

Real Time Face Recognition

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Abstract: Facial recognition is very popular Due to its wide range of uses, e.g. Entertainment, IC cards, information security, law coercion and surveillance. This is a related topic pattern recognition, computer vision, and image processing. Two main methods used for feature extraction Can be classified into appearance-based and model-based methods. Appearance-based methods use global methods Expressions for identifying faces. Model-based surface method The goal is to create a model of the human face that captures facial features. variation. Image similarity is the distance between images. Vector of two images. This document contains four sections. The first section describes facial recognition applications. example. The second section describes common features. Face recognition method

Keywords: Facial recognition

I. INTRODUCTION

Facial recognition is one of the most important applications of Biometric-based authentication systems developed in the past few decades. Facial recognition is a type of recognition task pattern. Faces are classified as known or unknown Compare with celebrity photos stored in databases. Facial recognition is difficult when considering reliability Fluctuations in information due to random fluctuations of different people, including systematic variations of different people Elements such as lighting conditions and pose.

The human face is a very complex and dynamic structure with clear and quick execution characteristics Changes in time. Facial recognition covers a variety of activities From various aspects of human life. Humans can recognize faces, but it can be difficult to remember when there are too many faces. Machine learning is currently being refined to accomplish this task. Scientists are trying to understand human anatomy when building or developing facial recognition systems.

Machine facial recognition research advances It is independent of research on human facial recognition. Meanwhile Typical pattern classification methods used in the 1970s measurements between facial features or facial contours are used. In the 1980s, research in facial recognition was largely stable. Since the early 1990s, the focus of research has been on mechanical surfaces. Awareness has increased significantly [5]. significant growth Depends on real-time hardware availability As the need for monitoring applications increases, commercial private research projects and Research on natural network classifiers with emphasis on real-time performance calculations and adjustments. Facial recognition system malfunctions Based on two classifications: verification and identification

In this work, human face recognition and detection software was prepared in initial deployment. This project is service oriented. However, the analysis and design are done to promote work such as product-based.

The project is called Facial Recognition and Recognition System.

Face recognition is a software application for managing human faces. It has the necessary provisions to collect images of the user to be able to detect the eyes, nose, mouth and entire face of the man in the image. There are many benefits to developing software that uses facial recognition and recognition in this field accuracy. Face recognition is an easy and simple task for humans, but not for computers. It is considered the most complex and challenging problem in the field of computer vision due to its large size Intra-class variations are caused by changes in appearance, lighting, and facial expressions

Face detection is the process of recognizing one or more human faces in an image or video. It plays an important role in multiple biometric, security and surveillance systems, as well as image and video indexing systems. Face recognition

can be considered a special case of object class recognition in object class recognition. The task is to find the position and size of all objects belonging to a certain class in an image.

The project titled "Real Time Face Recognition" aims to manage the entire front-end to back-end. A system that searches or recognizes specific areas of the human face. This software will help those who are looking for a more advanced image processing system. This software allows you to easily find and recognize faces. After saving, the face can be imaged and recognized. Facial recognition algorithms focus on recognition Human front face. This is similar to image recognition, where images of people are gradually matched a bit. The image matches the image store in the database. All facial feature changes in the database will be made to disable matching processing.

A reliable face recognition approach based on genetic algorithms and eigenface techniques. First, the possible regions of the human eye are recognized by testing all valley regions within the grey scale photograph. A genetic algorithm is then used to generate all possible facial regions containing that region.

Each possible face candidate is normalised to reduce flash effects due to bumps, enlightenment; and curling effects due to head movements. Fitness score for each candidate is measured based on its projection onto the eigenplane. After a series of iterations, all candidates are forced to choose those with high fitness values are selected for further review. Facial symmetry is measured at this stage. The presence of different facial features is then checked for each face candidate. There is growing interest in facial recognition among marketers. A webcam can be integrated into your TV, recognizing every face you pass. The system then calculates the face's race, gender, and age group

II. PROPOSED METHODOLOGY

The interest and focus on the methodology of the human face recognition system can help researchers to understand the basic system. Human face recognition system utilises some data obtained from a few or all of the senses, such as visual, auditory, and tactile. Each of these data are used either individually or together to memorise and store faces. In many cases, conditions around the person are also important in a human face recognition system. Handling sizable data and combining them are difficult for a machine recognition system.

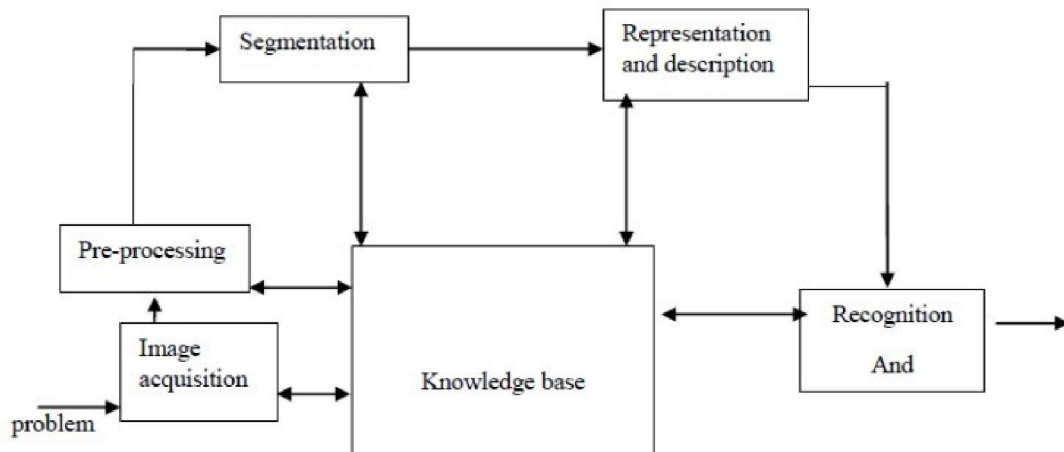
However, memorising many faces is also difficult. Key advantage of a machine system is the memory capacity. Human features that may be used for face recognition are continuously being studied, and arguably. Both local and global features are needed for face recognition.

Libraries used:

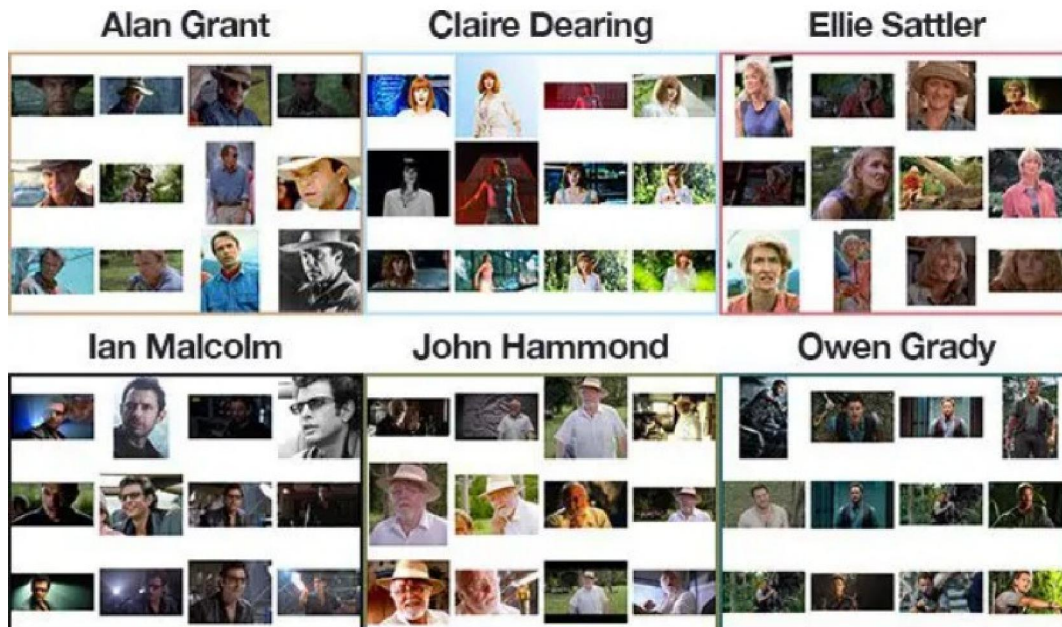
- **NUMPY** : Numpy is a package for computing with Python. It is a Python library that provides multidimensional arrays of objects, derived objects of various types (such as matrices). and a masked array.). Other mathematical calculations will also be implemented. On our system we used Numpy for this. Convert the image to some kind of array, so you can save the trained model.
- **OPEN CV**: OpenCV is an image and video processing library used for video and image analysis and also for facial recognition, Photo editing, licence plate reading, advanced robotics vision etc. The Dlib library contains an implementation of 'Deep Metric Learning' used to construct our faces embedding used for actual face recognition procedures. It is very easy to use the face_recognition library. Use this in your code first, then you need to install the Dlib library before installing the face_recognition library.
- **HAAR CASCADE FRONTAL FACE**: Haar Cascade Frontal Face Specifier is an Object Detector Algorithm used for face detection or recognition Real-time images or videos. Haar Cascade Algorithm Edge/line detection functions are commonly used. Viola and Jones proposed in a research paper "Fast object detection using boosted cascades" "Simple Function" was released in 2001. This algorithm retrieves many positive images. It consists of a face and many negative images that do not include each side to train models that existed The files created in this training are available on OpenCV GitHub repository.
- **LOCAL BINARY PATTERN HISTOGRAM**: LBPH (Local Binary Pattern Histogram) Facial recognition algorithms used to recognize or recognize a person's face is known for Performance and how it can be detected or recognized a person's face viewed from both sides, i.e. From the front and from the side face.

Fundamental steps in image processing are:

1. Image acquisition: to acquire a digital image.
2. Image pre-processing: to improve the image in ways that increases the chances for success of the other processes.
3. Image segmentation: to partitions an input image into its constituent parts of objects.
4. Image description: to extract the features that result in some quantitative information of interest of features that are basic for differentiating one class of objects from another.
5. Image recognition: to assign a label to an object based on the information provided by its description.
6. Image segmentation: to convert the input data to form suitable for computer processing.



DATA SETS:



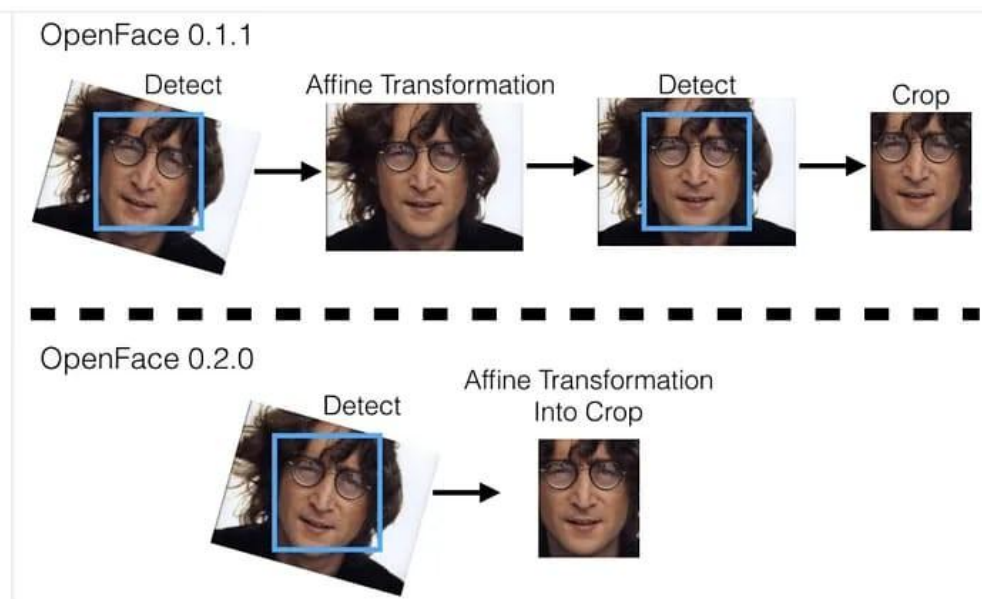
The example of the data set is shown here where we will enter the data of a particular person

Datasets are essential for face recognition for several reasons:

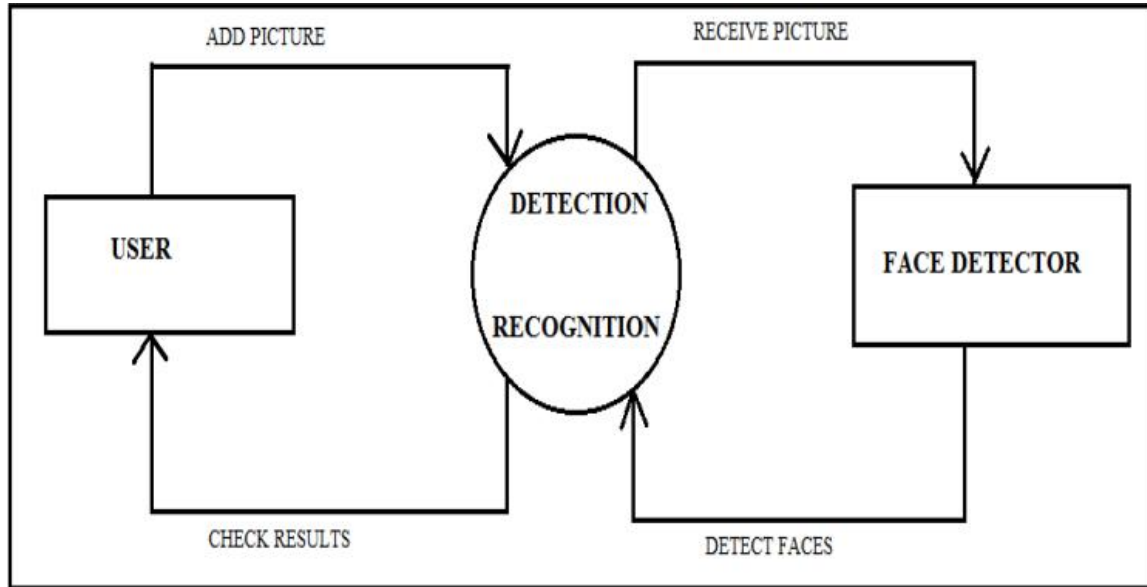
1. **Training Face Recognition Models:** Face recognition algorithms, especially deep learning models, require large amounts of labelled data for training. Datasets provide the necessary labelled images to teach the model to recognize and distinguish between different faces.
2. **Evaluation and Benchmarking:** Datasets are used to evaluate and benchmark the performance of face recognition algorithms. Researchers and developers need standardised datasets to compare the accuracy, efficiency, and robustness of different algorithms.
3. **Validation and Testing:** After training a face recognition model, datasets are used for validation and testing. These datasets help ensure that the model generalises well to unseen faces and performs reliably in real-world applications.
4. **Algorithm Development:** Face recognition datasets serve as a foundation for developing and refining face recognition algorithms. Researchers can use these datasets to innovate and improve existing methods.
5. **Real-World Applications:** Datasets help in building face recognition systems for real-world applications such as access control, security, authentication, and surveillance. These systems must be trained and tested on relevant datasets to ensure their effectiveness and accuracy.
6. **Privacy and Ethical Considerations:** Working with labelled datasets allows researchers and developers to address privacy and ethical considerations. They can implement privacy measures, data protection protocols, and fairness checks to ensure that face recognition technologies are used responsibly.
7. **Adaptation and Fine-Tuning:** In some applications, it's necessary to fine-tune a pre-trained model for specific usecases or domains. Datasets containing relevant face images help in this adaptation process.
8. **Bias and Fairness Analysis:** Datasets are also crucial for analysing and addressing biases in face recognition algorithms. By examining the diversity and representativeness of the training data, developers can identify and mitigate biases to create more fair and inclusive models.
9. **Research and Innovation:** Datasets fuel research and innovation in the field of face recognition. Researchers can use these datasets to explore new approaches, conduct experiments, and develop novel techniques to advance the state-of-the-art in face recognition.

It's important to note that the choice of dataset is critical, as it can significantly impact the performance and fairness of face recognition systems. It's essential to use diverse and representative datasets that include faces from different demographics, ethnicities, ages, and gender groups to build more robust and unbiased face recognition models.

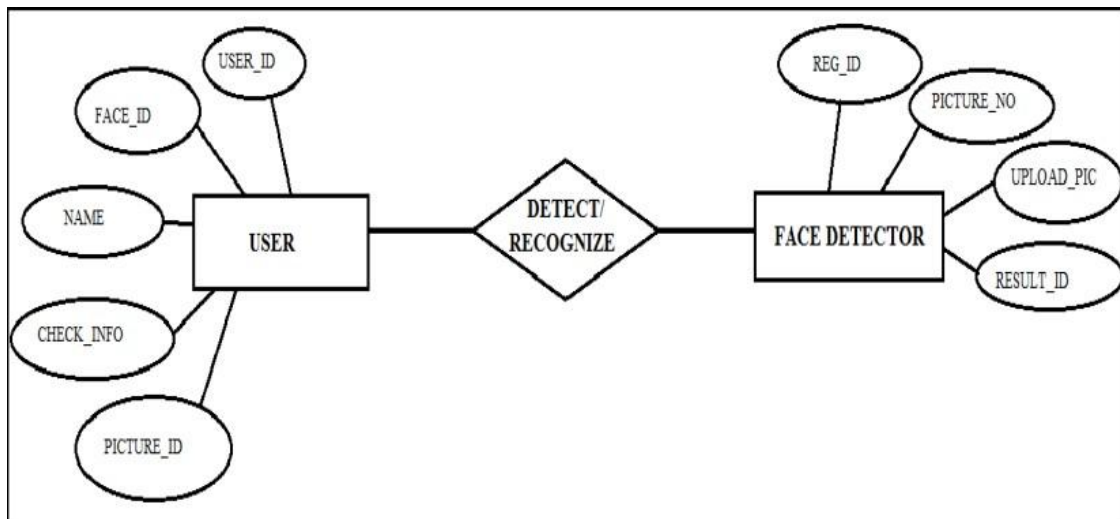
Additionally, adhering to ethical guidelines and privacy regulations is crucial when collecting, storing, and using face recognition datasets



For image processing, the OpenFace face detection library is first designed to find bounding boxes around faces, then each face will be fed separately into a neural network, which is expected to The input has a fixed size (currently 96 x 96 pixels). One way to get a fixed-sized input image is to reshape the face in the bounding box to 96 x 96 pixels.

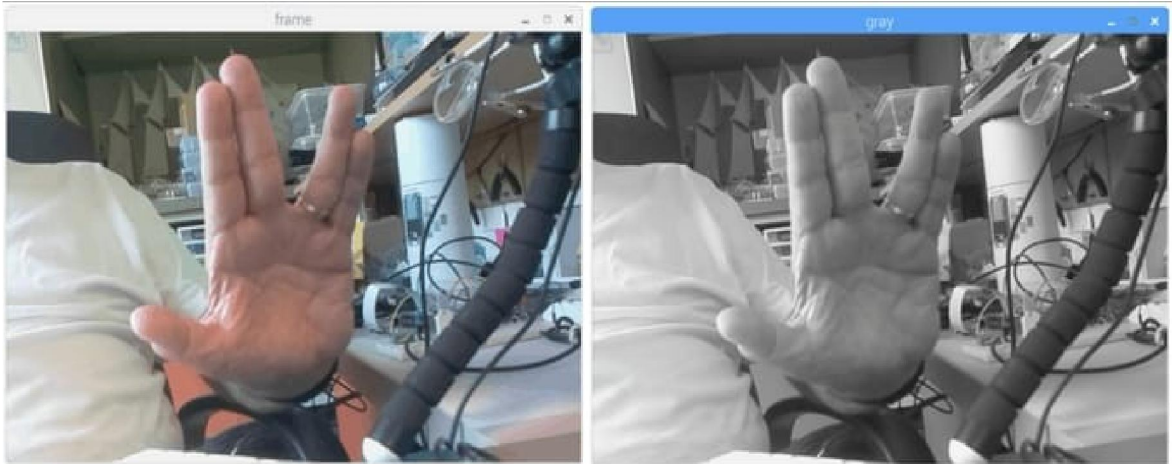


DATA FLOW DIAGRAM

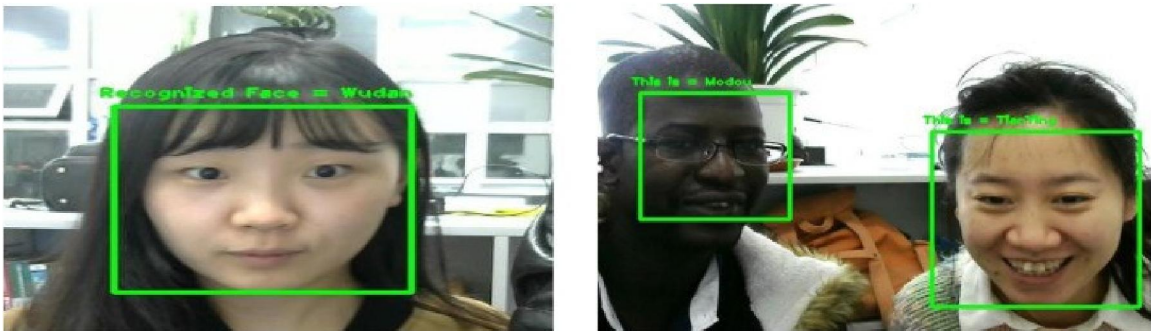


E-R DIAGRAM

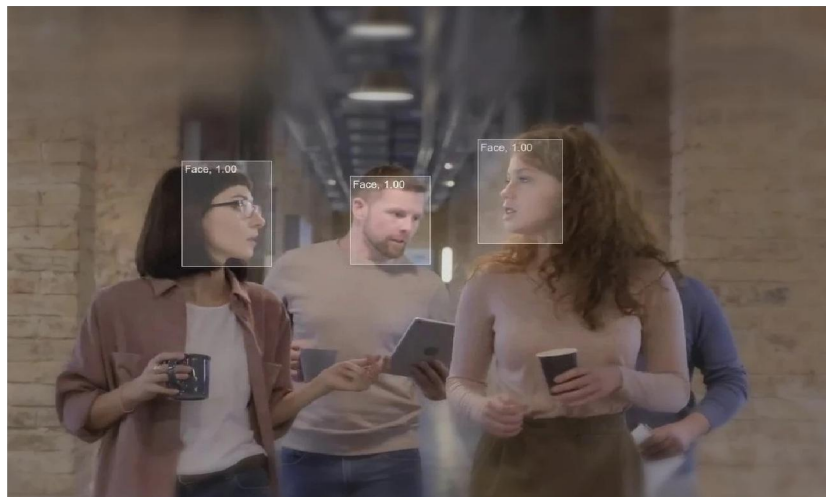
III. RESULTS



The given here will give you the result as “ASSERTION FAILED”.



The above image is the accurate result!



IV. CONCLUSION

In this study, we have implemented a Real Time Face Recognition System using OpenCV and Python. It can be used as a security system also because of its high accuracy. It recognizes a person if and only if the face of that particular person matches with the database with 100 percent accuracy. This is a Real-Time System which captures a person's images live using a webcam. In this project there is still some work remaining to do. Our future work is to implement

Iris Recognition in this system which will make this system more appropriate for security of some confidential data or recognition purpose too. The importance of face recognition and its numerous applications, algorithms, methods, face databases are discussed.

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