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Face Recognition in Real Time Video using Haar Cascade Classifier

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Abstract In the area of Image processing and pattern recognition Face recognition always considered as a challenging task. This paper presents Face recognition approach with the intention to implement actual time recognition of face within high resolution video via Haar feature-based cascade classifiers, which is an essential security application and also used for the purpose of attendance systems instead of fingerprints usage. The methodology works in the close real- time mode to a great degree low false cautions rate. Implementation is done with the help of Opencv library, test results on pictures of people under different obstacles and illuminations and some level of presentations and turns, in both training set and test set show that the proposed estimation is intense and achieves best in class execution. Besides, it is successful because of its simplicity and ease of execution.

Keyword-Face Recognition; Computer vision; OpencCV; Haar cascade classifier; Object Recognition

I. INTRODUCTION

In computer vision research Face identification from an image has been playing an essential task in the dynamic research zone starting from Principal Component Analysis & Eigen Faces for various applications such as observation, Biometric and Human Computer Interaction. The "Rapid Object Detection using a Boosted Cascade of Simple Features" in 2001 proposed by Paul Viola and Michael Jones [9] is a potent object recognition technique. This is based on machine learning based methodology in which a consecutive sequence work is prepared via a considerable measure of good and bad images. Thereafter this is considered to distinguish objects in different pictures. Haar – Like highlights generally utilized for recognizing and finding human face in pictures paying little heed to estimate, position and condition including shading, surface and movement under new circumstances & in consideration of the framework's are thought to be cornered by face recognition. A general framework for face recognition system is given below:

Fig. 1. Face Recognition System

This paper intended to execute the Haar-Classifier for Face identification and following based on the Haar- Features utilize basically in a human machine interface and activity translation. Haar-like highlights can be processed at any scale or area in consistent time utilizing the integral image representation for pictures. The issue in investigation the posture is parallel order, which needs to be arranged in each picture and isolate information having a place with the range of intrigue example to identify faces. The majority of scientists are focused on two primary parts of issues: Haar like highlight and Classifier. Haar Like key points are utilized to choose cluster of keypoints via enhancing the execution of a classifier in light of the prepared group of information relating to them. Haar Classifier adjusts the existing order calculations to the discovery and acknowledgment issues.

The organization of the mentioned research is as: II Section highlights the literature survey on various applications, in the following section II of this review, we examine haar classifier Algorithm to discuss its relative strength and potential pitfalls and finally, conclusions are summarized in Section IV.

II. LITERATURE SURVEY

Face identification in real time video assumes an indispensable job in a significant number of the application situations like in biometrics, frequently used as a piece of a facial assent schema. It is additionally utilized in video observation, human PC articulation and picture databases. Many of the current latest cameras employ face recognition to self-adjust. Face location is likewise helpful for choosing locals of interest for photograph slideshows that basically a utilization of container and-scale Ken Burns impact. Face recognition is picking up the enthusiasm among advertisers. According to recent literature survey different types of methodologies are available for performing detection & recognition of face with every one of its own shortcoming and qualities identified with utilization of tissue tones, some utilize shapes, and other are considerably more unpredictable which includes layouts, neural systems, or channels & few of these calculation are computationally costly in an image. The various algorithms utilized in this context are: Sparse

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Representation (SR) Based methods, LDA (Linear Discriminate Analysis), SVM (Support Vector Machines), PCA (Principal Component Analysis), LBP(Local Binary Pattern) and ICA(Independent Component Analysis) [4]. Face recognition techniques utilizing Haar-like Features was portrayed by Viola and Jones [1] and now it has variants which have a scope in numerous applications. One of these altered algorithm [2] was executed in OpenCV library [3]. The OpenCV execution gathered with OpenMP choice gives just 4.5 frames for each second on 4-center CPU. As an answer for this issue a parallel change of OpenCV calculation for GPU has been created. Some of parallel variants for face detection calculation utilizing Haar-like highlights [5, 6, 7]. In the Literature we could discover that the technique presented by Hefenbrock [3] was the first acknowledgment of a face recognition calculation utilizing GPU. The following parallel execution is can be seen in Obukhov's technique [7]. This is a solitary acknowledgment which utilize GPU and can perform via OpenCV classifiers without adjustment this is the reason why at present day, OpenCV library incorporate it. A primary issue of the technique is surface memory usage for classifier storage that putting it away on the grounds because surface memory isn't as powerful for general task as reserved worldwide memory on current GPU.

III. HAAR CLASSIFIER FACE DETECTION

Algorithm

A. Integral Image

The fundamental picture can be characterized as a aggregation of pixel points of an initial picture. The incentive at either position(X, Y) of a fundamental picture which can be a summation of the picture's picture elements upon & on one side of position (X, Y). Fig. 2 represents the Creation of an integral picture.

The basic rectangular outlines the image are figured out by utilizing a middle portrayal of an image known as the integral picture [1]. The fundamental picture is considered as an array consists of wholes of the pixels' magnitude values found especially to one side of a pixel and precisely upon the pixel over the area (X, Y) all-inclusive. Therefore, if A(X, Y) as initial image & A(X, Y) as integral image then the initial image is computed that is showed in Figure 2.

The highlights rely by forty five degrees similar to the line outline shown in Figure 2, require another halfway portrayal called the turned indispensable picture or turned total assistant image [1]. The pivoted fundamental picture is figured by finding the aggregate of the pixels' force esteems which are positioned at a 45 degree to one side point and underneath for y Pivoted fundamental picture at that point the essential picture is figured as appeared in condition 2 a delineated in Figure 2.

It just takes two goes to register both vital picture clusters, one for each exhibit. Utilizing the fitting indispensable picture and taking the distinction between six to eight exhibit components shaping a few associated square shapes, a component of any scale can be figured. Along these lines computing a component is to a great degree quick and effective. It additionally implies computing highlights of different sizes requires indistinguishable exertion from a component of just two or on the other hand three pixels. The identification of different sizes of the same protest requires a similar measure of exertion and time.

B. Haar Cascade Features

Haar highlights are made out of either a few square shapes. Face applicants are checked and looked for Haar highlights of the current stage. Each Haar feature include has an esteem that is figured by taking the region of each square shape, duplicating each by their separate weights, and after that summing the outcomes. The region of every square shape is effortlessly discovered utilizing the Integral picture as shown in fig.2. The coordinates of any edge of a square shape can be used to get the entirety of the considerable number of pixels upon & to left of that area utilizing an integral picture.

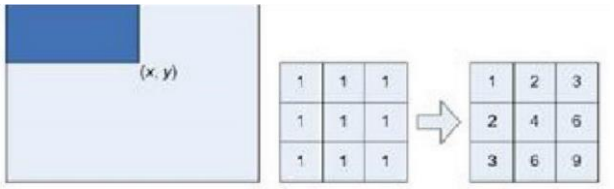

Fig. 2: Creation of Integral Image [3]

A Haar include classifier utilizes the square shape necessary to compute the estimation of feature. The Haar classifier duplicates the heaviness of every square shape by its region and the outcomes are included. A few Haar include classifiers create a phase.

In an image, non-face area is the greater part of the picture. Therefore this can be a major plan to have a incomplex way to determine if a identified region can be face area or not. Face rather on center on regions where there it can be . Along these lines, invest more energy for checking possible face areas. For this, the given algorithm represented the idea of Cascading of Classifiers.

IV. EXPERIMENTAL RESULTS & ANALYSIS

This paper shown the implementation of Haar Cascade algorithm in python & it is verified and constraints of given technique are watched through testing and investigating our codes on different data sets of images for real time face detection.

The developed system have the ability for capturing a live or real time video stream which can detect any faces in the captured frame and detect these picture's using a face recognition technique. Using Opencv library with python the mentioned methodology is evaluated and find that it is more reasonable for continuous face recognition as it need less usage of CPU asset and also it requires shorter time. The results of Face recognition using Haar Cascade Classifier are shown in given images illustrates that this classifier is good in terms of unwavering quality & speed. Different Datasets have been employed for given examinations. Within Face dataset various

conditions are considered such as accumulation with plain & colored ground, light variety, no head scale and yet having negligible updations as head turned, tilted, inclined, position's of face and powerful change in expression. Indeed, even the picture is influenced by change in brightness, face identification results are more precise utilizing haar cascade classifier. There is no confinement on wearing glasses.

The given below frames are extracted from real time video so as to evaluate the performance of Haar Cascade classifier in different scenarios. Sometimes the considered algorithm can't be able to extract features from the frame due to obstacles come infornt of face which hides the crucial features of the face such as shown in Figure 1. If we train the Classifier using Caption Labeling on taken dataset it is able to recognize while we capture the image as shown in Figure 3.

Multiple Face Detection is also possible using the considered technique.

Fig. 3: Extraction of Key points is not Possible (Face not Recognized)

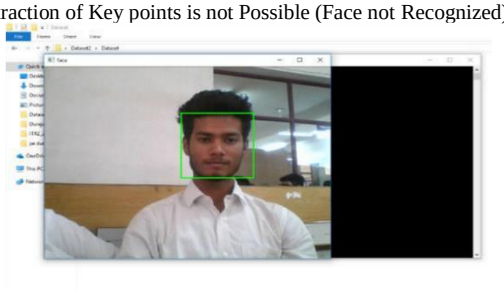

Fig. 4. Real Time Face Detection in simple image

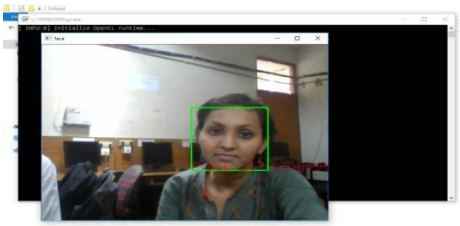

Fig. 5. TEST Results: Caption Labeling is shown While Recognizing the Face

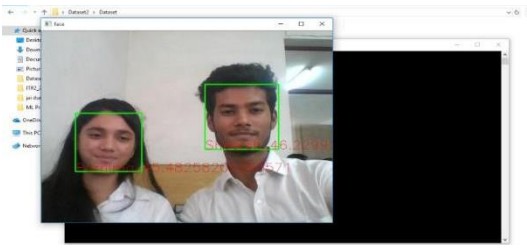

Fig. 6. Multiple Face Detection using HAAR Cascade Classifier

V. CONCLUSIONS

This paper shows HAAR Cascade Classifier methodology for face recognition which guarantees high recognition precision while lessening computational time. The created framework tried on various datasets which speaks to a wide assortment of genuine time circumstances. The considered dataset incorporates faces under an extremely extensive variety of conditions including: brightening, scale, posture, and camera variety in real time face detection. As there are various types of methodologies are available for performing FACE DETECTION. But, decision of a particular Face recognition technique in any investigation ought to be based on the specific requests of the application. None of the present techniques is the general best for all applications. Haar-like Features are computerized picture highlights utilized in context of Object Recognition. HAAR Cascade Classifier owe their name to their innate closeness with Haar wavelets also, were used in early days as real time face detector. Using Opencv library with python the mentioned methodology is evaluated and find that it is more reasonable for continuous face recognition since they requires less CPU asset and costs shorter time. The results of Face recognition using Haar Cascade Classifier illustrates that this classifier is good in terms of unwavering quality & speed. Besides the evolution, a face detection in real time is useful for various framework that are capable for commercial and industrial applications.

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