

Bank Safeguards System using Machine Learning with Face and Liveness Detection

Ms. Unde Suvarna P¹, Prof. Avhad G.T.²

¹ Student, Vishwabharati college of Engineering, Ahmednagar Maharashtra,India ² Asst.Prof., Vishwabharati college of Engineering, Ahmednagar Maharashtra,India

Abstract: - Facial Recognition software has a liveness detection feature that prevents hackers from using a customer's image for impersonation purposes. To Ensuring the security of transactions is currently the biggest threat to banking systems. The use of biometric user authentication has attracted huge sums of money from banks worldwide due to its convenience and acceptability. Especially in an offline environment where ID facial images are compared to digital selfies. In fact, matching selfies to IDs is also used in some broader programs these days, such as automatic immigration checks. The main difficulty of such a process lies in limiting the differences between the comparison face images due to their different origins. Based on deep features extracted by two well referenced Convolutional Neural Networks (CNN). We propose a new architecture for the cross-domain matching problem. The results obtained from the collected data, called Face Bank, show with more than 93% accuracy the power of the proposed head-to-head comparison problem and its incorporation into real banking security systems.

Key Words: Convolutional Neural Networks (CNN), Digital selfies, Artificial Intelligence, Face Recognition, Liveness Detection, Security.

I. INTRODUCTION: - In today's day to day life, security plays an important role. The aim is to verify the identity and allow the transaction to take place only if the identity of the account holder is positively identified. It also applies to other biometric modalities, such as fingerprints, where liveness detection does exactly that assesses the "liveness" of the facial display, as it is known. The recognition system also allows customers to access their bank accounts from computers. Facial recognition is one of many ways banks can reduce friction in their customer experience and increase efficiency and accessibility. First, an algorithm based on the Haar cascade was used for fast and simple face detection from the input image. The face image is then converted to a gray scale image. Then, iris candidates are extracted from the intensity valley from the detected face. The cost of each iris candidate is calculated. Finally, the iris candidates are matched and the cost of each possible match is calculated by a combination of mathematical models.

Machine learning (ML)

Machine learning is an application of artificial intelligence (AI) that provides systems with the ability to automatically learn and improve based on experience without being explicitly programmed. Machine learning focuses on developing computer programs that can access data and use it to learn for itself. The learning process begin with observation or data such as examples, direct experience, or instruction to look for patterns in the data and make better decisions in the future based on the examples we provide. The primary goal is to enable computers to automatically learn without human intervention or assistance and adjust actions accordingly.

CNN Algorithm:-

CNN is used in image classification, object detection, face recognition and image recognition. The image is processed by CNN image classification. Basic object recognition follows face shape and feature recognition. The facial features are then further studied to determine its basic qualifications. The shape of the nose, the texture and tone of the skin, the existence of scars, hair or other surface imperfections are a few examples. The sum of these qualifications is then added to the image data analysis of a particular person's appearance. This process involves looking at many samples, each representing the topic in a different way.

Facial recognition

Facial recognition is able to uniquely identify and confirm a person's face by comparing and analyzing a person's biometric face. A facial recognition system is an operation that is used to identify or verify a person from a digital image. A face is recognized if its embedding matches any other embedded face in the database as closely as possible. Facial recognition is one of many ways banks can reduce friction in their customer experience and increase efficiency and accessibility. This project enables identity verification and account withdrawals that allow customers to make withdrawals from their bank accounts. Biometric facial recognition software helps minimize fraud, where online hackers illegally use passwords and other data to steal



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from banking institutions. The software will verify a person's identity before processing any transaction. Our goal is to provide an extremely smooth, personalized experience with a focus on security.

II. LITERATURE REVIEW

Gang Pan et al.[1] present anti-photo spoofing in facial recognition using real-time liveness detection using spontaneous eye blinks. This method only requires a generic camera, no other hardware, to prevent a phishing attack in a non-intrusive way. Blinking is a physical process that instantly opens and closes the eyelids many times per minute. A generic camera captures 15 frames per second and provides two images of faces, which are used as clues against a fake content attack. Two images taken in multiple images to check the vividness, so the user should cooperate.

In this section, we will briefly review related work on Face Recognition and their various techniques. The work presents a study of various famous and unique techniques used for facial feature extraction and face recognition. Different facial expression research algorithms are compared on performance parameters such as recognition accuracy, number of emotions found, database used for experimentation, classifier used, etc. [1]. This work proposes a system that automatically identifies facial expression from a facial image and classifies emotions for final decision. The system uses a simplified technique called "Viola Jones Face Detection" for face localization.

S. Ramya et al.[2] In this paper author presents an efficient methodology for managing face recognition. The proposed system thus enables the detection and recognition of faces in a controlled environment. Since machine learning is really important today, there are several areas where this work can be extended. This paper will focus on extending the current scheme to increase usability and security. Since face recognition methodology appears to be more challenging compared to other biometric methods, a more efficient algorithm can be developed. We also need to discuss the camera scheduling approach based on the location estimation result to increase the efficiency of face detection.

V. Madane[3] This system is developing a biometric authentication system that uses voice and face biometrics. In order to reduce the temporal and spatial complexity of voice recognition, this system introduces an improved feature extraction method based on LBP coding. determining a person's authorization using voice and face recognition.

Surekha. R. Gondkar[4] This system is use of payment cards at various places like shopping, restaurants, lodges and online payments for hotel reservations, movie tickets, air tickets, trains etc. is increasing day by day. So the problem is that one has to carry payment cards with them and keep them safe so that they can use them all the time. Security was also lacking. In this work, facial recognition biometric payments are used in all

kinds of payments. This way you avoid having to remember different passwords. The facial recognition payment system is safe, secure and even easy to use. It is reliable and more efficient compared to other payment technologies. A general design of an online payment system using face recognition is proposed. The methods adopted for face recognition are own face search and Euclidean distance.

System Architecture:



Fig. System Architecture

Registration module and authentication module are two key modules that make up the developed system. First, enter the username and check whether the user has been registered or not. Otherwise, collect his voice and appearance and start the registration process. If not, the user must go through a verification process. We can then feed the voice and face biometric data into the established authentication system to use appropriate fusion to determine whether the authentication was successful or not. Face image and audio datasets are accepted as input. Output - Output to lookup Matched Fusion and determine if the person is verified or not. In this system, we need a way to detect faces and eyes in real time. So we use the -cascade classifier to perform these tasks. In this Haar Cascade classifier, a machine learning algorithm for object detection is used to identify objects in an image or video.

Methodology

Using the test data, the system is tested to determine its accuracy. The system is commissioned as described below:



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1) Dataset – Provide a dataset (This requires the data to be consistent and understandable to a machine that does not perceive data in the same way as humans.

2) Preprocessing – Real data often contains noise, missing values, and may be in an inappropriate format, so machine learning models cannot be directly built on it. Data preprocessing is a necessary step for data cleaning and preparation the machine learning model that also improves model accuracy and efficiency.

3) Feature Extraction – By generating new features from those that already exist in the dataset, feature extraction tries to reduce the number of features in the dataset (and then discard the original features). Therefore, it should be possible to summarize most of the information contained in the original collection of characteristics into this new, smaller set of characteristics.

4) Classification – To recognize new observations, a classification algorithm is used that uses supervised learning to categorize new observations in light of the training data. In classification, the program uses the set of data or observations that are available to learn to categorize new observations into different classes or groups. An algorithm will determine how many faces are present. The entire description applies to the proposed work.

Algorithms Used

For face detection and face identification algorithms: the CNN algorithm and the Harr cascade method.

VGG16 (Visual Geometry Group)

VGG16 is a simple and widely used convolutional neural network (CNN) architecture used for ImageNet, a large visual database design used in visual object recognition software exploration. "VGG" stands for Visual Geometry Group, which is the group of experimenters at Oxford University who developed this framework, and "16" means that this framework has 16 layers. We can extract the 8000 encoding from the face using the vgg16 algorithm.

VGG16 is used in many deep learning image classification methodologies and is popular due to its easy implementation.

Haar Cascade classifier

Haar Cascade classifier to put our use case into practice. The Haar Cascade classifier, developed by Paul Viola and Michael Jones, is a successful object detection strategy. This method basically uses machine learning where a cascade function is learned using a large number of positive and negative images. Then, based on the training, it is used to detect things in the other images.

CNN

An input layer, an output layer, and numerous hidden layers make up the CNN architecture used. Hidden layers usually consist of convolutional layers, pooling layers, fully connected layers, and normalization layers (ReLU). CNN flow for input image processing and face classification based on face coding. 128-dimensional face coding for each face in the image, which is compared with known face coding. Finally, we have the output, which is whether the input surface matches the surface in the dataset. HAAR feature-based cascade classifiers based on "Rapid Object Detection using a Boosted Cascade of Simple Features" is a machine learning approach in which a cascade feature is trained using a large number of positive and negative images. It is then used to detect objects in other images. Here this method is used for face detection. Eye blink detection technique is used to identify liveness. The eye blink detection algorithm uses the aspect ratio of the eye given in Eq. The aspect ratio of the eye is approximately constant when the eye is open, but rapidly drops to zero during blinking.

3. CONCLUSIONS

In this paper, we proposed machine learning based face recognition and liveness detection for bank locker. It is a highly reliable system to ensure the safety of our valuables. Authentic face detection for security assurance is an implemented method that generalizes the privacy concerns of confidential data that require secrecy. The proposed method can be improved in terms of ensuring safety, i.e. work in facial recognition for high level data authentication and security.

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The heading should be treated as a 3^{rd} level heading and should not be assigned a number.

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