



Face Recognition Security System

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***Abstract** — Nowadays organizations are facing security concerns; accordingly, they require specially trained engineers to look after the security as well as for its management., as not being machines, we may make miscalculations that might affect the system. A proposed result to the forenamed matter is a Face Recognition Security System, which can result in interference to an organization and help in minimizing errors. This system consists of two major parts: the first being the tackling part and the second, being the software part. The first part uses a camera, while the second part includes discovery and face-recognition algorithms. When someone tries to enter an area in question, a series of images are captured and delivered to the program(system) to be processed and the model which is already trained identifies whether the person belongs to that organization. Else an alarm gets triggered if the particular person is not identified.*

Keywords—*Machine Learning, Deep Learning, Flutter, CNN, Face Recognition, Security-System.*

INTRODUCTION

Information age is snappily revolutionizing the way deals are completed. Everyday conduct is decreasingly being handled electronically, rather than with pencil and paper or face to face. This increasing demand in electronic deals has affected in a lesser demand for fast and accurate stoner identification and authentication. Access canons for structures, banking and other systems frequently use pins for verification and security allowances.

The correct PIN allows access, but if the stoner of the PIN isn't attested. When debit or ATM cards are stolen, an unauthorized stoner can frequently guess the correct canons. Despite warnings, numerous people continue to choose fluently guessed PIN's and watchwords, birthdays, phone figures and social security figures. Recent case studies of identity theft have shown the need for styles so someone can really claim who he/she claims to be. The technology may unravel this situation as a face is doubtless related to its proprietor exception for the case of identical twins. It's non transmittable. The software can also analyze reviews to records stored in a central or original database.

RELATED WORK

Numerous face recognition applications have been designed and tested over the last few years. every application has different styles and algorithms. Some applications also excerpt the features of the face from the data to recognise the face. Other applications homogenize several images and also compress the data, also storing the data in one image which is used for identification and recognition. The image that is inputted is then compared with the sample image. The new systems that are used nowadays are 3-D systems. In this system, a 3-D detector captures the information about the face so that only distinctive features of the face, similar to the figure of eye sockets, nose, and chin are used for identification and recognition. It has some advantages over other applications and algorithms that include the angle of the image, light effects, and many more. development and growth are part of any system so a new trend is followed in facial recognition that is called skin texture analysis. This latest upgrade uses the details of the skin itself for the purpose of identification. It captures the spots, facial lines, and any other specific details of the person's skin to identify. listed down below are some existing models that are used for facial recognition. FaceFirst is an application that provides a completely friendly, automated, turnkey mobile and live- videotape surveillance system. This software triggers an alert whenever a face is not recognized; The advantage of the FaceFirst system is the ability to provide results in a low -resolution environment. that provides us with real-world performance. MorphoTrak MorphoTrak provides security that results in a broad line of requests including law enforcement, border control, motorist licenses, and installation. It mainly provides its software to governments and law enforcement that are suitable also for wireless or any other system such as mobile.

• EXISTING MODEL

Several applications have been designed over the last few years. Each software uses a different style and algorithms than other software. Some applications excerpt the features from the input sample for identification. Some use other methods for identification .

below are the latest face recognition application and softwares that are recently designed and are used -

1. VGG-Face

VGG (Visual Figure Group) A VGG neural network (VGGNet), is one of the most used image recognition model types that's grounded on deep convolutional neural networks. The VGG armature came notorious for achieving top results at the ImageNet challenge. This model was designed by the University of Oxford as a part of an experiment .

It has the same structure as the regular model, it's compiled with facial images. The face recognition model provides a 97.1 delicacy on the Labeled Faces in the Wild (LFW) dataset.; The DeepFace library uses visual figure group- Face as the dereliction model.

2. Facebook DeepFace

This face recognition algorithm was made by Facebook. The algorithm was trained over a number of 4.6 millions labeled faces over multiple individual faces , which makes this the world's largest trained model. This method uses DNN(deep neural network) with at least 9 layers.

This algorithm provides an accuracy of 98.4 percent on the LFW dataset standard. The experimenters claim that the algorithm

3. DeepID

The algorithm performs face recognition grounded on deep literacy. It was one of the first models using convolutional neural networks and achieving better outcomes on face recognition and identification tasks. It was designed by the Chinese University of Hong Kong.

Systems grounded on DeepID face recognition were some of the first to outperform all the other algorithms. For illustration, DeepID2 achieved 98.8 on the (LFW) dataset.

Algorithm suggested for Face Detection

The Recognition procedure, original image will be argentine spanned to increase the efficiency.. After using the Haarcascade Frontal Face algorithm, the face part is used for comparison with the database. First , the faces are detected by the Haarcascade Frontal Face algorithm, and the images are divided into 3-sub images that focuses on special features for the purpose of recognition.

Algorithm suggested for Facial-Recognition Process

- Data Acquisition
- Input Pre-Processing
- Face image classification and decision making

Data acquisition

Data acquisition is a process of getting the data or in other words collecting the sample for the processing. In face recognition the data can be a videotape or a still image of the person . generally one camera is used to produce a processable 3-D image of the face .

Input processing

The preprocessing task is to identify the main characteristics of the face such as eye position. It also takes care of the environment , enhancing the image removing excess light and color friction. it localizes a face in the image .

There are many facial recognition systems in the world all having different approaches for processing. Some use the whole face while others use regions such as(eyes, nose, lips , etc). depending on the conditions that the facial expression and many other factors can change the efficiency of the algorithm.

Face image classification and decision making

below shown is the algorithm that is used for the classification The images we see have multiple hidden layers. The input layer is divided into hidden layers these are same as the neuron they are all connected to each other and takes part in image processing and facial recognition.

PROPOSED MODEL

The proposed result is a real time face-recognition system that processes a videotape from a camera that is connected to the system running the application, identifies the faces that are present in the videotape, and this also checks for the face in the databases using face recognition fashions .the algorithm has two parts the first being : face discovery and the second face recognition.

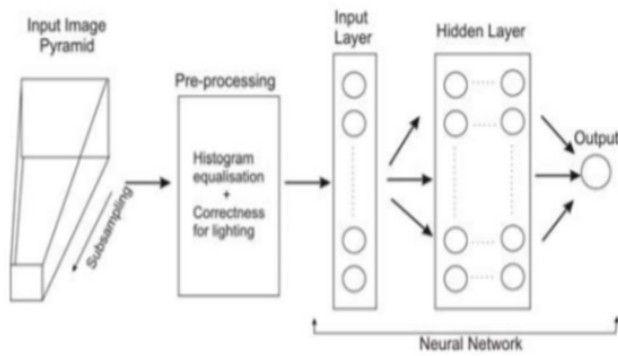


Figure 1 Face Detection Algorithm

IMPLEMENTATION

Comparing the traditional model from today's methods of recognition primarily identifies people with some certain personal characteristics, like IDs, documents, with obvious shortcomings. They are easily misplaced, lost or forgotten. If we consider some of the personal features to identify the result you will be very good, such as: face recognition, fingerprints and more. According to algorithms, there are frameworks for sharing between the convolution layer and the CNN convolution layer. The major advantage of it is that it helps in memory management and reduction, thus the parameters required for the process are also reduced, and the performance and speed of the algorithm is increased. At the same moment, in some machine learning algorithms, the images require that we perform a preliminary processing or extract a feature. However, it is not uncommon for us to be required to perform these functions while using a Convolutional neural network for image processing. This is another thing that other ML algorithms can do. There is a lack of in-depth reading, which requires multiple samples for creating a model, which makes it an inefficient model whereas the new model has given quite significant results.

Introduction to convolutional neural network
 With the introduction of CNN in this field, the discoveries made are getting greater and greater. To improve it further and make it more effective we can modify the neural network environments.

CNN model
 Currently, the typical neural network architecture is divided into the following categories: LeNet5, AlexNet, ZF Net, GooLeNet, and VGGNet, these will be done by LeNet5 with detailed analysis architecture. LeNet5 is an old CNN architecture, and is widely used in handwriting recognition.

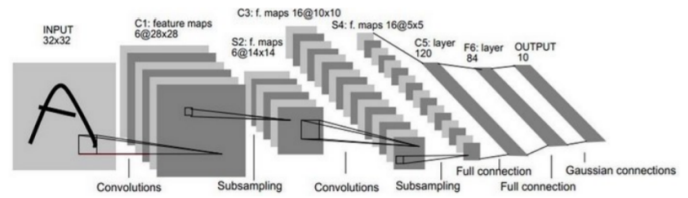


Figure 2 LeNet5 structure diagram

Face image collection and processing

Image processing that uses CNN requires a large amount of samples to be collected for further processing. This article will take a lot of people to take lots of pictures, after collecting a lot of pictures that cut out the important parts of the face. This article uses face detection and cutting saved in the created folder. During this time, the collected images were cut and resized. Then all the pictures are sewn and sown into the olive face database, each line represents a group of two people, after all the face images that come together, and then get the treatment of the small facial gray stems. The figure below is the subject of the set face data to be trained:

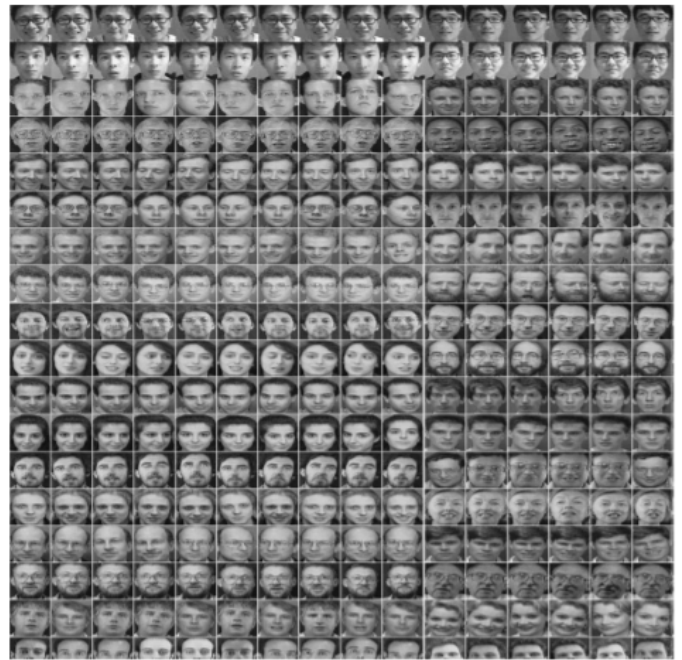


Figure 3 Face data set

The construction of the CNN, this model, contains the structural layers, namely all connected layers, input layer, output layer, convolution layer, pooling layer, convolutional layer and downgrade layer. LeNet5 model reference for this article convolutional model is set. The model is a dynamic layer and a duplicate layer that is integrated into a layer, named "LeNetConvPoolLayer", "LeNetConvPoolLayer" in the convolution of the third layer and the full layer layer, the full layer layer -perceptron with multiple layers. The final layer is the exit layer, because it is a multi-faceted facial split, using the

Softmax retrieval model, called "LogisticRegression." Figure 4 of the structure of the convolution neural network structure:

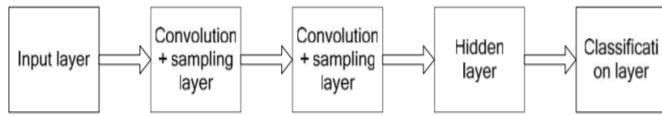


Figure 4 CNN structure diagram

Firebase Database

An entity that is responsible for compressing, processing, storing and compressing data taken with stored data. Firebase is a platform for Google Inc. used to create web applications and mobile applications. Provides backgrounds for Web, Android and IOS apps. Firebase offers a hosting platform, different types of authentication, different APIs and a real-time website.

- 5 The systems must be able to provide near real-time performance.
- 6 The system must be both automatic and manual.
- 7 Frontal view face recognition will be realized using only a single known image.

FIREBASE

Pricing

Firebase offers many things at a reasonable price that includes Storage, Real time Database, Cloud Functions,, Test Lab, Phone Authentication and many more, and some are also available for trial purpose.

Downloads all sub trees on load

It helps to download all the data at a particular channel and remove the load.

Inconsistencies

Even if the client goes offline it supports their operation but at the same time it may lead to inconsistency .

Data migration

It is a NOSQL database so that why it is not easy to handle the data migration like the other simple SQL databases

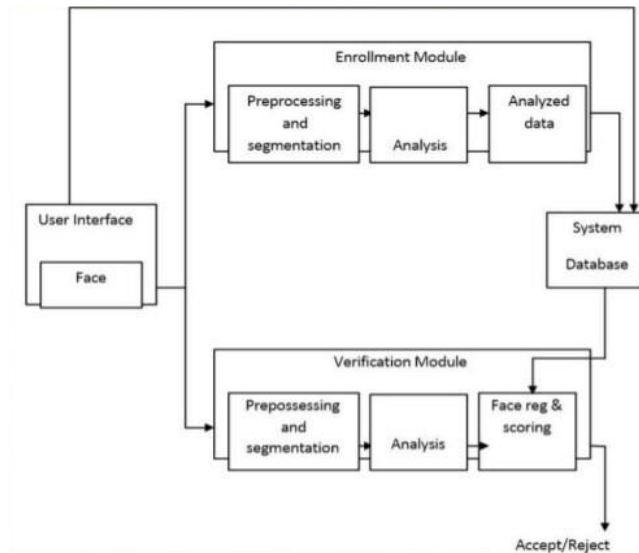


Figure 5 Implementation Diagram

CHALLENGES

The subsequent scope of the project was reached after reviewing face recognition and facial recognition documents, as well as determining the real-world scenarios in which such systems would be used. The following system requirements have been identified

- 1 Advanced face recognition system for still images
- 2 A given face-to-face view system
- 3 A non-reflective face, the main one to be presented in face detection and recognition
- 4 The system should show high light invariance.

VI. CONCLUSION

In this activity, we achieve facial recognition using in-depth learning algorithms. We primarily use the algorithm of convolution neural networks to extract in-depth knowledge of multi-layer networks in the face recognition process .And we also use the algorithm to create a compatible computer on a cloud platform to speed up the face recognition process, analyzing theory. acceleration rate, and test validation. Test results show that we achieved positive results. Yes, the similarities we are doing are a rough character, and there are still many modules that can be adjusted to the algorithm. This will be our focus in the future to continue to improve the work.

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