification. The geometric features from a facial image are obtained based on the symmetry of human faces and the variation of grey levels, the positions of eyes; nose and mouth are located by applying the edge operator algorithm. The gender and age are classified based on shape and texture information using Posterior Class Probability.

Keywords- Biometric identification; Face detection; Age prediction; Gender prediction; Feature extraction; MATLAB Image processing.

I. INTRODUCTION

In day to day lives Age and Gender play fundamental roles in social interactions. Languages reserve different salutations and grammar rules for men or women, and very often different vocabularies are used when addressing elders compared to young people.

Despite the basic roles these attributes play in our day-to-day lives, the ability to automatically estimate them accurately and reliably from face images is still far from meeting the needs of commercial applications.

This is particularly perplexing when considering recent claims to super-human capabilities in the related task of face recognition. Past approaches to estimating or classifying these attributes from face images have relied on difference in facial feature dimensions or “tailored” face descriptors.

Most have employed classification schemes designed particularly for age or gender estimation tasks, including and others. Few of these past methods were designed to handle the many challenges of unconstrained imaging conditions.

Faces from the audience benchmark for age and gender classification. These images represent some of the challenges of age and gender estimation from real-world, unconstrained images. Exploit the massive numbers of images examples and data available through the internet in order to improve classification capabilities.

II. BLOCK DIAGRAM

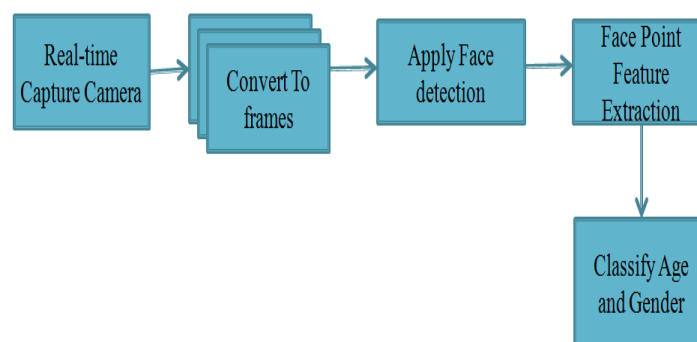


Fig 1: Block diagram

Description:

- A. **Real-time capture camera:** In the initial condition whole setup is ready to perform through general camera video is continuously searching and streaming to the computer. We can take video from multiple source like CCTV, WEBCAM, live streaming videos from server etc.
- B. **Convert to frames:** The Viola-Jones object detection frame work is the first object detection frame work to provide competitive object detection rates in real- time proposed in 2001by Paul viola and Michel Jones. Although it can be trained to detect a Varity of object classes, it was motivated primarily by the problem of face detection. This algorithm implemented in openCV. The characteristics of Viola-Jones algorithm which make it good detection algorithm are:
1. Robust- very high detection rate (true-positive rate) and very low false- positive rate always.
 2. Real time – for practical application at least two frames per second must be processed.
 3. Face detection only (not recognition) - the goal is to distinguish faces from non faces.
 4. At the computer unit video is converted into frames. Every frame is an image contains some information through MATLAB images processing is done over all frames. There are two types of feature color feature and texture feature, images contain these two features.
- C. **Face detection:** Face detection is a computer technology being used in a variety of applications that identifies human faces in digital images. Face detection also refers to the psychological process by which human locate and attend to faces in visual scene. Face-detection algorithm focuses on the detection of frontal human faces. It is analogous to image detection in which the image of a person is match bit by bit. Image matches with the image stored in data base. Any facial feature changes in the database will be invalidating the matching process. Firstly, the possible human eye region is detected by testing all the valley regions in the grey- level images. Then the genetic logarithm is used to generate the entire possible faces region which includes the eyebrows, the iris, the nostril & the mouth corners. Each possible faces candidate is normalized to reduce lightning effect caused due to uneven luminous and shirring effect due to the head movement. The fitness value of each candidate is measured based on its projection on the Eigen-faces. After number iterations, all the faces candidates with a high fitness values are selected for further verification. At this stages the face symmetry is measured an existence of the different facial feature is verified foe each faces candidates. ^[3]
- D. **Face point feature extraction:** Through image processing colour and texture features is extracting and further testing finally capture frames (images) and training database are compared and predict the gender & age. At training duration several texture feature like nose, eyes, lips, eyebrow, beard of several faces and colour of same several faces are extracted and create database using extracted (face) information. During testing time frames of capture video is compare with existing database and predict the faces he/she is male & female and also predict the approximate age.
- E. **Classify Age and Gender:** To classify age and gender we are using SVM [Support Vector Machine]. We prepare a datasets library containing extracted face feature. SVM compare the feature of detected face with feature of face datasets and predict age and gender. SVM decide the class of age and gender according to matched feature of current detected face with training datasets.

IV. SOFTWARE IMPLEMENTATION

A. Software description.

We are using MATLAB 2013 version. MATLAB has inbuilt many applications like image processing, PID Tuner, Signal analyse, SIM Biology, Instrumentation control etc. It also provides many other applications which is available over internet.

In this project, we are using MATLAB Image processing for Face detection and Age and Gender. MATLAB has inbuilt many library file for image processing. We are using Open CV for face detection and the algorithm is Vision cascade detector.

For age and gender prediction we use HOG [Histogram of Oriented Gradients] feature for feature extraction of face images and classify using SVM [Support Vector Machine]. With the help of GUI [Graphical User Interface] Creator we develop a GUI for this project. To implement face detection on real time video we use the Video file reader function which is inbuilt.

B. System Flow.

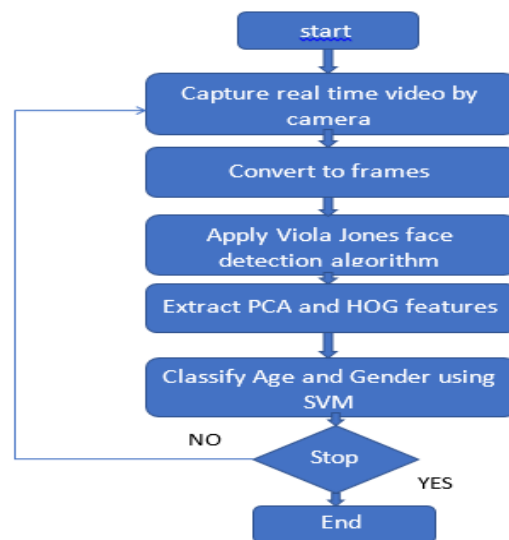


Fig 2: Flow chart of algorithm

Description:

By a click on start icon on GUI [Graphical User Interface] MATLAB algorithm start fetching real time video files and converting that video file into frames. Every frame is an image contains some information. MATLAB images processing is done over all frames. The image contains two types of features, color feature and texture feature.

The detected face portion in video frames by MATLAB algorithm is cropped and different feature extraction method like HOG [Histogram of Oriented Gradients] and LBP [Local Binary Pattern] is applied over the cropped face portion of image.

In machine learning, support vector machines (SVMs, also support vector networks) are supervised learning models with associated learning algorithms that analyses data used for classification and regression analysis. Given a set of training examples, each marked for belonging to one of two categories, an SVM training algorithm builds a model that assigns new examples into one category or the other, making it a non-probabilistic binary linear classifier. An SVM model is a representation of the examples as points in space, mapped so that the examples of the separate categories are divided by a clear gap that is as wide as possible. New examples are then mapped into that same space and predicted to belong to a category based on which side of the gap they fall on. ^[1]

V. SIMULATION RESULTS

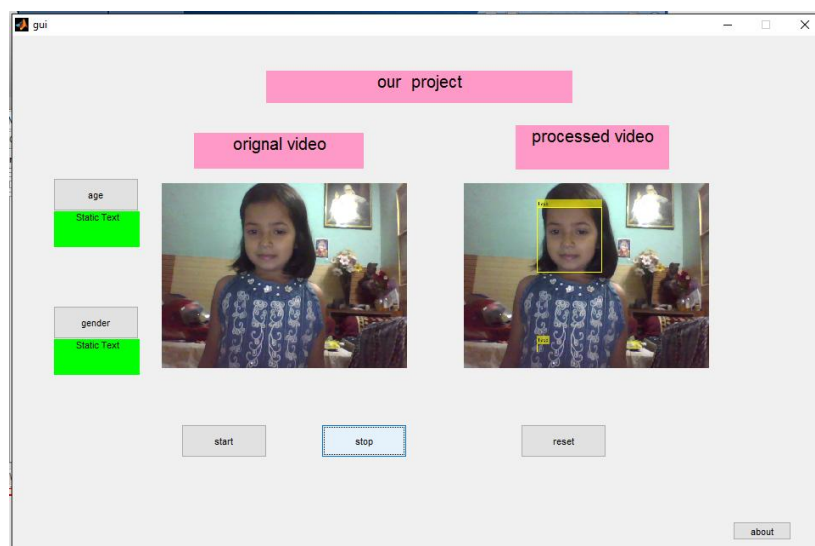


Fig. 3: Graphical user Interface

Description:

Graphical user interface (GUI) consists of two axel window, push buttons, static text windows. Axel window that are label with “original video” plays the original video which is directly stream form camera and the second axel window label with processed video plays processed video. In this window face detection feature is visual. There are four push button respectively start, stop, reset and about. Start button initiate the program. Stop button provide interrupt function and reset button reset the program and back to the initial condition. BY pressing the about button, it shows the details of this GUI version. Two static text window age and gender show the age and gender after processed.

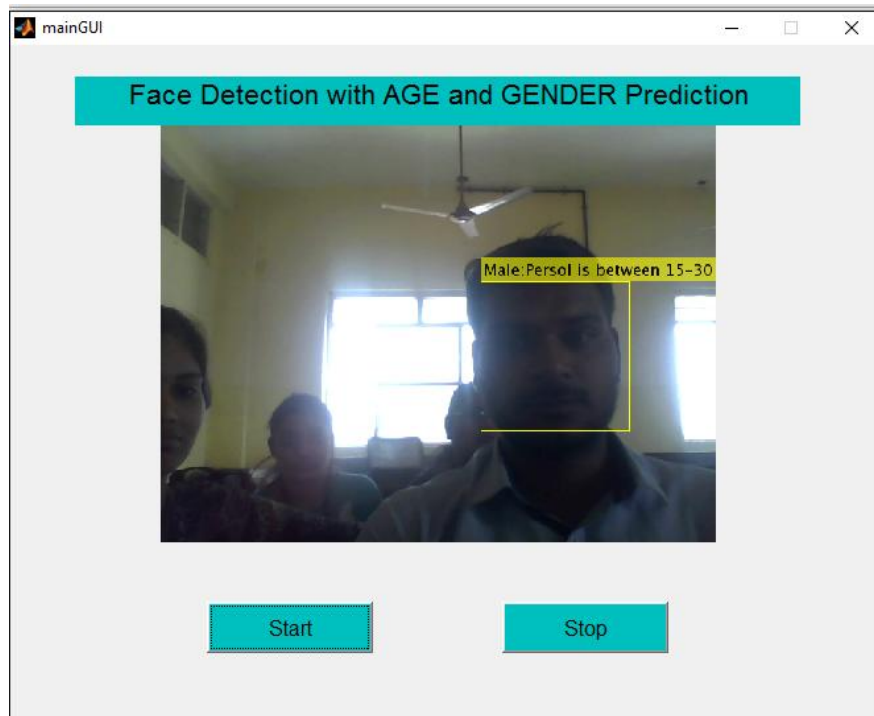


Fig. 4: Age and Gender prediction

VI. CONCLUSION

Working upon this project we are exploring lot more regarding the image processing technology. The technology can extract the features of different individuals and also gets trained automatically by its own and can recognize the thing in the very similar manner as human does.

We through this project have successfully worked on under till date:

1. Detection of face.
2. Tracking of face.
3. Age prediction
4. Gender prediction

We have used viola Jones for face detection algorithm and particle filter algorithm for tracking of the same.

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