IJIRCCE

e-ISSN: 2320-9801 | p-ISSN: 2320-9798

INTERNATIONAL JOURNAL OF INNOVATIVE RESEARCH

IN COMPUTER & COMMUNICATION ENGINEERING

Volume 12, Issue 5, May 2024

INTERNATIONAL STANDARD SERIAL NUMBER INDIA

Impact Factor: 8.379

International Journal of Innovative Research in Computer and Communication Engineering

| e-ISSN: 2320-9801, p-ISSN: 2320-9798| www.ijircce.com | |Impact Factor: 8.379 | Monthly Peer Reviewed & Referred Journal |

|| Volume 12, Issue 5, May 2024 ||

| DOI: 10.15680/IJIRCCE.2024.1205141 |

Face Detection-Based Transaction System with Python GUI

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ABSTRACT: The Face Detection-based Transaction System with Python GUI is a project that aims to enhance the security and convenience of financial transactions by integrating face detection technology. This system allows a transaction to take place between a requester and a receiver, where the requester initiates the transaction by requesting a specific amount and authenticating using a UPI (Unified Payments Interface) PIN and face detection. The receiver then approves the requested amount by validating their identity through face detection. By incorporating face detection technology, this project adds an additional layer of security to the transaction process. Face detection algorithms analyse the facial features of the individuals involved, ensuring that only authorized individuals can initiate and approve transactions. This technology eliminates the need for traditional authentication methods like passwords or physical identification cards, making the transaction process more seamless and secure.

KEYWORDS: Python GUI, Machine Learning, OpenCV, UPI, Face detection,Haar cascade, Gray scaling, UPI Transactions.

I. INTRODUCTION

The Face Detection-based Transaction System with Python GUI is a project that aims to enhance the security and convenience of financial transactions by integrating face detection technology. This system allows a transaction to take place between a requester and a receiver, where the requester initiates the transaction by requesting a specific amount and authenticating using a UPI (Unified Payments Interface) PIN and face detection. The receiver then approves the requested amount by validating their identity through face detection. By incorporating face detection technology, this project adds an additional layer of security to the transaction process. Face detection algorithms analyse the facial features of the individuals involved, ensuring that only authorized individuals can initiate and approve transactions. This technology eliminates the need for traditional authentication methods like passwords or physical identification cards, making the transaction process more seamless and secure.

The Python GUI (Graphical User Interface) component of the project provides an intuitive and user-friendly interface for both the requester and receiver. The GUI enables the users to input transaction details, view relevant information, and interact with the face detection system effortlessly. The Face Detection-based Transaction System with Python GUI provides a secure and efficient way to perform financial transactions by leveraging face detection technology. It combines the power of facial recognition with a user-friendly interface, offering a seamless and convenient experience for both the requester and receiver.

Recently, facial-recognition payment gained popularity in China as a new digital-payment method at physical stores. cash isn't accepted in some places, only mobile payment. A Chinese shopper can leave home without her purse if she has her phone. The wallet-free reality is due to QR code scanning. People scan the QR code in a shop and pay for the order on their phones. Facial acknowledgment takes this handle a step advance you do not indeed require your phone. The rise of digital payments in India has been grown. In few years, we have gone from a cash-dominated economy to where digital payment are increasing. The most popular digital payment methods in India is Unified Payments Interface (UPI), which allows users to transfer funds directly to any bank easily UPI is quick, helpful, and secure and making it an fabulous choice for everyone who is willing to form cashless exchanges.

The success of the unified payments interface (UPI) has been marred by an alarming rise in citizens being robbed or cheated out of their money while conducting transactions online. Data from the Ministry of Home Affairs shows a 34% higher occurrence of cybercrimes via UPI compared to other categories like card and e-banking fraud. These numbers and statistics show a consistent rise in cybercrime complaints filed on the centralised portal since 2021. According to the

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Reserve Bank of India, UPI payments rose by a whopping 1,200% from April to September 2022. With this exponential surge, criminal activity concerning digital finances also skyrocketed. With over 690 million people using the internet, constituting around 40% of the country's population, India's digital footprint is second only to China. Digital payments and online banking have seen a boom in both urban and rural areas.

From April to June 2022, fraud complaints regarding UPI payments rose to 84,145, from 62,350 cases seen between January and March (Q1 and Q2 of 2022). Swapping of credit cards, debit cards, and mobile sims contributed to 26,793 cases, rising from 24,270 in the year's first quarter. Criminal activities around online banking saw a quarter-on-quarter increase of 19,267. According to the NCRP, the category of 'Online Financial Fraud' was the most active, with 67.9% of complaints registered under it. Moreover, such cases continue to rise even today, despite various steps taken to curb this menace. The National Cybercrime Threat Analytics Unit (NCTAU) of the Indian Cyber Crime Coordination Centre (I4C) has undertaken many measures of Cyber Security Cooperation and Cyber Crime Prevention with various Domestic and International Agencies to curb rising online threats. However, where there is money, there will always be thieves and crooks, and India's digital footprint has been marred by a similar surge in cyber fraud. The foundation of this project lies in setting up the development environment. Ensuring Python is installed is the first step, followed by installing essential libraries like OpenCV for face detection and Tkinter for GUI development. With these tools in place, we can proceed to implement the core functionality of the system - the face detection algorithm. Utilizing techniques such as Haar cascades or deep learning models like Dlib or OpenCV's dnn module, we'll detect faces accurately from the input sources.

The graphical user interface (GUI) plays a pivotal role in making the system accessible and user-friendly. Leveraging Tkinter, we'll design an intuitive interface with buttons for initiating face detection, controlling the system's behavior, and entering transaction details. This GUI will serve as the primary means through which users interact with the system, providing visual feedback on the face detection process and facilitating transaction handling.

Integrating the face detection algorithm seamlessly with the GUI is essential for a cohesive user experience. We'll connect the code responsible for capturing video frames, processing them for face detection, and displaying the results with the GUI elements. Users will be able to see the live video stream with bounding boxes around detected faces, enhancing their understanding of the system's functionality and performance.

The heart of the system lies in its ability to handle transactions based on the detected faces. Recognizing specific individuals and associating them with transactions, such as payments or authentication processes, will be a key feature. Integration with external APIs or databases may be necessary to facilitate transaction-related tasks, ensuring that the system can perform meaningful actions based on the identified faces.

Thorough testing and debugging are imperative to ensure the system's reliability and accuracy. Rigorous testing will validate the face detection capabilities and transaction handling logic, while debugging will address any issues that arise during development. Optimizing the code for performance and refining the GUI for usability will further enhance the system's functionality and user experience.

Documenting the code and preparing it for deployment are essential steps in making the system accessible to others. Clear documentation detailing how each component works and how to use the system will enable others to understand and contribute to the project. Packaging the system appropriately for deployment and providing instructions for installation and usage will ensure that the system can be deployed and utilized effectively in real-world scenarios.

The face detection-based transaction system combines the power of computer vision with practical applications, offering a versatile solution for various use cases. Through careful integration of face detection algorithms with a user-friendly GUI and robust transaction handling logic, this system aims to provide a seamless and secure user experience while opening avenues for further exploration and development in the field of computer vision and human-computer interaction.

OpenCV

OpenCV, or Open Source Computer Vision Library, is a widely used open-source computer vision and machine learning software library. It provides a wide range of tools and functionalities for tasks such as image and video analysis, object detection and tracking, facial recognition, and more. OpenCV is written in C++ and has bindings for Python and other languages, making it accessible to a broad audience.Its extensive collection of algorithms enables developers to perform various computer vision tasks efficiently. OpenCV supports multiple platforms including Windows, Linux, macOS, iOS, and Android, making it versatile for use in a wide range of applications from robotics to augmented reality to medical

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imaging.The library is continuously evolving with contributions from the open-source community and is backed by a strong developer community and extensive documentation, making it a go-to choice for computer vision projects.

Haar Classifer

Haar classification is a method used in object detection, particularly in the context of face detection. It relies on Haar-like features, which are simple rectangular patterns used to characterize objects within an image. These features are like templates that help in distinguishing objects from the background based on differences in pixel intensities. The process involves training a machine learning model, typically a variant of the Viola-Jones algorithm, using a large dataset of positive and negative examples.

The process involves training a machine learning model, typically a variant of the Viola-Jones algorithm, using a large dataset of positive and negative examples. Positive examples contain the object of interest (e.g., faces), while negative examples contain images without the object.

During training, the algorithm learns to identify discriminative features that are common in positive examples and rare in negative examples. These features are then used to create a cascade of classifiers that efficiently scan an image, identifying regions of interest where the object might be present.

Haar cascades are fast and efficient for detecting objects in real-time applications. However, they may not perform as well in complex or cluttered scenes compared to more advanced techniques like deep learning-based approaches. Nonetheless, they remain a popular choice for tasks where real-time performance is crucial and computational resources are limited.

II. EXISTING SYSTEM

There are several methods for transferring money, such as UPI and net banking. These methods facilitate the easy transfer of funds between banks using a virtual payment address. However, UPI transactions require users to possess a smartphone and an active internet connection, which can be a hindrance for individuals without smartphones or with limited internet access. Moreover, users who lose or damage their smartphones may encounter difficulties accessing their UPI accounts and conducting transactions. While UPI transactions are generally secure, there have been reported cases of fraud and unauthorized access to users' bank accounts via UPI. Hackers may employ phishing or other tactics to acquire sensitive information like UPI PINs or device IDs, which they can then exploit for unauthorized transactions. Furthermore, UPI transactions are heavily reliant on internet connectivity. In regions with poor network coverage or weak internet signals, UPI transactions may fail or experience significant delays, inconveniencing users who depend on UPI for their everyday transactions.

III. PROBLEM STATEMENT

Existing system has various ways to transact money through UPI, Net banking which has security concerns, Dependency on smartphones, Network connectivity issues. Thus a new solution is Face payment which uses biometric technology to replace traditional passwords by "scanning your face" in the payment stage, optimizing the payment process, successfully making strides the day by day utilization encounter of clients, progressing the exchange effectiveness of dealers, and driving the improvement of different businesses.

IV. PROPOSED SYSTEM

The proposed system attempts to design and adopt a Face Detection-based Transaction System with Python GUI that aims to enhance the security and convenience of financial transactions by integrating face detection technology. By incorporating face detection technology, this project adds an additional layer of security to the transaction process. Face detection algorithms analyse the facial features of the individuals involved, ensuring that only authorized individuals can initiate and approve transactions.

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System Architecture

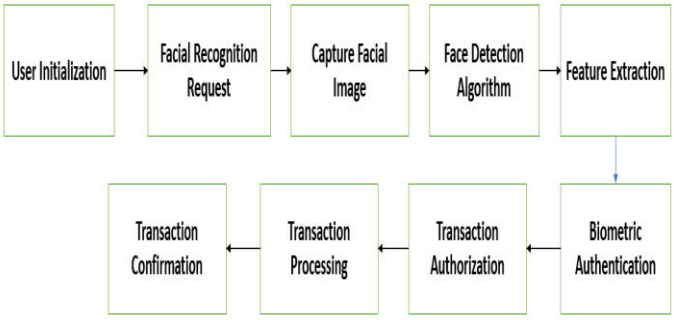

Figure : System Architecture

The system architecture for face data storage and detection for users with UPI PIN involves multiple components working together to securely store and detect facial data. Here is a overview of the system architecture:

- **User Initialization:** The user initiates a transaction using a Python GUI.
- **Facial Recognition Request:**The GUI prompts the user to undergo facial recognition for secure authentication.
- **Capture Facial Image:**Activate the device's camera using OpenCV in Python to capture the user's facial image.
- **Face Detection Algorithm:**Implement a face detection algorithm, such as Haar cascades or a deep learning-based model, to identify and locate the user's face within the captured image.
- **Feature Extraction:**Extract facial features from the detected face to create a unique representation for user authentication.
- **Biometric Authentication:**Compare the extracted facial features with stored biometric data associated with the user's account.
- **Transaction Authorization:**If the facial features match the stored data, authorize the transaction through the GUI.
- **TransactionProcessing:** Proceed with the transaction, securely transmitting details if needed.
- **Transaction Confirmation:** Confirm the completion of the transaction through the GUI.

V. RESULT

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VI. CONCLUISON

This device is an innovative solution aimed at empowering visually impaired individuals by providing them with the independence they need. It's a low-cost, electronically smart guiding stick equipped with ultrasonic sensors to aid navigation and alert the user to any potential hazards or obstacles along their path. The Blind Walking Stick prototype has been developed to address the challenges faced by the visually impaired in their daily lives. Not only does it enhance their mobility, but it also prioritizes their safety by proactively detecting and warning of dangers. This device has the potential to significantly improve the quality of life for blind individuals worldwide, facilitating their movement and ensuring their safety during everyday activities.

VII. FUTURE SCOPE

Future iterations of the Blind Walking Stick could incorporate state-of-the-art sensor technologies, such as LiDAR or radar, to provide more precise environmental perception and obstacle detection capabilities. Integrating artificial intelligence algorithms could enable the device to learn from user interactions and adapt its functionality to better suit individual needs.

Additionally, exploring connectivity options like Bluetooth or IoT could allow for seamless communication between the walking stick and other devices or infrastructure, while companion mobile applications could offer navigation assistance and remote monitoring features. Wearable technology integration, such as smart glasses or haptic feedback systems, presents another avenue for enhancing user experience and accessibility.

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INTERNATIONAL STANDARD SERIAL NUMBER INDIA

INNO SPACE SJIF Scientific Journal Impact Factor

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