

Human face detection algorithm via hybrid Haar cascade classifier Review

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Abstract: face detection has been a challenging issue within the areas of image processing and pattern recognition. a brand new external body part detection algorithm by employing a Haar-cascade classifier is proposed during this paper. First, images of individuals are processed by a primitive Haar cascade classifier, nearly without wrong face rejection (very low rate of falsenegative) but with some wrong acceptance (false positive). Secondly, to urge eliminate these wrongly accepted non-human faces, a weak classifier supported face skin hue histogram matching is applied and a majority of non-human faces are removed. Next, another weak classifier supported eyes detection is appended and a few residual non-human faces are determined and rejected. Finally, a mouth detection operation is used on the remaining non-human faces, and also the false positive rate is further decreased. With the assistance of OpenCV, test results on images of individuals under different oclusions and illuminations and a few degrees of orientations and rotations, in both training set and test set show that the proposed algorithm is effective and achieves state-of-the-art performance. Furthermore, it's efficient due to its easiness and ease of implementation. The accuracy and F1 score are found to be 98% and 0.9798 respectively.

IndexTerms - Haar Cascade algorithm, face detection, face recognition, gray conversion

I. INTRODUCTION

Face acknowledgment may be a standout amongst the foremost difficult and dynamic research themes within the IT industry for recent years. The goal of face recognition is to tell apart a person irrespective of whether the face is blocked. A face acknowledgment framework must perceive a face autonomously and vigorously notwithstanding when there are picture varieties, for instance, enlightenment, present, impediment, appearance, so forth. A face is claimed to be impeded if some piece of the face is secured with an item sort of a sunglass, a hand, a veil. This application is utilized by the doorway control frameworks, law authorization offices, observation at various open spots like ATMs, air terminals, and so on. The overall objective of this undertaking is identifying a face irrespective of whether there's an impediment present or not and to advance the execution of PCA for the recreation of blocked districts of facial pictures. Face acknowledgment may be a standout amongst the foremost vital issues for checking or recognizing a face from an inquiry picture or information picture. This framework has risen as a vital field within the event of reconnaissance frameworks. Face identification is a very amazing asset for video reconnaissance, human PC interface, face acknowledgment, and film database the board. Impediment implies unessential articles that ruin face acknowledgment, e.g., face secured with a shawl, wearing glasses, whiskers, top, and so forth. Is it one of the most effective difficulties in face acknowledgment frameworks? Different issues are light, present, articulations, and then forth. The impediment may be a serious issue while recognizing a face, to beat that the impediment location would be performed during this venture. The face is one of the foremost important parts of the physical body and plays a good role during non-verbal communication between people. Face provides a singular identity to every individual and thus detection of the face is crucial especially for security in many institutions and organizations. Detection of face finds its usage in biometrics and also in video monitoring and surveillance, image management, and human-computer interface. The new-age digital cameras use face detection for autofocus. With the advancement in mobiles, security problems are on the increase. Therefore, face detection has gained popularity. Detection of the face is a crucial step for the detection of facial emotions. Therefore, during this paper, a technique that involves the detection of the face and its parts from enhanced human facial images employing a cascade object detector is put forth. Face detection and detection in realworld surveillance videos could be a challenging task as faces can be influenced within the video streams by variations in both the illumination and also posture. Furthermore, sometimes input images might contain some interference factors like noise, which complicates the face detection process considerably. However, face detection is a vital task especially for security monitoring purposes and it's necessary for several smart city applications. Face detection plays a significant role in personal identification, crowd analysis, biometrics, database establishment, access control, general biometric identification, and abnormal event detection. Such technologies are invaluable particularly to the personnel for tracking criminals. Since surveillance videos are employed in many applications, these cameras are installed in many public places like airports, shopping malls, streets, etc. Manual security monitoring is both unreliable and expensive and using computer science to detect, recognize and identify humans improves the efficiency and robustness substantially.

II. LITERATURE SURVEY

Face acknowledgment may be a standout amongst the foremost essential problems with checking or distinguishing a face from an inquiry picture or info picture. This framework has risen as an essential field if there should be an incident of observation frameworks. Face identification is an incredible asset for video reconnaissance, human PC interface, face acknowledgment, and film database the board. Impediment implies incidental articles that thwart face acknowledgment, e.g., face secured with a shawl, wearing glasses, whiskers, top, and then forth., is one in every of the simplest difficulties in face acknowledgment frameworks. Different issues are light, present, articulations, then forth. A proficient technique is used for the situation of impediments, which determines the missing data within the blocked face. The strategy utilized for face discovery is Viola-Jones calculation, for

impediment location and recreation of face quick weighted PCA is used are Neural Network (NN) is used for face acknowledgment. Other suitable techniques are Principal Component Analysis (PCA), Local Binary Pattern (LBP), Eigenfaces. Propose technique which is used will distinguish blocked face and perceive the face with the help of given same appearances from the database. [6]

Face acknowledgment displays the difficulty of impediment. The impediment is often invested a touch weight to debilitate its effect on acknowledgment execution. Supported this thought, many existing calculations utilized the remaking mistake or projection blunder because of the likelihood estimation for the impediment picture. These techniques require iterative calculation, which can prompt the difficulty of limited choice and time intricacy. To tackle these issues, this paper proposed a unique strategy for impediment face acknowledgment by utilizing a blunder identification technique. Initially, a face picture is partitioned into four locales and Xiaolin Chen and et al [7] extricated include and distinguish mistake for each district. Second, utilized the logarithmic change mistake administrator to establish the load estimation of each locale. The tests are hooked into the AR database exhibit that the proposed calculation for impediment face acknowledgment accomplishes high effectiveness and great vigor and beats this strategy sure enough impediment acknowledgment.

Even though there has been gigantic research in facial investigation and increasingly complex calculation, face acknowledgment flops continuously when facial pictures are blocked. Paper [8] clarified the calculation and specialized ideas driving the high exact face acknowledgment frameworks for 2D frontal pictures with impediments for business requirements. Face acknowledgment is actualized utilizing Convolutional Neural Network (CNN) for preparing the impediment pictures where the highlights are separated by utilizing Constrained Local Neural Field (CLNF). The work has done the continuing uncontrolled impediment dataset and perceived the face with the exactness of 98.5% for the FAR of 0.

Recognizing a person with an image has been promoted through broad communications. Be that because it may, it's less hearty to unique finger impression or retina examining. This report portrays the face identification and acknowledgment smaller than usual task embraced for the visual discernment and independence module at Plymouth College. It reports the innovations accessible within the Open-Computer-Vision (OpenCV) library and approaches to actualize those utilizing Python. For face discovery, HaarCascades were utilized and for face acknowledgment Eigenfaces, Fisherfaces, and native parallel example histograms were utilized. The philosophy is portrayed including stream graphs for every phase of the framework. Next, the outcomes are demonstrated including plots and screen-shots pursued by an exchange of experienced difficulties. [9]

"Inhibition of Occluded Facial Regions for Distance-Based Face Recognition", [10] centered around the plan and approval of a CBR framework for effective face acknowledgment under incomplete impediment conditions. The proposed CBR framework depends on a longtime separation-based order strategy, altered to expand its strength to the unfinished impediment. This is often accomplished by utilizing a unique disparity work that disposes of highlights originating from impeded facial districts. Investigate the reconciliation of a productive dimensionality decrease technique into the proposed structure to diminish computational expense. The proposed CBR framework beats established strategies for comparable computational prerequisites within the undertaking of face acknowledgment under fractional impediment.

Table 1 shows the brief survey of 5 literature. It may be concluded that the majority of the literature refers to, use of Haar cascade for face detection thanks to its superiority and high accuracy over another algorithm.

I. PROPOSED METHODOLOGY

Human face detection has been a challenging issue within the areas of image processing and pattern recognition. A replacement external body part detection algorithm by employing a Haar-cascade classifier is proposed during this paper.

A. Architecture

Many face detection methods supported skin, but thanks to various lighting conditions and plenty of existing interference areas, skin-based face detection sometimes cannot attain acceptable outcomes from surveillance video sequences. Additionally, some approaches use feature extraction and machine learning to detect faces. The most effective algorithm during this category is Viola and Jones's approach. During this approach, an AdaBoost Cascaded Classifier and Haar Features are used and achieve good ends up in the sphere of face detection.

The first stage of the proposed system is to convert the image into grayscale and so creating a face detection system using Haarcascades. Using face-cascades alone caused random objects to be identified and eye cascades were incorporated to get stable face detection.

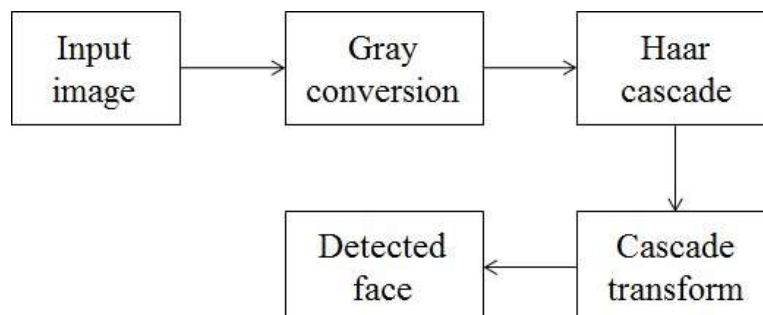


Fig 1 proposed system architecture

A Haar wavelet may be a mathematical fiction that produces square-shaped waves with a beginning and an end and is employed to form box-shaped patterns to acknowledge signals with sudden transformations. To investigate a picture using Haar cascades, a scale is chosen smaller than the target image. It's then placed on the image, and therefore the average of the values of pixels in each section is taken. If the difference between two values passes a given threshold, it's considered a match. Face detection on somebody's face is performed by matching a mixture of various Haar-like features.

IV. CONCLUSIONS

In the past few years, the applying of surveillance for security and smart cities are growing rapidly. Human detection supported surveillance videos could be a complex task and traditional clothing like headscarf makes this task even tougher. The surveillance systems designed for several countries are required to be ready to recognize the people with these traditional clothing. During this paper, a computer vision system for face detection in low-resolution surveillance videos is presented. The proposed framework uses a mix of Haar cascade and Locally Binary Patterns Histogram (LBPH) for feature extraction and faces classification. The accuracy of face detection is found to be 98% which is kind of above the prevailing system (86%). Face detection could be a heated topic within the last decade, there are many problems thereupon, and occlusion could be a major drawback during this issue. There are many places where face detection is required majorly, in security systems. Additionally, it's very difficult to acknowledge the individual when faces are occluded. Therefore, research during this field is extremely important, and now when occlusion is detected and still the person is found it even within the occluded image that's where the matter is solved.

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