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A Face Detection using Haar Like Feature Algorithm

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Abstract:

Nowadays , the security forms the mostimportant section of our lives. Security of the home or the nearones is important to everybody. Home automation is an exciting area for security applications. Security cameras are utilized in order to build safety homes, and cities. However, this technology needs a person who detects any problem in the frame taken from the camera. In this paper, Haar Cascades is joined with python in order to detect the faces of people. For this purpose, to execute this system, a camera is useful So it helps to monitor and get notifications when motion is detected, captures the image and detect the faces, then sends images to a Smartphone via utilizing e mail used to see the activity and get notices when movement is detected.

Keywords —Face detection, python, email.

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I. INTRODUCTION

Face detection involves separating image windows intotwo classes; one containing faces. It is difficult because although common things exist between faces, they can vary considerably in terms of age, skin colour and facial expression. The problem is further complicated by difering lighting conditions, image qualities and geometries, as well as the possibility of partial occlusion and disguise. An ideal face detector would be able to detect the presence of any face under any set of conditions, upon any background. The face detection task can be broken into two steps. The first step is a classification task that takes arbitrary image as input and outputs a binary value of one or zero, indicating whether there are any faces present in the image. The second step is the face localization task that aims to take an picture as input and output the location of any face or faces within that image as some bounding box with (x, y, width, height). The face detection system can be divided into the three steps:-

1. Pre-Processing:

To reduce the variability in the faces, the piture are processed before they are fed into the network. All positive examples that is the face picture are obtained by cropping picture with frontal faces to include only the front view. All the cropped picture are then corrected for lighting through standard algorithms.

2. Classification:

Neural networks are implemented to classify the picture as faces or nonfaces by training on these examples. We use the pair of our implementation of the neural network and the Matlab neural network toolbox for this task. Different network

configurations are experimented with to optimize the results.

3. Localization:

The trained neural network is then used to search for faces in an picture and if present localize them in a bounding box. Various Feature of Face on which the

work has done on:- Position Scale Orientation Illumination.

II. AIM AND OBJECTIVE

A Face detection using haar like feature algorithm.

Objective:

The objective of our project is to built software that can detect human faces from an image and send alert to user.

A] Detect faces.

B] Match detected faces to database

C] Sending alert

Motivation:

We get motivated of existing system we have to match user objects with database image using haar like feature method. In that system stores the image by mapping it into a face coordinate structure.

III. LITERATURE SURVEY

Reference No: 1

Title: "A Face Detection Algorithm Based on Adaboost and New Haar-Like Feature"

Author:songyan Ma, Lu Bai
Publisher:IEEE

Summary:This paper uses a new face detection method based on Haar-Like feature. NewHaar-Like feature is an extension of the Haar-Like feature basis. This article usefour new Haar-Like feature, and these features with existing Haar-Like feature areinput Adaboost classifer together to select feature, nally constructed classification performance and powerful cascade classifer for face detection. After detection experimentswe can see, the algorithm can get better results compared with othertraditional face detection classifiers like Haar-Like.

Reference No: 2

Title:-Time Face detection System Using Adaboost and Haar-like Features.

Authors:ie Zhu , Zhiquian Chen
Publisher:IEEE

Summary:

In this paper, a real time face detectionsystem using framework of Adaboost andHaar-like feature is developed. In the end, the experiments show high performancein both accuracy and speed of the developed system. Face detection is widely usedin interactive user interfaces and plays a very important role in the feld of computervision. In order to build a fully automated system that can analyze the informationin face image, there is a need for robust and efcient face detection algorithms .

Reference No: 3

Title:Fake News DetectionFace Detection and Annotation with Loosely Face Geometry

Authors:Dr. P.Shanmugavadivu,Ashish Kumar

Publisher: IEEE

Summary:This paper presents a strategic approach for rapid detection and annotation ofpartially occluded face. Partially Occluded Face Detection (POFD) problem isaddressed by using a combination of feature-based and partbased face detectionmethods with the help of face part dictionary. In this approach, the devised algorithm aims to automatically detect face components individually and it startsfrom mostly un-occluded face component called Nose. Nose is very hard to

coverup without drawing suspicion. Keeping nose component as a reference, algorithmsearch the surrounding area for other main facial features, if any. Once face partsqualify facial geometry, they are normalized (scale and rotational) and tag withannotation about each facial features so that partial face recognition algorithm canbe adapted accordingly with the test image .

Reference No: 4
Title:-Multicues Face Detection in Complex Background for Frontal Faces.

Authors:Amit Pal
Publisher: IEEE

Summary:

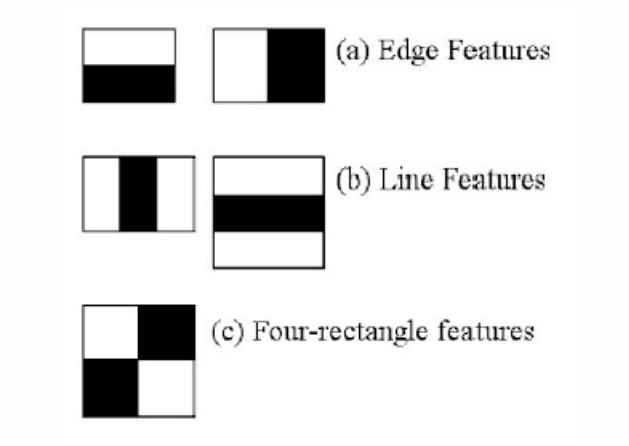
Face recognition is one of the main biometric techniques for security applicationsand face detection is the frst step toward the success of face recognition. To designan automatic face recognition system, the key problem is to detect the face location
quickly and efciently. In addition, face detection also plays an important role inmany applications such as video conferencing, human computer interface (HCI),and video surveillance. The task of face detection is so trivial for the human brain,yet it remains a difcult and challenging problem to enable a computer to do facedetection. This is because human face changes with respect to internal factors likefacial expression, beard and moustache, glasses etc and it is also afected by externalfactors like scale, lightening conditions, contrast between face and background andorientation of the face. Much work has been done in the feld of face detection.

IV. ALGORITHM

- **Haar Like Feature**

Haar-like features are digital picture features used in object recognition.They own their name to their intuitive similarity with Haar wavelets and were usedin the first real-time face detector. Paul Viola and Michael Jones in their papertitle "Rapid Object Detection using a Boosted Cascade of Simple Features" usedthe concept of Haar-feature classifier based on the Haar wavelets. This classifier iswidely used for tasks like face detection in industry.Haar cascade classifier employs a machine learning approach for visual itemdetection which is capable of processing picture extremely rapidly and achievinghigh detection rates. This can be attributed to three main reasons.
-Haar classifier employs 'Integral Image' concept which allows the features helpby the detector to be computed quickly.The learning algorithm is based on AdaBoost. It selects a small number ofimportant features from a big set and gives huge efficient classifiers.More complicated classifiers are combined to form a 'cascade' which discard anynon-face regions in a picture, thereby spending more computation on promisingobject-like regions.

Haar Features



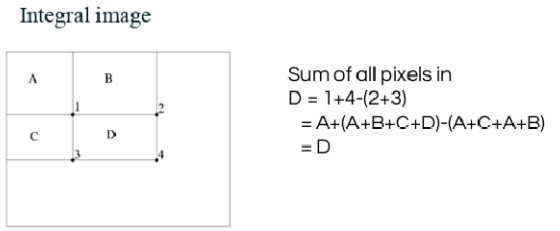
'Haar features' extraction

These Haar Features are like frames and are placed upon picture to compute asingle feature. The feature is essentially a individual value obtained by subtracting thesum of the pixels under the bright region and that under the dark. The process cansimply visualized in the example below For demonstration purpose, let's say weare only

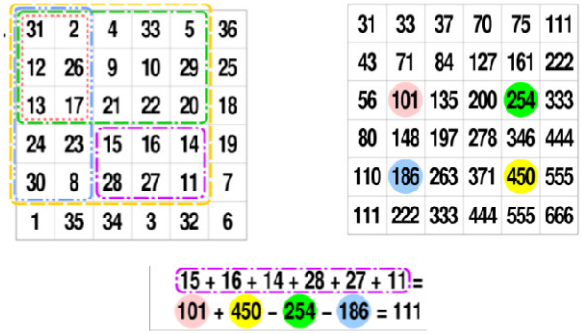
extracting dual features, hence we have only two windows here. The firstitem relies on the point that the eye region is darker than the adjacent cheeksand nose region. The second item focuses on the fact that eyes are kind of darkeras compared to the bridge of the nose. Thus, when the feature window moves over
the eyes, it will calculate a single value. This value will then be compared to somethreshold and if it passes that it will conclude that there is an edge here or somepositive feature.

Integral Images concept

The algorithm proposed by Viola Jones uses a 24X24 base pixel window size, andthat would result in more than 180,000 features being calculated in this pixel window.Visualize calculating the pixel difference for all the features The solution devisedfor this computationally intensive technique is to go for the Integral Image concept



Integral image calculation



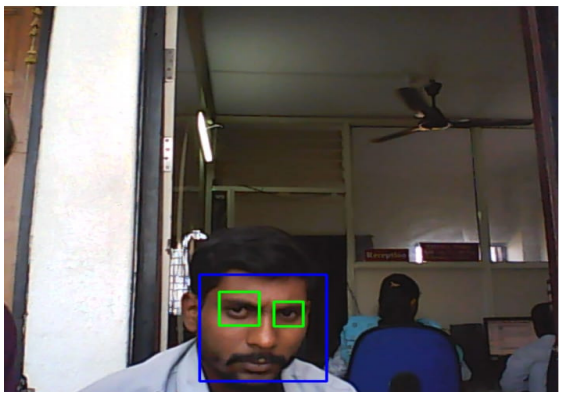
The integral picture means that to find the sum of all pixels under any rectangle,we smoothly need the four corner values.This means, to calculate the sum of pixels in any feature frame, we do not needto sum them up separately. All we need is to calculate the integral pixel usingthe 4 edge values.

V. WORKING MODELS AND RESULTS

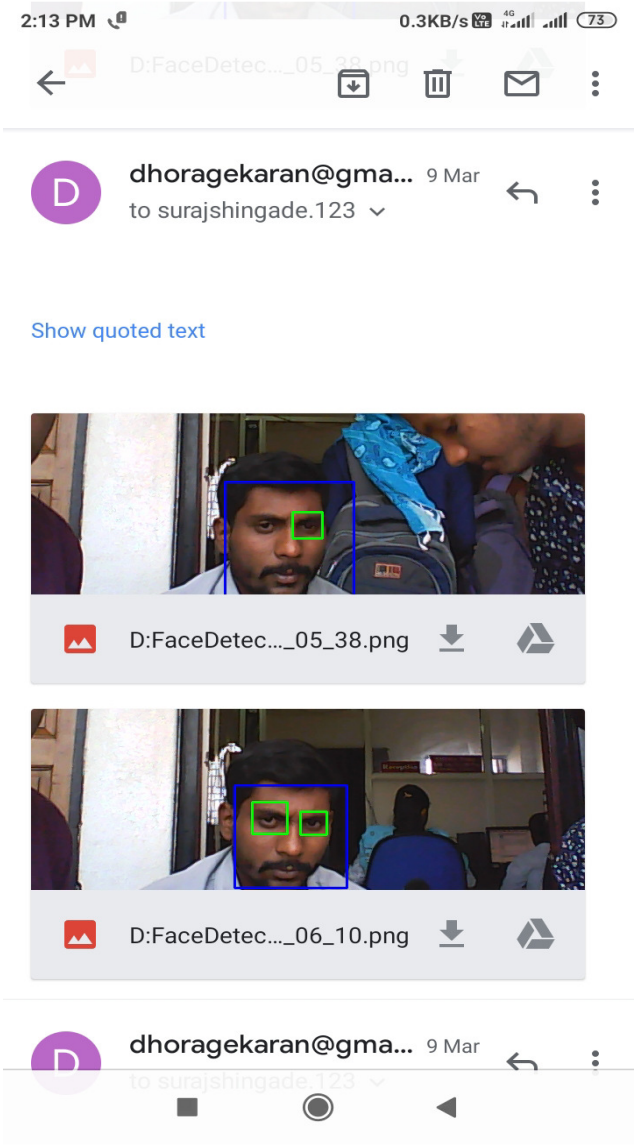
1) Login Page

2) Detecting Multifaces

3) Detecting Singleface



4) Alert sends to admin after detecting face



VI. CONCLUSION

It is partially included face can be detected and annotated with fewerfacial components in real time scenarios by the means of loosely facegeometry based face part detection techniques .Face detection is one ofthe main challenges of computer vision. Boosting has been shown to bean effective technique for face detection. This paper builds a real timeface detection system by using Haar-like features. The experiments showhigh performance in both accuracy and speed of thedeveloped system.

VII. REFERENCES

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