Survey on Face Recognition using Biometrics

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Abstract - *Face Recognition is the most talked topic in recent years in biometrics research. Many public places now a days have surveillance cameras for video capture and therefore have an important purpose in security. It is widely known that face recognition has played an important role in surveillance system. As human face is a complex object having high degree of variability in its appearance, which makes face recognition hard problem in computer vision. The goal of this paper is to provide solution to image-based detection and recognition with high accuracy.*

Key Word: Opencv, Haar Cascade, Face Recognition, Cascade Classifier, Integral Images.

1. INTRODUCTION

Within just a couple of decades, biometric identification has gone from being some staple of extremely advanced security system in movies to existing all around the world and even within the palms of our hands. The technology has been enforced in many ways in which in our society, phones use biometric identification to grant access and a few governments like china and also the United States of America are mistreatment biometric identification on databases like driver's license for style of reason. Then we've got fun things like snapchat filters that utilizes facial detection. There's an enormous distinction between biometric identification and face detection. With face detection, the pc will observe the face and with face recognition the pc will establish someone's face.

When we think about face, we tend to in all probability think about pretty basic set of options. A face has eyes, nose and a mouth. However clearly there's additional to face than simply these options.

We notice that they dissent during a ton of things just like the dimension of the nose, the gap between the eyes, the form and size of the mouth so on. We tend to propose a face detection and recognition system mistreatment python at the side of opencv package. This method holds 3 modules that are detection, coaching and recognition. Haar cascade is use to observe and acknowledge the faces. It's a machine learning primarily based approach wherever a cascade operate is trained from heaps of positive and negative pictures. It's then wont to observe objects in alternative pictures.

2. METHADOLOGY

The algorithm has four stages:

2.1 Haar Feature Selection

2.2 Creating Integral Images

2.3 Adaboost Training

2.4 Cascading Classifiers

2.1 Haar Feature Selection

Haar Cascade could be a machine learning object detection algorithmic used to identify objects in a picture or video. It is mostly a machine learning based approach where a cascade function is trained from a lot of positive and negative images. It is then used to detect objects in a picture or video.

Here we tend to work with face detection. Initially the algorithm needs a lot of positive image such as images with faces and negative images like images without faces. To train the classifier the features are extracted from it. For this haar features from below are used. Each feature could be a single price obtained by subtracting total of pixels underneath white rectangle from total of pixels underneath black rectangle.
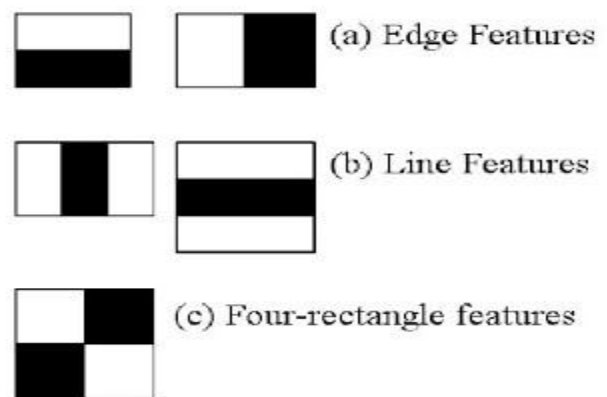

Fig 1.1: Haar Features

2.2 Integral Images

An integral image allows you to calculate summations over image subregions. Rapidly. These summations are useful in many applications, like calculating HAAR wavelets. This square measure employed in face recognition and alternative similar algorithms. Suppose a picture is w pixels wide and h pixels high. Then the integral of this will be w+1 pixel wide and h+1 pixel high. The primary row and column of the integral image square measure all zeros. All other pixels have a value equal to the sum of all pixels before it.
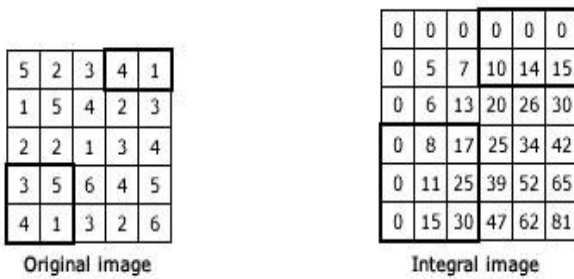
Fig 1.2: Integral Image

2.3 Adaboost Training

Initially a simple classifier has been fitted on the data also called a decision stump which splits the data into just two regions and whatever the class is correctly classified will be given less weight in the iteration that is iteration two and higher weightage for misclassified classes. And again, another decision stamp or weak classifier will be fitted on the data and will change the weights again for the next iteration that is iteration three. Weights are automatically calculated for each iteration based on error rate to come up with a strong classifier which predicts the classes with surprising accuracy.

Fig 1.3: Training Set

2.4 Cascading Classifiers:

The cascade classifier consists of a number of stages, where each stage is a group of weak learners. These weak learners are simple classifiers called decision stumps. Each stage is trained using a method called boosting. Boosting provides the ability to train a highly accurate classifier by taking the weighted average of decisions made by the weak learners.

A concept called Adaboost which both selects the best features and trains the classifiers is used. This algorithm constructs a strong classifier using a linear combination le weak class

Finally, in the recognition module the principal components of the face from the new video are extracted. Then those features get compared with the list of elements stored during training and the ones with the best match is found and name of the person recognized is displayed. This monitoring system fulfils the basic needs of face detection and recognition system, also takes the cost into consideration to ensure the pervasive mode as economical as possible. Furthermore, it can also be combined with real-time analysis algorithms.

3. CONCLUSION

In this paper we developed a face recognition system using opencv. It is used to detect and identify human faces. With the help of images datasets which are defined and trained before recognition. Haar cascade algorithm is used for detection. In future these technologies can be use for number for purposes. The technology can be improved by increasing the input images to get more accuracy. Adding color processing, edge detection helps to increase the accuracy. Data is most important in these processes the more images are used the more accuracy we get. There are several techniques which can be used to obtain more training images. Such as generating new images from existing ones. Mirror images can be taken to double the training images. Resizing and rotation also helps, and you could also add noise to have more training images that improves the tolerance to noises.

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