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Online Transaction Security Using Face Recognition: A Review

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Abstract: The growing development of the e-commerce market is of great significance in the world. In this online shopping process, the security of personal information and debit card or credit card information increases the popularity of e-commerce and is an important part. This paper provides limited information and is necessary for transferring money by online transactions by securing data and trust of customers. Facial recognition technology identifies a person's information through a digital image. It is automatically determined. It is mainly used in security systems. It matches facial recognition from different angles. It is mainly used in airports. It will recognize the face and we can avoid some unwanted fraud by using the facial recognition system. The fundamental gain of face popularity is used for fraud restrict and crime controlling motive due to the fact face pictures which have been archived and recorded, on the way to assist us to perceive someone later. Facial recognition identifies each distinct skin tone on the surface of a human face, such as curves on cheeks, eyes and nostrils, and more. The technology can also be used in very dark conditions and prevent identity theft.
Keywords: e-commerce, debit card, credit card, Lbph, Harr cascade, Face recognition.

I.   INTRODUCTION

In today's technologically advanced world, it's easy to hackers to get personal information of users so some People are afraid to use online transactions. This makes Security as an important factor in the digital age Payments. Therefore, we propose a system to enhance security Transact online by providing a very crucial verification process: OTP verification or by facial recognition.

During the transaction process the system will first verify the users face, if it matches then the transaction will be successfully completed and in case if the users face does not match then an otp will be sent to the user in order to successfully complete the transaction. The system, which we are able to propose, will try and lessen the variety of assaults on the time of creating virtual payments. Online transactions become vulnerable to loss or theft card, account theft, card forgery, fraud applications, multiple footprints and collusion merchants. In the case of account takeover, a card holder unknowingly offers his banking info to a fraudster and the fraudster then makes a replica card with the one's info. Among the colluding merchants, the employees of Merchants work with scammers. Suggestion system succeed in reducing all these frauds by capturing and verifying Real-time image of the cardholder. Biometric authentication is attracting a lot of attention due to unique to each individual. Several different biometric data authentication is fingerprint, hand geometry, iris, face and Palm. In this paper, we are using face recognition as it's the most popular, easily usable and widely acceptable. This system uses a computer system, a bank account to perform transactions and identify users. They provide PINs for security purposes. Use the right pin for access. But purchaser now no longer use right pin then now no longer be verified. In many cases, debit or credit cards are lost when unauthorized users can access personal information such as passwords, phone numbers, shared birthday numbers. They easily guess the PIN. So we need to improve security such as strong passwords. But the authorized person easily use the password at that time by facial recognition technology to enhance the security and the user's information is authenticated.

A.   What is Face Recognition?

Facial recognition is a technology capable of recognizing or verifying a subject through an image, video or any audio visual element on their face. Generally, this identifier is used to access an application, system or service. This is a method of biometric identification that uses these body measurements, in this case face and head, to verify a person's identity through a pattern and facial biometric data. surname. The technology collects a unique set of biometric data from each person linked to their face and facial expressions to identify, verify and/or authenticate a person. Facial recognition systems are currently used by governments and private companies worldwide.

II. LITERATURE REVIEW

1) *Cancellable Biometric Filters for Face Recognition:* In this article, we cover the issue of producing revocable biometric templates; features essential in implementing any biometric authentication system. We propose a new scheme encoding the training images used to synthesize a unique minimum mean correlation energy filter for biometric authentication. Theoretically, we show that transforming the training images with any random convolution before constructing the biometric filter does not change the obtained correlation output peak ratio, since that maintains authentication performance.

2) *An Associate-predict Model for Face Recognition:* Managing variations between parties is a major challenge in facial recognition. It's hard to know how appropriately measure the similarity between human faces in significantly different settings (e.g. pose, lighting, and expression). In this paper, we propose a new model, called "Associate-Predict" (AP) model, to address this issue. The predictive association model is built on top of a complementary common identity dataset, where each identity contains multiple images with large intraspecific variability.

3) *Facial Feature Detection for Face Authentication:* This paper presented an efficient algorithm for facial feature detection and a method for to automatically extract features for face authentication. The approach consists of combining different methods of region detection and feature extraction from face images. The Gabor filters, texture features, feature vector dimensionality reduction method are described.

4) *Partial Face Recognition:* An alignment free approach: Many methods have been developed for comprehensive face recognition with impressive performance. However, very few studies address the question of how to recognize an arbitrary image patch of an overall face. In this paper we ad- dress this problem of partial face recognition. Part of a face often appears in unrestricted photography environments, especially when the face is captured by a surveillance camera or mobile device (e.g. mobile phone). The proposed approach uses a variable-size descriptor representing each face with a set of key point descriptors.

5) *Enhancing User Authentication of Online Credit Card Payment:* The popularity of online transactions over the past decade has resulted in the leakage of information about users. The security of the transaction process can be hacked more easily with advanced technologies. Biometric verification is seen as the key to improving security. In this article, a new process with face-match verification is proposed to improve the security of online payment system. Simulation of the online payment process is also created and then executed. The proposed new process is evaluated.

6) *A Real-time Face Recognition System Based on the Improved LBPH Algorithm:* The Local Binary Patterns Histogram (LBPH) algorithm is a simple solution to the face recognition problem, which can recognize both front and side faces. However, the recognition rate of the LBPH algorithm under the conditions of light diversification, expression variation and attitude bias all decreased. To solve this problem, a modified LBPH algorithm based on pixel neighbourhood gray median(MLBPH) is proposed. The gray value of a pixel is replaced by the mean of its neighbourhood sampling value, then the object value is extracted by sub-blocks and a statistical histogram is plotted to form a dictionary MLBPH object, used for human face recognition against the test image.

7) *Research on Face Recognition Based on Deep Learning:* With deep learning in various achievement domains, among other methods, a new wave of neural network development has been generated. The concept of deep learning originates from the artificial neural network, which, in essence, refers to a class of deep structured neural networks consisting of effective training methods. In this paper, we have a tendency to target the analysis hotspots of face recognition supported depth learning within the field of biometrics, combined with the relevant theory and ways of depth learning, face recognition technology, on the order of depth learning, based on the depth of learning face recognition, face recognition application to start out research.

8) *Review of Face Recognition Techniques:* Face popularity era is a biometric era, that's primarily based totally at the identity of facial capabilities of a person. People acquire the face images, and the popularity equipment routinely procedures the images. The paper introduces the associated researches of face recognition from exceptional perspectives. The paper describes the improvement ranges and the associated technology of face recognition. Introducing the real-world face recognition research, general evaluation criteria and general face recognition database.

9) *LBPH Algorithm for Frontal and Side Profile Face Recognition on GPU:* Facial recognition is a process of identifying a person based on that person's facial features or characteristics. LBPH (Local Binary Patterns Histogram) is a method to detect and recognize the face of a person. In LBP, first part of grayscale image is taken as a 3x3 window of size and neighbouring pixel value is compared with centre pixel value, then binary value is assigned, value This is then converted to a decimal value. LBP is then combined with histograms and so is called an LBPH algorithm. In this paper, front and side face recognition of by LBPH algorithm is implemented on GPU. The CPU and GPU performance is then compared.

10) *Face Detection and Recognition System Using Digital Image Processing:* While recognizing an individual, the most important attribute is the face. It serves as a personal identity for all people and thus facial recognition helps to authenticate the identity of any person by using their personal characteristics. The whole validation process of any face data is divided into two stages, in the first stage, face recognition is done quickly except for cases where the subject is placed far enough away, followed by a second phase which was initiated in which faces were recognized as an individual. Basically, there are two type of techniques that are currently being followed in face recognition pattern that is, the Eigenface method and the Fisher face method. The area of interest of this paper is using digital image processing to develop facial recognition systems.

11) *Study on Face Recognition Techniques:* An accurate and effective facial recognition system is a hot topic in almost every industry and research fields. This is a type of biometric information process that is easily adaptable compared to a traditional card identification system. Generally speaking, facial recognition systems predate face recognition techniques. Face recognition technique is the first step to detect a live face pictures. In this article, several face recognition techniques are discussed such as skin probabilistic image search, skin segmentation, morphometric operations to extract boundary regions, Haarlike feature. After face recognition technique , face recognition technology is applied to detected face to further recognize by several classifiers.

12) *Real-Time Implementation Of Face Recognition System:* Facial recognition is the ability to detect and recognize a person by their facial features. Face is multidimensional and therefore requires a lot of mathematical calculations. The facial recognition system is essential and important to provide security, ID photo matching, law enforcement applications, user verification, user access control, and more. and is mainly used to recognize different applications. All of these applications require an efficient facial recognition system. This paper proposes a hybrid face recognition algorithm by combining two face recognition techniques by integrating (PCA) principles of component analysis, (LDA) linear discriminant analysis. The Jacobi method is used to compute the eigenvectors required for the PCA and LDA algorithms. Face recognition system will be implemented on Raspberry pi 3 board based on embedded system.

13) *Fast and Efficient Implementation of Convolutional Neural Networks:* This paper recommends a deep convolutional neural network architecture code named Inception, for classification and detection in the 2014 Image Net Large-Scale Image Recognition Challenge (ILSVRC14). This paper focuses on an efficient deep neural network architecture for computer vision, codenamed Inception, which takes its name from Lin et al's article Networks in networks in conjunction with the famous Internet meme that we need to go further.

14) *Credit Card Fraud Detection Based on Transaction Behaviour:* The proliferation of EMV (Europay/MasterCard/VISA) chip card designs in the credit card industry has largely solved the problem posed by the older magnetic card technology. This paper suggests that there should be a detection model to capture the possible anomalous transactions - a fallback in case the technology fails. Several classifiers were evaluated during model generation, but only Random Tree and J48 gave the highest accuracy values of 94.32% and 93.50%, respectively. Through in-depth analysis of these two (2) classifiers, it shows that J48 has a better understanding of transaction log data.

III. METHODOLOGY

Module 1: Dataset Creator
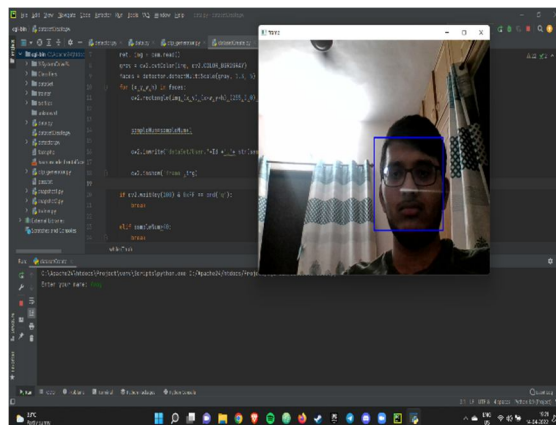
In this module, we'll create a dataset that will hold photos of the user alongside the information they've provided. This module makes use of a number of libraries, including cv2 for computer vision, numpy for image arrays, and sqlite3 for database dataset creation. All of the photographs are stored in array format, which means that the pixels of the image are stored as an array. Account.db will be used to store the information. The name of image stored will have id and the name details that are given by the user to the system in its first run.

The module will use the haar cascade algorithm to save the user's photographs using the cascade classifier function of the cv2 module. In this module the picture is taken as input using camera and stored in grayscale which is the format on which LBPH algorithm works on.

When the module is activated, the system will ask the user for their name and ID number. Further using cv2function the module will take input from camera, create a block where it detects face structure using harr cascade algorithm. When a face is detected, a block is created around it, which is subsequently saved in grayscale in the database. This module's code specifies the number of photos to be stored, which is currently set at 51.

Module 2: Trainer
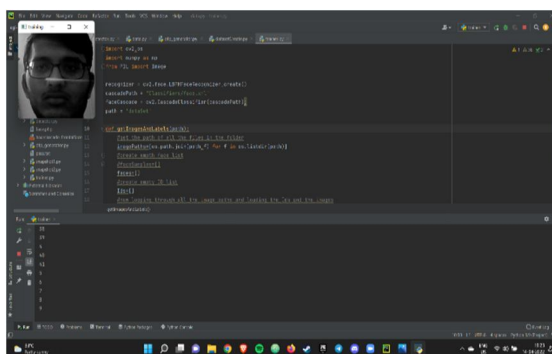
This lesson involves training the dataset established in the previous module and exporting the trained data as a.yml file. This modules also uses a lot of libraries which includes cv2 for image processing, os for accessing paths, numpy to modify and classify pixels of images that are stored in the form of an array. Other library used is pil whichis Python Imaging Library.

To recognise the image, this module uses a local binary pattern histogram.

In this module, the images in the dataset are trained using the LBPH algorithm, which compares the light and dark contrast of image pixels and then labels them to construct a boundary for all objects in the image.

Module 3: Detector
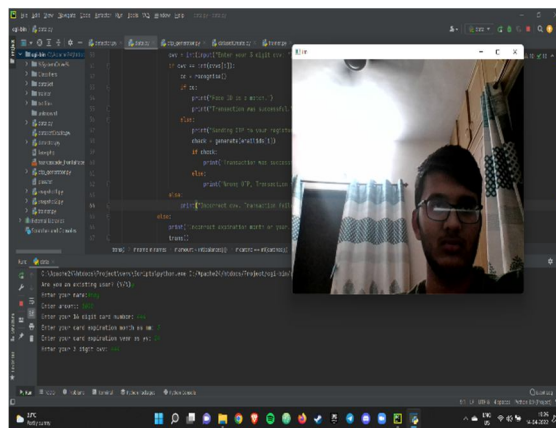
This is the main module which the client will use actually to get output. In this module, we use the cv2 library to access the real-time input stream from the camera, as well as the numpy library to manipulate the image's array of pixels. The local binary pattern histogram is also used by this module to match the face in the input image.

Local Binary Pattern (LBP) is a very simple and effective texture operator which helps in labelling the pixels in an image by comparing the features of pixels present the neighbour of the pixel we are labelling and if similarities are found then the pixels belong to the same label. In LBPH, labels are made out of binary numbers. To create a prediction, this module now compares the trained LBPH with the real-time image from the camera.

This module delivers two values: the confidence value and the person's id, which the user provided in the first module. It will also provide a confidence value, which will indicate how accurate the machine prediction is by comparing the similarity between the trained image and the person's real-time input image. When a person is recognised and goes to payment, an OTP is given to the registered email id, which must be entered in order for the transaction to be completed successfully. This OTP verification process with pin is used to make payment secure androbust.

IV.   SYSTEM ARCHITECTURE

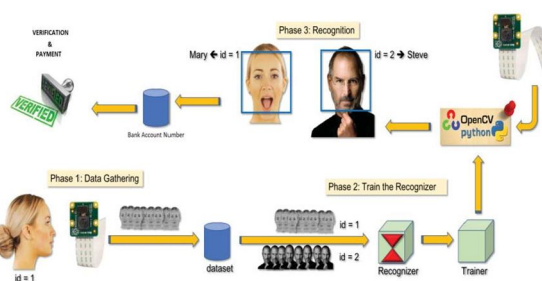

Figure 1. Diagram depicting the whole process taking place based on which the project is made.

A. *Techniques Used*

1) *LBPH Algorithm (From paper 9):* The visual frame is divided into a grid-like structure in the LBPH method, with each pixel generating a grid cell. Now the algorithm takes a pixel and uses the other neighbouring pixels to form virtual lines. This is accomplished by drawing a circle around the main pixel and selecting eight adjacent pixels; if the central pixel value is greater than the neighbouring pixel, a '0' is assigned; otherwise, a '1' is assigned, resulting in the formation of virtual lines on the image based on light and dark contrast.
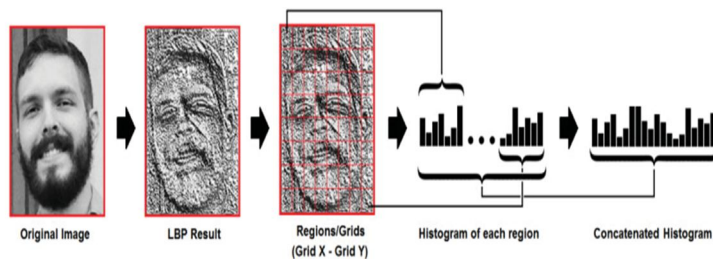

FIGURE 2. Diagram showing conversion of image to LBPH

2) *Haar Cascade Algorithm (From paper 11):* Instead of drawing virtual lines in the picture, this technique creates wavelets. To use this technique on a photograph, it must first be converted to grayscale. In order to create a wave pattern on a single sheet, dark and light hues are taken from various images. When these patterns are combined, a haar wavelet is created, which is used to determine face structure and aid recognition.

3) *Neural Network (From paper 13):* A neural network is a network or circuit of biological neurons, and in the modern sense, an artificial neural network composed of artificial neurons or nodes. Therefore, a neural network is either a biological neural network composed of biological neurons, or an artificial neural network for solving artificial intelligence (AI) problems.

V. EXISTING SYSTEM

A basic multi-factor authentication setup consists of asking a user for their login and password (which they already know) and then verifying their identity with a second factor, such as an SMS message sent to their phone (something they have). That covers two authentication factors, but adding photo recognition to the mix offers an extra layer of protection without making the login procedure too complex or annoying for authorised users. Many banks employ picture recognition as part of their multi-factor authentication procedure so that their clients may securely access their accounts and authorise different financial activities. On the web, picture recognition authentication is great for combating phishing attempts in which a website imitates your bank's look and feel.
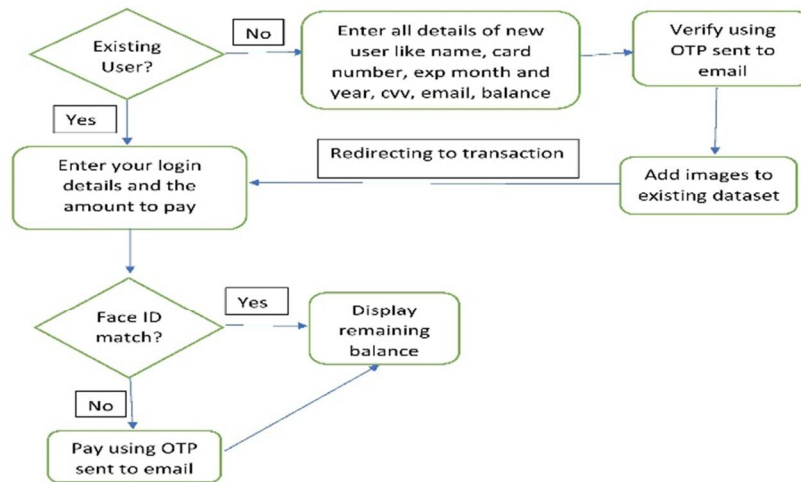
VI. PRPOSED SYSTEM

Figure 3. Data Flow Diagram

A data flow diagram (DFD) depicts the flow of data across an information system graphically. A DFD provides a high-level overview of the system without getting into too much detail.

The system's flow is as follows:
1) The user inputs the desired amount and confirms it.
2) Face verification is done by comparing input image with datasets.
3) If face is successfully verified, payment is successful.
4) If face verification fails, pin code is asked.
5) If pin code is verified, then the payment is completed.
6) If not verified, payment is declined.
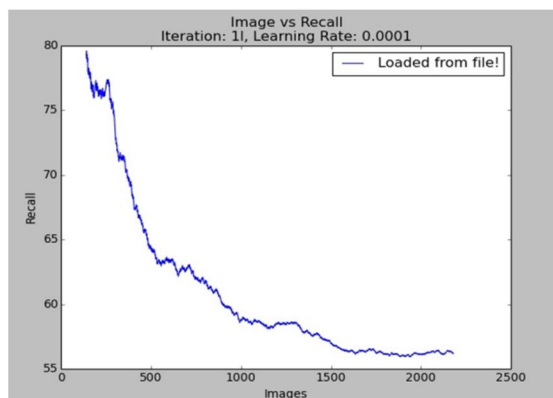
VII. RESULTS

A. Learning Rate (0.0001)

Learning rate is the training parameter that controls the size of weight and bias changes during learning.

In the below graph x-axis stands for images whereas y-axis stands for IOU.
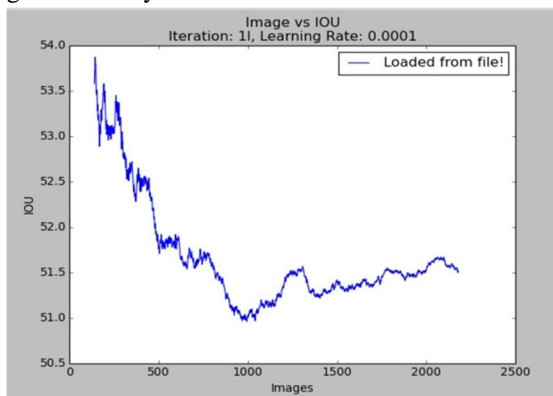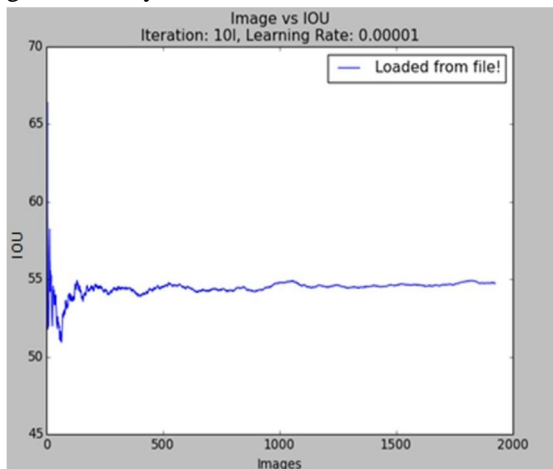

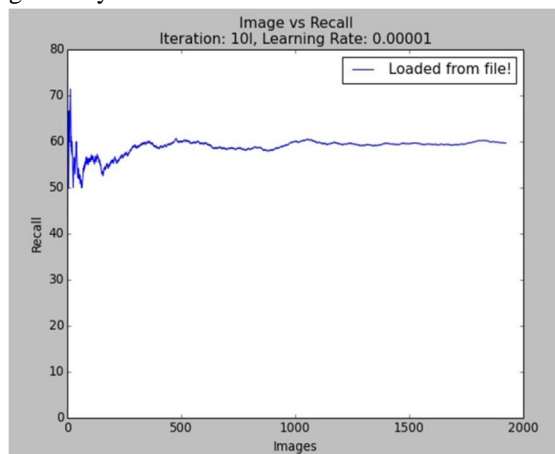In the below graph x-axis stands for images and y-axis stands for Recall.

After conducting the above experiments with respect to training parameter Learning rate, the optimal value was found to be-
Learning rate of 0.0001 detected objects, but with lesser accuracy in terms of classification.

B. Iterations: 800000

In the below graph x-axis stands for images whereas y-axis stands for IOU.

In the below graph x-axis stands for images and y-axis stands for Recall.

After conducting the above experiments with respect to training parameter Iterations, the optimal value was found to be- Number of training iterations:800000 For training below 800000 iterations, the network was found to predict fewer bounding boxes with less accuracy. Hence, the optimal number of training iterations was concluded to be as 800000.

VIII.   CONCLUSION

The project was created to make payment more convenient. The project is based on the Python programming language's OpenCv module. In this project we have successfully created a database of face images of user and the details of user's account and registered phone number, trained it using LBPH algorithm and Haar cascade classifier. For the payment process, an OTP is sent to the registered email id after the machine recognizes the user. For further security OTP is backed by pin verification.

IX.   ACKNOWLEDGMENTS

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