Real Time Face Detection and Recognition: Overview and Suggested Approach

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Abstract

This paper presents the detailed analysis of the existing state-of-the-art real time face detection and recognition approaches and a possible solution to the identified problems. The analysis covers the face detection, pattern recognition and measurement of facial part. The analysis of the Viola-Jones is followed by a possible model approach. This approach is based on a combination of techniques and algorithms working on Viola–Jones object detection platform.

Keywords: Viola Jones face detection algorithm, Feature

INTRODUCTION

Amongst the various existing methods of face detection and recognition, Viola Jones face detection algorithm and camshaft has been proved to have eminent characteristics.

Viola Jones face detection algorithm:

Viola Jones algorithm works on four different features as shown in Figure 1. The features are obtained by subtracting white areas from the black areas. The area hereby means the précis of all the pixels' gray scale value within the concerned rectangle.
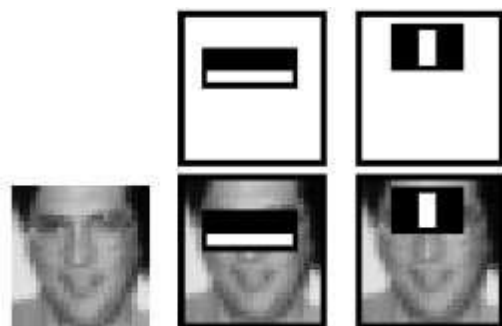

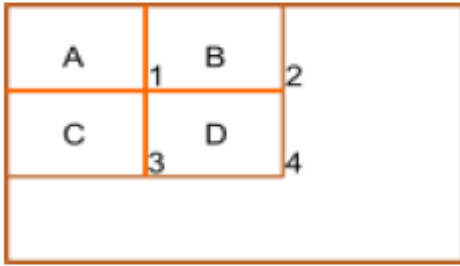*Figure 1: Four Basic Features of Viola Jones Algorithm*

Figure 2: The calculation of pixel sum within a rectangle

Figure 3: Integral pixels in linage for calculating the summation of rectangle D

Haar-Like feature is made up by 2-3 rectangular blocks, by integral image we can quickly calculate the sum of gray value in rectangle, thereby obtaining Haar-Like feature values. Similarly, new Haar-Like feature can be seen made up by the three rectangular blocks, so integral image can also be used to calculate feature value. As shown in Figure 3, let four vertices of the rectangle D in Integral image are (xo' Yo)' (Xl' Yl)' (X2' Y2)' (X3' Y3)' the sum of all pixels in the rectangular region D can be expressed as:

$$Sum_D = II(x_3, y_3) - II(x_2, y_2) - II(x_1, y_1) + II(x_0, y_0)$$

among them, (x, y) represents the value of pixel (x, y) in integral image, That is the sum of all the pixel at the top left of the pixel gray.
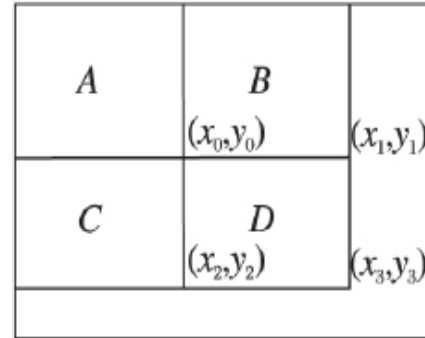
The method of calculate Haar-Like feature can be expressed as:

$$\lambda = \sum_{i \in \{1,\dots,N\}} \omega_i \times Sum(R_i)$$

among them, N represents the number of OJ rectangles, i represents the weight of the rectangle, Sum(J?,) represents the sum of the gray values of all pixels within the ith rectangle.

SUGGESTED APPROACH

This approach is based on a combination of techniques and algorithms working on Viola–Jones object detection platform.
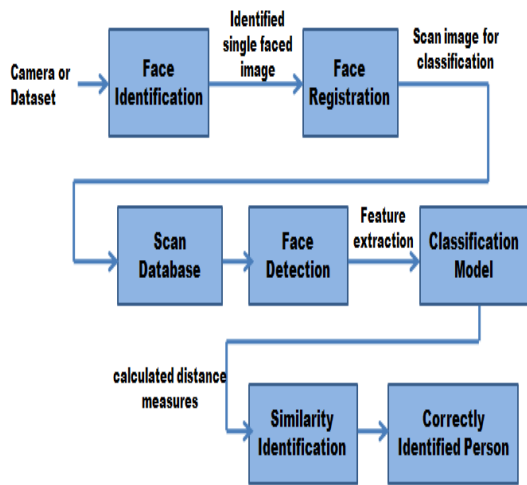
Figure 4: Block Schematic Approach for Face Detection

The AT&T Dataset or Camera is used as input for this approach. The Face Identification block is used to first detect the face of specified user by ignoring the background details, then the identified single faced image is input for Face Registration block where the image is first register to database and then it is ready for scan the database image.

The scanned image is now used for feature extraction where various classification model is used to differentiate between the images using calculated distance measures. Now the Similarities Identification is used to identify the same similar image from database to show correctly identified person.

AIMS TO BE ACHIEVED

- To develop Algorithm for Feature Extraction using various different Classification Model.

- To develop a model for finding similarities real time and database facial images.

- To create system objects which detects objects using Viola Jones Algorithm.

- Classification of local binary patterns (LBP) to encode facial features

- Identifying pair wise distance between pair of objects to calculate cluster points.

OBJECTIVES TO BE ACHIEVED

- Developed a function for calculating similarities between pair wise and ehd Histograms distance.

- Filtering images by technique like horizontal mask, vertical mask, diagonal mask, anti-diagonal mask

- Developing a program to build fully automated accurate human facial recognition and classification system from images or dataset with complex backgrounds.

- The best performance was achieved when the person stays at

150cm from the system camera. The accuracy rate achieved is 90.59%. At the time the person facing directly towards the camera, the best performance is achieved.

CONCLUSION

This paper presented the analysis of the existing Viola–Jones object detection framework which is used for face detection, pattern recognition and measurement of facial part. The study is then followed by a possible model based on a mixture of techniques and algorithms which works on Viola–Jones object detection framework algorithm.

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