

Face Recognition based Attendance Monitoring System

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ABSTRACT

With the advancement of contemporary technologies areas associated with AI and laptop vision, real time image process has become a significant technology into consideration. therefore here a strive has been created for a completely unique approach for capturing pictures from the Pi Camera in real time atmosphere and method them as we tend to square measure needed. This project portrays a machine learning approach for face recognition to accomplish this method terribly fast with high identification rates exploitation Open CV. Here in this project depicts a basic and simple equipment execution of face location framework utilizing Raspberry Pi, which itself is a mini computer of a small estimate and is of low cost. The framework is modified utilizing Python programming language. The destinations of the face recognition area unit to acknowledge appearances and its spatial space in any footage or recordings. The proposed framework distinguishes the faces present in a grayscale and colored image. This project center around us age of face detection framework for human recognizable proof in light of OpenCV library with python. Here in this project the idea of identification has been built up by composing distinguishable code for dataset generator ,trainer and indicator. Effectiveness of the framework is examined by ascertaining the Face recognition rate for every one of the databases. The destinations of the face recognition area unit to acknowledge appearances and its spatial space in any footage or recordings. At last, the data that will be shown alongside recognized photograph has been put away on database. This concept has a higher scope on security and surveillance projects and various operation.

Keywords:

Face Recognition; Face Detection; Haar- Cascade classifier; Local Binary Pattern Histogram; attendance system; Open CV;

INTRODUCTION

In today's networked world, the necessity to take care of the safety of knowledge or property is turning into each progressively necessary and progressively troublesome. From time to time we tend to hear concerning the crimes of master card fraud, laptop breaking's by hackers, or security breaches during a company or edifice.

In most of those crimes, the criminals we have a tendency to take advantage of a elementary flaw within the typical access management systems: the systems don't grant access by "who we are", but by "what we have", such as ID cards, keys, passwords, PIN numbers, or mother's maiden name.

None of these means are really define us. Recently, technology became available to allow verification of "true" individual identity. This technology is based in a field called "biometrics".

Biometric access control are automated methods of verifying or recognizing the identity of a living person on the basis of some physiological characteristics, such as fingerprints or facial features, or some aspects of the person's behavior, like his/her handwriting style or keystroke patterns. Since biometric systems establish someone by biological characteristics, they're tough to forge. Face recognition is one in every of the few biometric ways that possess the deserves of each high accuracy and low officiousness. It's the accuracy of a physiological approach while not being intrusive. For this reason, since the first 70's (Kelly, 1970), face recognition has drawn the eye of researchers in fields from security, psychology, and image process, to computer vision.

1. REVIEW OF LITERATURE:

Face recognition is one among the few biometric ways that possess the deserves of each high accuracy and low officiousness. It has the accuracy of a physiological approach without being intrusive. Over past 30 years, many researchers have proposed different face recognition techniques, motivated by the increased number of real-world applications requiring the recognition of human faces. There are many issues that build automatic face recognition an awfully troublesome task. However, the face image of an individual inputs to the information that's sometimes noninheritable underneath totally different conditions.

Face recognition technology is well advance that may apply for several business applications like personal identification, security system, image- film process, psychology, pc interaction, recreation system, smart card, law enforcement, surveillance and so on. Face recognition can be done in both a still image and video sequence which has its origin instill- image face recognition. Different approaches of face recognition for still pictures are often categorized into 3 main teams like one.

1.1 Holistic approach:

In holistic approach or world feature, the complete face region is taken into consideration as input file into face detection system. Samples of holistic strategies square measure eigenfaces (most wide used methodology for face recognition), probabilistic eigenfaces, fisher faces, support vector machines, nearest feature lines (NFL) and independent-component analysis approaches

They are all based on principal component-analysis (PCA) techniques that can be used to simplify a dataset into lower dimension while retaining the characteristics of dataset.

1.2 .Feature-based approach:

Feature-based approach: - In feature-based approaches or native feature that's the options on face like nose, so eyes square measure segmental so used as computer file for structural classifier. Pure pure mathematics, dynamic link design, and hidden mathematician model ways belong to the current class. One of the foremost triple-crown of those systems is that the Elastic Bunch Graph Matching (EBGM) system [40],[41], that is predicated on DLA.

Wavelets, particularly Gabor wavelets, play a building block role for facial illustration in these graph matching strategies. A typical native feature illustration consists of ripple coefficients for various scales and rotations supported mounted ripple bases. These regionally calculable ripple coefficients square measure sturdy to illumination amendment, translation, distortion, rotation, and scaling. The grid is suitably positioned over the image and is hold on with every grid point's regionally determined jet in figure 2(a), and serves to represent the pattern categories. Recognition of a new image takes place by transforming the image into the grid of jets, and matching all stored model graphs to the image. Conformation of the DLA is done by establishing and dynamically modifying links between vertices in the model domain

1.3 Hybrid approach:

Hybrid approach: - the concept of this methodology comes from however human vision system perceives each holistic and native feature. The key factors that influence the performance of hybrid approach embrace a way to verify that options ought to be combined and the way to mix, therefore on preserve their benefits and avert their disadvantages at the same time. These issues have shut relationship with the multiple classifier system (MCS) and ensemble learning within the field of machine learning. Sadly, even in these fields, these issues stay unresolved. In spite of this, various efforts created in these fields so give North American nation some insights into determination these issues ,and these lessons is used as tips in planning a

hybrid face recognition system. Hybrid approach that uses both holistic and local information for recognition may be an effective way to reduce the complexity of classifiers and improve their generalization capability.

2. PROPOSED SYSTEM:

A throughout survey has discovered that numerous ways and combination of those ways will be applied in development of a replacement face recognition system. Among the many possible approaches, we have decided to use a combination of knowledge-based methods for face detection part and neural network approach for face recognition part. The main reason during this choice is their swish relevancy and dependableness problems. Our face recognition system approach is given in Figure.

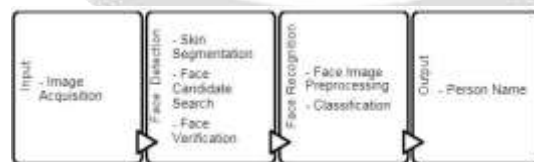


Figure 1: Face Recognition Approach

2.1 Input Part:

Input half is requirement for face recognition system. Image acquisition operation is performed during this half. Live captured pictures square measure regenerate to digital information for playing image-processing computations. These captured pictures square measure sent to face detection formula.

2.2 Face Detection Part:

Face detection performance locating and extracting face image operations for face recognition system. Face detection part algorithm is given in Figure given below. Our experiments reveal that skin segmentation, as a first step for face detection, reduces computational time for searching whole image. While segmentation is applied, only segmented region is searched whether the segment includes any face or not.

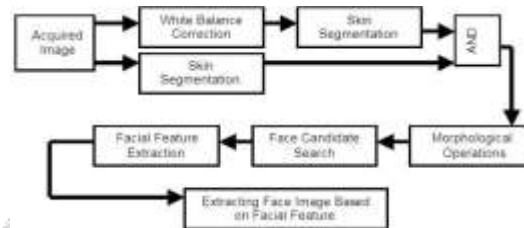


Figure2: Algorithm of Face

For this reason, skin segmentation is applied as a first step of detection part. RGB color space is used to describe skin like color [4]. White balance of images differs due to change in lighting conditions of the environment while acquiring image. This situation creates non-skin objects that belong to skin objects.

After “and operation” is applied on segmented images, some morphological operations are applied on final skin image to search face candidate. Noisy like small regions elimination, closing operations are performed. Then, face candidates are chosen with two conditions which are ratio of bounding box of candidate and covering some gaps inside the candidate region. Ratio of bounding box should lie between 0.3 and 1.5. Based on these conditions, face candidates are extracted from input image with modified bounding box from original bounding box. The height of bounding box modified as 1.28 times bigger than width of bounding box because chest and neck parts will be eliminated if candidate includes them. This modification value has been determined experimentally. These face candidates will be sent to facial feature extraction part to validate the candidates. Final verification of candidate and face image extraction, facial feature extraction process is applied. Facial feature is one of the most significant features of face. Facial features are eyebrows, eyes, mouth, nose, nose tip, cheek, etc. The property is used to extract the eyes and mouth which, two eyes and mouth generate isosceles triangle, and distance between eye to eye and mid-point of eyes distance to mouth is equal [2]. Laplacian of Gaussian (LoG) filter and some other filtering operations are performed to extract facial feature of face candidate.

3. METHODOLOGY FOR IMPLEMENTATION:

A similar separation of pattern recognition algorithms into four groups is proposed by Jain and colleagues. We can group face recognition methods into three main groups. The following approaches are proposed.

Template matching: - Patterns are represented by samples, models, pixels, curves, textures. The recognition function is usually a correlation or distance measure.

Statistical approach: - Patterns are represented as features. The recognition function is a discriminate function.

Neural networks. The representation may vary. There is a network function in some point.

Note that many algorithms, mostly current complex algorithms, may fall into more than one of these categories. The most relevant face recognition algorithms will be discussed later under this classification.

4. RESULT AND DISCUSSION:

The users can interact with the system using a GUI. Here users will be mainly provided with three different options such as, student registration, faculty registration, and mark attendance. The students are supposed to enter all the required details in the student registration form. After clicking on register button, the web cam starts automatically and window as shown in Fig.4. Pops up and starts detecting the faces in the frame. Then it automatically starts clicking photos until 60 samples are collected or CTRL+Q is pressed. These images then will be pre-processed and stored in training images folder. The faculties are supposed to register with the respective course codes along with their id in the faculty registration form provided.



Figure 3: Sample images taken by our Detector Program (inputs)

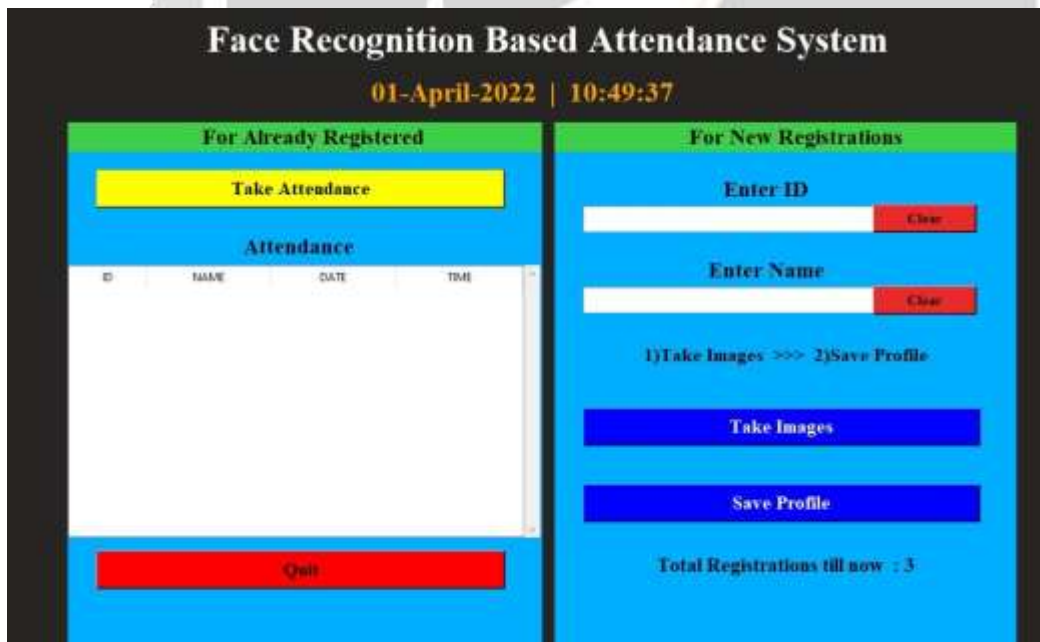


Figure 4: Output of Registration

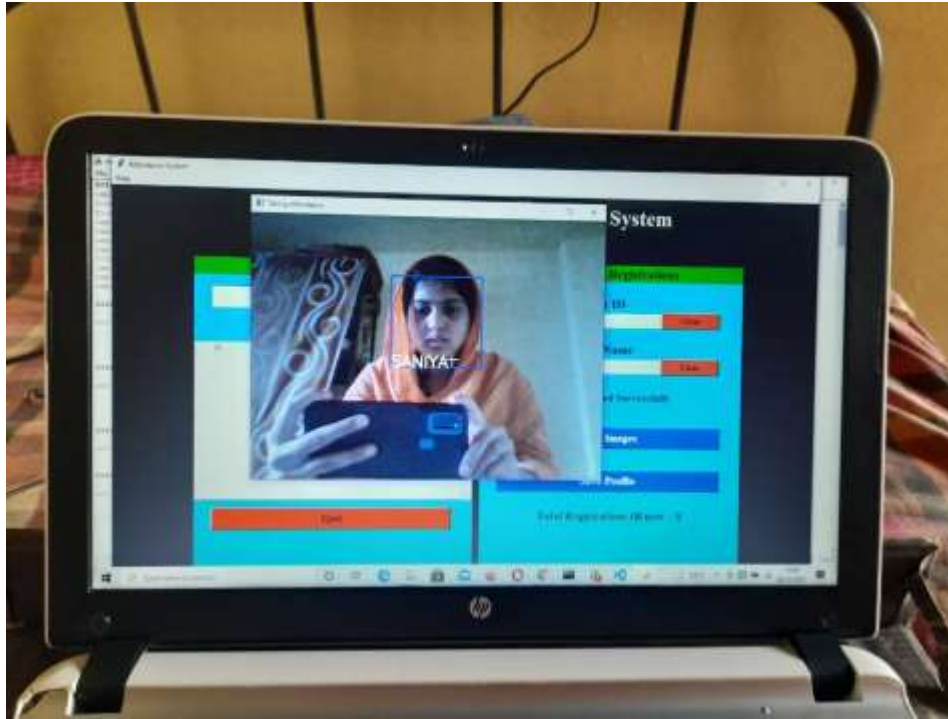


Figure 5: Take Attendance (if already registration)

5. CONCLUSION

. Face recognition systems are part of facial image processing applications and their significance as a research area are increasing recently. Implementations of system are crime prevention, video surveillance, person verification, and similar security activities. The face recognition system implementation will be part of humanoid robot project at Atılım University.

The goal is reached by face detection and recognition methods. Knowledge-Based face detection methods are used to find, locate and extract faces in acquired images. Implemented method are skin color and facial features. Neural network is used for face recognition. RGB color space is used to specify skin color values, and segmentation decreases searching time of face images. Facial components on face candidates are appeared with implementation of LoG filter. LoG filter shows good performance on extracting facial components under different illumination conditions.

FFNN is performed to classify to solve pattern recognition problem since face recognition is a kind of pattern recognition. Classification result is accurate. Classification is also flexible and correct when extracted face image is small oriented, closed eye, and small smiled. Proposed algorithm is capable of detect multiple faces, and performance of system has acceptable good results.

6. REFERENCES

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