

Identification of the Important Persons with Gender from Video Images

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ABSTRACT

Gender identity is one of the most fundamental aspects of life. The sex of a person is usually assigned at birth and becomes a social and legal fact from there on. In this paper, a method is proposed to identify the most important persons from the video as well as detect the gender of those persons.

Keywords: Biometric, Person Detection, Video, and Gender Identification

I. INTRODUCTION

Gender identity, in nearly all instances, is self-identified, as a result of a combination of inherent and extrinsic or environmental factors; gender role, on the other hand, is manifested within society by observable factors such as behaviour and appearance. For example, if a person considers himself a male and is most comfortable referring to his personal gender in masculine terms, then his gender identity is male. It is defined by one's own identification as male, female, or intersex; gender may also be based on legal status, social interactions, public persona, personal experiences, and psychologic setting.

The notion of 'gender identity' offers the opportunity to understand that the sex assigned to an infant at birth might not correspond with the innate gender identity the child develops when he or she grows up. Most people legally defined as man or woman will correspondingly have a male or female gender identity. Many international and national medical classifications impose the diagnosis of mental disorder on transgender persons.

The most important and impressive biometric feature of human being is the face. It conveys various information including gender, ethnicity etc. Face information can be applied in many sectors like biometric authentication and intelligent human-computer interface. Many potential applications such as human identification, smart human computer interface; computer vision approaches for monitoring people, passive demographic data collection, etc., and needs a successful and dependable classification method. It is really a very challenging job to detect male or female accurately separating two sets of data. So it is very urgent to have a reliable classifier to improve the classification performance.

Gender recognition plays an important role for a wide range of applications in the field of Human Computer Interaction also for commercial purposes. Gender recognition may in fact find application in areas such as advertising. An example might be an advertising screen, which uses a camera for detecting the gender of a human who looks at it and displays the content accordingly. Since the first moment of life, we learn to recognize our mother and father and during all existence, we constantly perform gender recognition, often without being aware of it.

In this paper, a video with group of peoples are accepted as input. Initially the main task is to identify the most important persons in a running video. Normally in most of the security reasons it is required to locate important persons from video and if there is any unforeseen incidence happened on them then there shall be security lapse from the security side. So the proposal for this paper is divided into two parts- (1) Identification of important persons from video, (2) also to detect gender of those persons.

II. REVIEW WORKS

Object extraction is a challenging area in the image processing. In object extraction technique, extracting of objects in the pre-processed stage is made to find out similarity class within image is made into a number of clusters for isolating segmented images from the original image [1-3]. There are a number of methods for automatically extract interesting objects. Image Object extraction techniques are very useful for disease detection, object localization and object tracking [4-7]. Image Segmentation is a process of dividing an image into sub partition based on some characteristics like colour, intensity etc. [8].

Similarly, same procedure is applicable for the video. First identifying the most important people for all image dataset and video, finding the centroid of images then using viola jones method find the faces of the people, using Euclidian distance, measure the distance of the position of all faces from centre-point of the image. Accept a threshold distance value, and mark those faces, which are below the threshold value. These are the faces of important person in the images. Similarly, for video first split and save every frame of the video then the next procedure is same as above. After that using gender detection classifier for detect the gender of those persons.

III. PROPOSED METHOD

In this application first step is detect all the facial area of the input images. Then next step is store those

faces, then create a database where each faces mean, standard deviation and a class value is stored. Then find most important person of each images and finally, those important faces passes through a gender classifier for detect the gender of those faces. The proposed technique is depicted in figure 1.

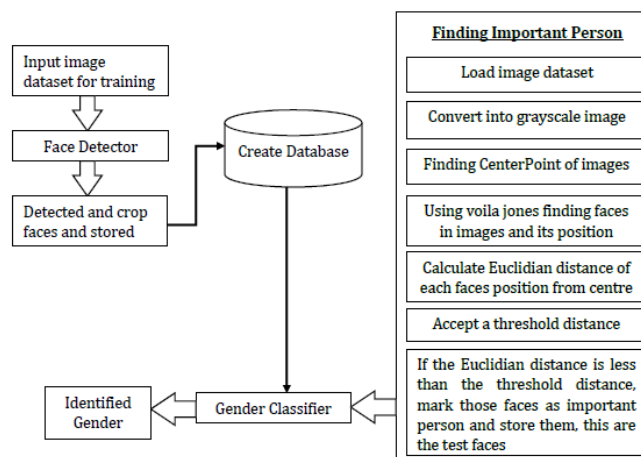


Figure 1. Proposed Procedure for Identification of Important Person and their Gender

The Steps are involved in this methodology are describe below:

Input image dataset:

In this application, a dataset of images taken, which is contain more than 100 images. Each images contains at least two peoples. Therefore, the total dataset contains more than 400 peoples.

Face Detection:

For detecting the face of each persons from each images, the viola jones face detection algorithm used. This algorithm follow the basic principle that a sub window is scanned and detecting the face from image. This approach to detecting faces in images combine four key concepts. 1) Simple rectangular features called Haar Features, 2) Integral image for rapid face detection, 3) The Adaboost machine learning method, 4) Cascade classifier to combine many features efficiently.

Detected, Cropped and Store the faces:

After detecting face area from input images cropped the face area and convert the faces into gray scale. Finally, after converting into grayscale, store the faces into a folder for trained.

The following figure 2 describes the process from original image to crop image.

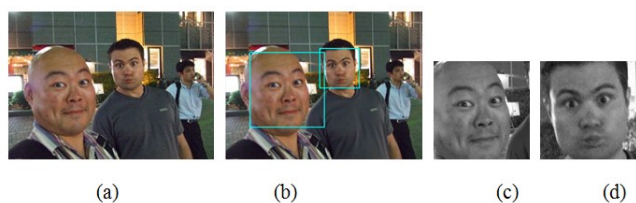


Figure 2. a) Original image, b) after face detecting using voila jones, c) & d) cropped the faces and convert into grayscale

Create Database:

After storing the faces, create a database where the mean and standard deviation value of those faces are stored, also manually assign a class value corresponding each faces. Here two-class value used, 1 for male faces and 2 for female faces.

Identify the important persons:

For this application, an images dataset of group of people is already accepted. Here the goal is, automatically predict the important persons among the group of people's in an image. For this approach, used to capture the distance between faces in the images.

It is clear that the photographers often frame their objects; therefore, people closest to the centre of the image tend to be the most important. So first, find the centre point of the image. Now, there are many methods are available for finding the faces in an image, using any of the method find the faces in the image and then find the centre point of the face boundary boxes.

After that, measure the distance between image centre point and face boundary boxes centre point.

Consider a threshold distance value, which is very much close to the centre point of the image. Then check whether the distance between images and face boundary boxes centre point is below of the threshold distance value. Bounded those faces with a specific colour, which are below the threshold value. Now this faces are the most important faces in the images and store them in a folder.

Gender Classification:

At face detection stage already every face in the image dataset are stored into a folder and using those images created a database.mat file. Again at important person detection stage, stored important persons in a folder. This classifier is an algorithm that stores all available examples and classifies new instances of the example based on a similarity measure. Here this classifier used database.mat file for measuring and comparing the new instances with given instances. In this database already, 400+ examples are stored. Now this gender detection classifier calculate the mean value of important persons from the important person's folder, and measure the difference between old and new mean value. Then it find the minimum difference value of the mean value. After finding the minimum value, it check for which it get that minimum value and check it class value. Depending on the class value classifier, decide the result for male or female face. If the class value is 1, then the face is "male", and if the class value is 2, then the face is "female".

For Video:

For video sequence, first split the entire video sequence into frames and store them. Then using face detection method find faces and create a database using this faces. Then find the important faces using important persons face detection technique, discuss above and store them. Now using the gender classification technique classify the gender of the important persons.

The following Algorithm describes the whole process in pseudo language.

Algorithm: The algorithms of the above methodology given below:

Algorithm for detecting face from input image dataset and save them into a folder

- 1) Load the input image dataset
- 2) for j = 1 to length of the input image dataset
 - 2.1) read the image file
 - 2.2) resize the image
 - // face detection
 - 2.3) create a face detector object
 - 2.4) create a boundary box around the face region
 - 2.4) for i = 1 to size of the boundary box
 - 2.4.1) give boundary box of all faces detect in image
 - 2.4.2) crop each face boundary box
 - 2.4.3) convert the RBG faces into gray scale
 - 2.4.4) write them into a specific folder
 - 2.5) end of for loop
- 3) end of for loop

Algorithm for feature extraction, face trained and database creating of trained face

----- Feature Extraction -----

- 1) function [F] = FeatureStatistical(im)
 - 1.1) calculate mean value(say, m) of the image
 - 1.2) calculate standard deviation(say, s) of the image
 - 1.3) concatenate mean and standard deviation into an array, F = [m s]

----- Face Trained -----

- 1) read the stored input face image

- 2) display it as an input image
- 3) c =input('Enter the class of the image(only 1&2,1 for male & 2 for Female): '); // console view
- 4) F = FeatureStatistical(im); // function calling
- 5) try
- 6) load database;
- 7) F = [F c]; // In F = [[mean standard_deviation] class]
- 8) face_db = [database;F]; // one end another data row start
- 9) save database.mat database //database name
- 10) catch
- 11) database = [F c];
- 12) save database.mat database
- 13) end

Algorithm for detecting important person

- 1) Load the input image dataset
- 2) for j = 1 to length of the input image dataset
 - 2.1) read image file
 - 2.2) resize the images
 - 2.3) convert the RGB images into grayscale
 - 2.4) find the center-position of the images
 - // face detection
 - 2.5) create a face detector object
 - 2.6) create a boundary box around the face region
 - 2.7) for i = 1 to size of the boundary box
 - 2.7.1) give boundary box of all faces detect in image
 - 2.7.2) find the center point of the boundary boxes
 - 2.7.3) calculate the euclidian distance between boundary boxes center point and images center point say, D.
 - 2.7.4) accept a distance threshold value, if the distance D is less than the threshold value
 - 2.7.4.1) crop those faces //Important person faces
 - 2.7.4.2) convert into gray scale
 - 2.7.4.3) save them into a specific folder
 - 2.7.5) end of if loop

2.8) end of for loop

3) end of for loop

Algorithm for gender classification of the important persons

- 1) Load the input image dataset of important person faces
- 2) for j = 1 to length of the input image dataset
 - 2.1) read the face image file
 - 2.2) F_test = FeatureStatistical(im)
 - 2.3) load database file //file format database.mat
 - 2.4) F_train = face_db(:,1:2); // store the mean and standard deviation value
 - 2.5) C_train = face_db(:,3); // store the class value
 - 2.6) for i = 1 to size of F_train 1st column mean value
 - 2.6.1) find the difference between F_train and F_test say, dist
 - 2.6.2) find the minimum distance and check it with database mean value
 - 2.6.3) after minimum value find its corresponding class value say det_cls
 - 2.6.4) if the det_cls value is 1, the face is "Male" person
 - 2.6.5) end if
 - 2.6.6) if the det_cls value is 2, the face is "Female" person
 - 2.6.7) end if loop
 - 2.7) end for loop
- 3) end of for loop

For Video Sequence:

For video sequence, first split the entire video sequence into frames and store them. Then the next procedures face detection cropped and save, then database create, then important persons face detection and finally the gender classification all are same and the algorithms are given above.

Algorithm for split the frames from video

- 1) vid = creates object vid to read video data from the file with specific name.
- 2) for j = 1 to vid.NumberOfFrames
//NumberOfFrames counting total no of frame in video

2.1) read each frame of the vid object

2.2) write the frames into a specific folder

3) end of for loop

Algorithm for identifying important person in video frame by frame

- 1) Vid = Read the video file
- 2) Vidframe = outputs the next video fram
- 3) vidInfo = returns the information about the video
- 4) vidPlayer = create a video player object to show the input video
- 5) while videofile read is done
 - 5.1) faceDetector = craate a face detector object for each frame
 - 5.2) videoframe = extact the next video frame from the input video
 - 5.3) convert the input video into gray scale mode
 - 5.4) find the center point of each video frame
 - 5.5) bbox = create a boundary of around each faces in each video frame
 - 5.6) insert the boundary box into the video frame
 - 5.7) for I = 1 to size of the boundary box
 - 5.7.1) calculate the center point of each boundary box
 - 5.7.2) calculate the euclidian distance between frame centerpoint and each bbox centerpoint, say D.
 - 5.7.3) accept a threshold distance value say threshD,
if D>threshD
then, give the rectangular annotated boundary box around those faces, they are the important faces in the video in each frame.
 - 5.7.4) end if loop
 - 5.8) end for loop
- 5.9) display the video.
- 6) End while loop
- 7) Release the video object and video player object.

Result:

The following results are obtained while running the algorithms through MATLAB for image as well as

video and these outputs are shown in figure 3 to figure 7.

For image dataset



Figure 3. Original images



Figure 4. After important person recognition, (rectangle box faces are the VIP person)

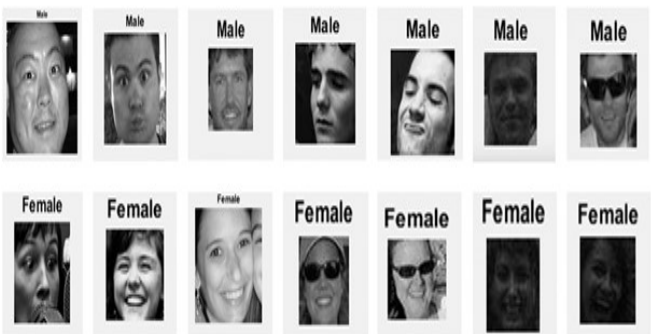
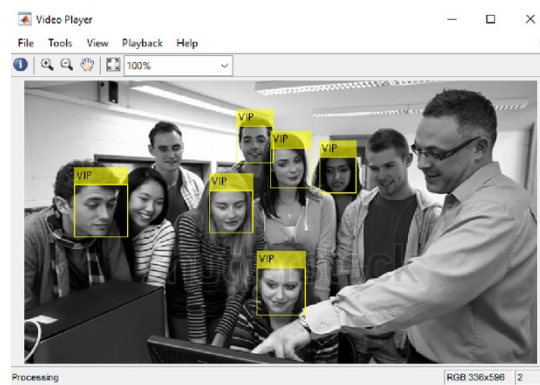


Figure 5. Identifying male and female important person

For video:



(a)



(b)

Figure 6. one of the video sequence of a) Original Video, b) important persons in the video (in grey scale mode)



Figure 7. After Male and Female important person recognition

IV. CONCLUSIONS

This paper proposed a method for identifying gender from the still image as well as video image. The method has a number of applications such as detection of particular part of medical images, detecting players from group photo of players in a tournament, etc.

V. REFERENCES

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