

A Viola Jones Detection Algorithm for Face Feature Detection

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Abstract

Face Feature detection technology is that when we recognize different feature (eyes, nose, mouth) of human face as we know the every human face is different to one another; so we have to discriminate an individual in computer applications. In real world there are so many biometric applications which is must for security purpose. This detection technique is used to automatically detect a human through a virtual or digital picture. It is used in security system. It capture the feature of person. There are so many advantage of face feature Detection It can detect skin tone, curve of face, eye, and nose hole, chin etc.

Keywords

Viola jones; RGB;

I. Introduction

Face Feature Detection, is part of biometric which is included physiological side of human and it became more important For security in real world such as in corporate life, government and May android applications. In today's world these biometric application growing very fast and Face feature detection is one of the main application which popular in technology world. Biometric feature detection is one the interested and important area of research .this is important for security, smart classes, Business attendance, intelligent robots, Alert system for drivers.

What is Face Feature Detection?

Face Feature Detection technology [1] is the fastest and least biometric Technology. This technique is work for individual identifier like human face.

Instead of requiring people position their eye in front of a scanner and place hand on a reader face feature recognition systems unobtrusively take input as a picture of person's faces and defined area of face. There is no Delay and Intrusion, and in mostly cases the Threats are entirely unaware of the Detection process. They do not consider that they are under surveillance or they are under the eye of cyber investigators.

Human face feature detection technique is of two main type for recognition and detection which is based on face and face feature of human.

a) Face Image based Methods

This method uses neural networks, linear subspace approach and statistical method for human face feature detection.

b) Face Feature based Methods

This method based on two, one is low level analysis and second is face feature analysis.

Face Feature detection Introduced by Viola, Jones which is based on Statistical methods. This is most popular detection method in face feature. However this method is not enough accurate than others method which is used to Face feature detection. This approach detect face in four approaches:

1)Feature Invariant Approaches:

In this approaches detection is through skin tone, colour, texture etc.

2)Pattern match method:

This feature detection technique is describe by comparing two images. Examples of Pattern match result are Shape template and active Shape model.

3)Knowledge-based method:

According to knowledge based method the face position is localized by feature invariant method. IT determines person face present in input data

4)Appearance-based method:

According to appearance based method series of faces is used to make face modal that used to detect face. Such as Hidden Markov Model and Neural Network.

II. Previous Research

There are so many face extraction methods [2] reported by researchers in the field of face feature Detection. To combine knowledge of face and input image information is the main trend. The process of Face feature extraction is described by Figure 1. Flowchart of complete process.

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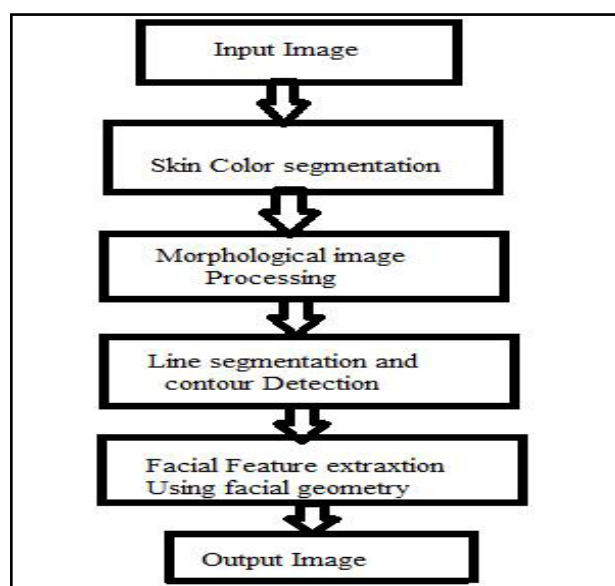


Fig. 1 : Face detection Flowchart depicting the entire process

Because of this cascading we get each and every pixel of given input image is equal to the complete sum of all left pixels.

Viola Jones detection algorithm is used a quite simple classifier to build efficient features using Ada Boost[5] for human face feature selection. Mathematical Explanation of weak classifier is, Where f is the applied face feature, x is a sub window, θ is threshold and p is a polarity that concludes whether x should be as positive (face) or a Negative (non-face).

Hybrid Viola-Jones detection algorithm in which scan several times though single input image –every time with a new and unique size. Non face of area in image is detected by detector and this non face area is to be discard as non-face area. Hybrid Viola Jones take advantage of cascading through discard the non-face area. When we applied sub window to cascading stages, each and every stage give concludes whether the window is a non-face or face object. Then this window faces are passed to another stage and rest are discarded. Now we can say in the final stage of algorithm we considered having high percentage of face feature.

III. About Viola Jones Detection Technique

Viola-Jones human face feature detection technique [3] is depend on analyzing the face image as input data .Hybrid Viola Jones refined a scale human face feature invariable detector which is basically working on multiple times on single input image. On other hand Scale invariable the detector need number calculation of size for input image.

Hybrid viola.jones architecture based on cascade detector. Cascade Detector is a simple and easy detectors which is use to remove only those windows from input image which do not have face.Because of this the complexity of detectors are highly increased analysis of human face feature in detail form as explain in figure 2.

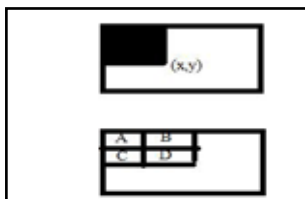


Fig. 2: Cascade Detector.

Basically in fig.2 it shows the conversion of input image data into equal cascade images. By doing so, sum of pixels inside the given rectangle can be calculated using only four values.

IV. Workflow of Our Research

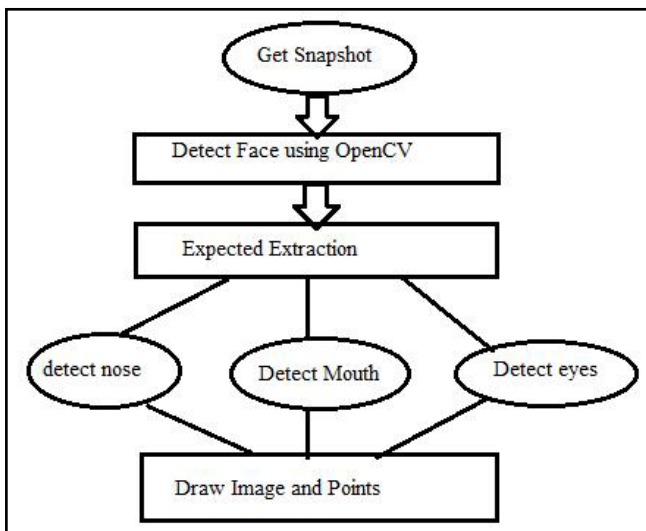


Fig. 3 : Workflow of entire detction process

According to Figure 1 we take input image from the front cam of device and then make segments of image according to skin colour. Now when we have no of segments of our input image then processing of image is done and at final step features is extracted from the image.

In the Fig 3. Describe the whole process of implementing hybrid viola jones face feature detection technique. According to this flowchart firstly we have to take a snapshot or input image then applying algorithm for detecting face. When we have image of face from the complete image then viola jones algorithm is to be implemented for extraction. Now detected point's shows in output images.

Paper Title

V. Hybrid Design Of Feature Detection

The hybrid viola jones design for Feature Detection consists of three Steps. In the first step face is detected from the given image. this is done by extracting human skin colour pixels from the given input image data. If they are extracted then hybrid Viola Jones is applied to detect human face from the given image. And as a result this Exaggerate efficiency of hybrid Viola Jones feature techniques and decreases consumed image detection time. Workflow is explain by fig 4. In which each and every step of this algorithm is describe.

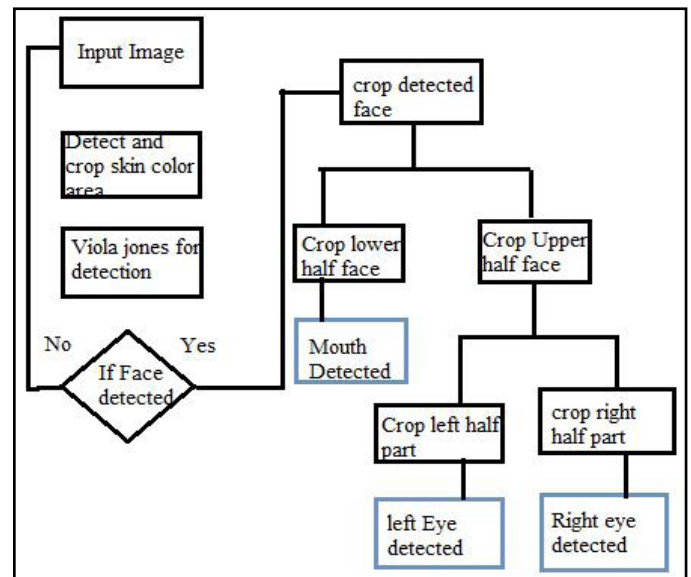


Fig. 4: Hybrid Viola jones for face feature detection flowchart

In this fig 4 description of hybrid design working. In the second step extracted face image divided into 2 parts: one is lower half face and second is upper half face as shown in the figure. Now finally at the last step upper half face is further divide into two parts left half or right half and now we get our detected parts and shown by points.



Fig. 5 : Process of hybrid design

In fig 5 it shows how input face image is cropped into lower half and upper left half and upper right half . this is the process or work flow of our research over face feature detection technique.

VI. Experimental Result

BASIC DESCRIPTION COLOUR IN THE IMAGE IS SPECIFIED BY THREE TERMS-

HUE – It is the actual colour seen by eye. Red, green, blue, yellow etc. represent different hues in the spectrum of colours.hue is the result of the effect produced on the eye by the wavelength of that colours.

LUMINANCE – It is the total amount of light intensity or light energy received by eye. It is known that certain colours appear brighter than others. This is because of brightness.

SATURATION-It indicates the purity of the colour.it represents the amount of other colours present in it.different colours have different wavelengths. Thus a colour has a frequency and an amplitude. Saturation is skin to signal to noise ratio.

RGB COLOUR MODEL-

It is an additive colour model in which green, red and blue light are added together in various ways to reproduce a broad arrays of colours. The name of model comes from the initials of the three additive primary colours, red green and blue

The main purpose of RGB color model is for sensing, representation and display of images in electronic systems.earlier the RGB colour model already had a solid theory behind it, based in human perception of colours.

RGB is device dependent color model. Different devices detect or reproduce a given RGB value differently, since the color elements and their response to the individual R, G, B colours.

Output Images:



Figure 6: Detecting face

In Fig 6 the face is extracted from the entire image.

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Fig. 7: Points of feature detection shown.

In the fig 7 points of dark colour or vibrant colour from the RGB model is detected and as a result we get face feature detection.

Number of images tested: 3

Success: 90%

The following Table shows the results of the first 12 images. And these first 12 images include lower half of face and upper left, right of face

Table : Table of Result

Image no	Name	Eyes	Nose	Mouth
1	c1m.jpg	•	•	•
2	c2m.jpg	•	•	•
3	c37m.jpg	•	•	•
4	c4m.jpg	•	•	•
5	c5m.jpg	•	•	•
6	c6m.jpg	•	•	•
7	c7m.jpg	•	•	•
8	c8m.jpg		•	•
9	c9m.jpg	•	•	•
10	c10m.jpg	•	•	•
11	c11m.jpg	•	•	•
12	c12m.jpg			

VII. Conclusion

This paper we discussed the face features can be detected using OpenCV library. Basically we detect few features of the face like mouth, nose and eyes. The remaining range of extraction is being judged. Future work make system less Hue/saturation dependent on camera quality. Because of that it leads to wrong detection. It

is also dependent on environment too, which is uncontrollable by us False detection is possible even when no face is present.

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