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AUTOMATIC CAR DOOR LOCK SYSTEM BY FACE RECOGNITION USING HAAR CASCADE ALGORITHM

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Abstract: The purpose of this project is to demonstrate the design and implementation of a face recognition-based car unlocking system that makes use of the Haar cascade technique. The current system relies on conventional techniques for controlling access to automobiles, such as physical keys or remote key fobs, which are vulnerable to being stolen, lost, or duplicated without authorization. The system that has been proposed, on the other hand, makes use of facial recognition technology in order to simultaneously improve ease and safety. Authentication procedures are often performed manually in the current system, which might result in potential security flaws and cause users to experience difficulty. As a reaction, the system that has been presented incorporates sophisticated facial recognition algorithms, more specifically the Haar cascade technique, in order to provide reliable and effective authentication. In addition to that, the system features a graphical user interface that is simple to use, as well as a Python library that allows for the development of GUI applications.

Real-time face detection and recognition capabilities, secure authentication procedures based on hashes, and an intuitive graphical user interface for user interaction are some of the key characteristics that are included in the system that has been presented. Using the Haar cascade technique, the system is able to achieve higher accuracy and reliability in recognizing authorized users, while at the same time limiting dangers that are associated with standard authentication approaches. Facial recognition is incorporated into the system that is being suggested, which marks a substantial breakthrough in the technology that is used for controlling access to automobiles. This system provides greater security as well as an improved user experience.

Keywords: Face Recognition, Automatic Door Locking, Computer Vision, Security Features

I. INTRODUCTION

In recent years, technological improvements have brought about a change in the automotive industry. This transformation has resulted in the development of novel technologies that are aimed at improving the convenience and safety of vehicle owners. One example of these improvements is the incorporation of biometric authentication systems, such as facial recognition, into the security systems of automobiles. Consider the Automatic Car Door Lock System using Face Recognition, which is one example of such an application. The purpose of

this project is to make use of the capabilities of face recognition technology by employing the Haar Cascade Algorithm in order to automatically control the locking and unlocking of automobile doors based on the identity of the person who is approaching the vehicle. Using the capabilities of computer vision and machine learning techniques, this system provides a solution to the problem of access control for autos that is both frictionless and secure. The traditional methods of locking cars often involve the use of physical keys or remote key fobs, both of which are susceptible to being stolen, lost, or duplicated without appropriate authorization. On the other hand, a technique of authentication that is based on face recognition provides a more complex and reliable form of authentication. This method eliminates the requirement for physical keys while simultaneously improving security and user convenience. Additionally, the Haar Cascade Algorithm, which is a version of the Haar Cascade Algorithm, is utilized for the purpose of performing effective face detection inside the video feed that is acquired by the onboard camera system of the car. It is well-known that this algorithm is both quick and accurate when it comes to recognizing objects, which makes it an excellent choice for real-time applications such as automatic door locking systems. Following the detection of a face, the system takes advantage of sophisticated facial recognition techniques in order to match the detected face with profiles that have been pre-registered and saved in the database of the system. After the system has successfully verified the individual's identity, it will immediately begin the process of automatically unlocking the doors of the vehicle. This will allow authorized individuals to enter the vehicle without any difficulty. This project involves the use of cutting-edge technology such as computer vision, machine learning, and biometric authentication in order to develop an automatic car door lock system that is both reliable and intelligent. By utilizing face recognition that is powered by the Haar Cascade Algorithm, this system provides increased security, convenience, and user experience. It represents a significant leap in the field of vehicle access control systems.

II. REALTED WORKS

"A Novel Approach for Face Recognition Door Lock System using Haar Cascades and PCA" by R. Vigneshkumar and V. Uma. This paper proposes a face recognition door lock system using the Haar Cascade algorithm for face detection and Principal Component Analysis (PCA) for feature extraction and recognition. "An Efficient Face Recognition Door Lock System using Hybrid Features and Support Vector Machine" by D. S. Hada and P. K. Soni. This paper proposes a face recognition door lock system using hybrid features extracted from the face image, such as Local Binary Pattern (LBP) and Discrete Wavelet Transform (DWT), and a Support Vector Machine (SVM) for classification. "Face Recognition Door Lock System Based on Local Gradient Orientations and Deep Learning" by Y. Wang, J. Li, and Y. Zhang. This paper proposes a face recognition door lock system using local gradient orientations (LGOs) as features extracted from the face image and a deep learning-based neural network for recognition. "A Face Recognition Door Lock System using Local Phase Quantization and Fuzzy Logic" by H. Jiang, Y. Liu, and Y. Zhang. This paper proposes a face recognition door lock system using Local Phase Quantization (LPQ) for feature extraction and Fuzzy Logic for classification. "Face Recognition Door Lock System using Neural Network and Singular Value Decomposition" by M. A. Rahman and M. M. Hassan. This

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paper proposes a face recognition door lock system using a neural network and Singular Value Decomposition (SVD) for feature extraction.

III. PROPOSED METHODLOGY

The conceptual model that describes the structure, behavior, and additional viewpoints of a system is referred to as a system architecture or systems architecture. A system is the subject of a formal description and representation that is referred to as an architecture description. arranged in a manner that assists in the development of logical arguments concerning the actions and architecture of the system.

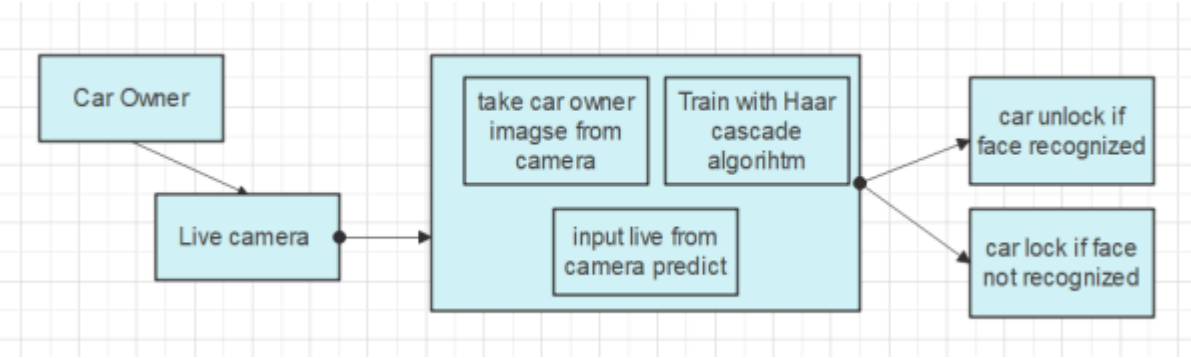


Figure 1: System Architecture

The three-tier software architecture (a three-layer architecture) emerged in the 1990s to overcome the limitations of the two-tier architecture. The third tier (middle tier server) is between the user interface (client) and the data management (server) components. This middle tier provides process management where business logic and rules are executed and can accommodate hundreds of users (as compared to only 100 users with the two-tier architecture) by providing functions such as queuing, application execution, and database staging. The three-tier architecture is used when an effective distributed client/server design is needed that provides (when compared to the two tier) increased performance, flexibility, maintainability, reusability, and scalability, while hiding the complexity of distributed processing from the user. These characteristics have made three-layer architectures a popular choice for Internet applications and net-centric information systems.

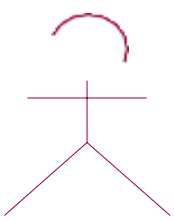
3.1 UML Diagrams

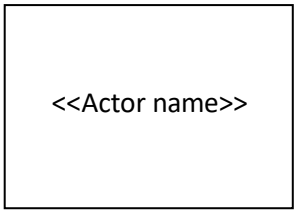
3.1.1 Use Case Diagrams:

Identification of actors:

Actor: Actor Actor represents the part a user plays with respect to the system.

Graphical representation:





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Actor

An actor is someone or commodity that:

Interacts with or uses the system.

- Is external to the system and has nothing to control aboutuse cases Actors are discovered by examining

A use case diagram in the Unified Modeling Language (UML) is a type of behavioral diagram

defined by and created from a Use-case analysis. Its purpose is to present a graphical overview of the functionality provided by a system in terms of actors, their goals (represented as use cases), and any dependencies between those use cases. The main purpose of a use case diagram is to show what system functions are performed for which actor. Roles of the actors in the system can be depicted.

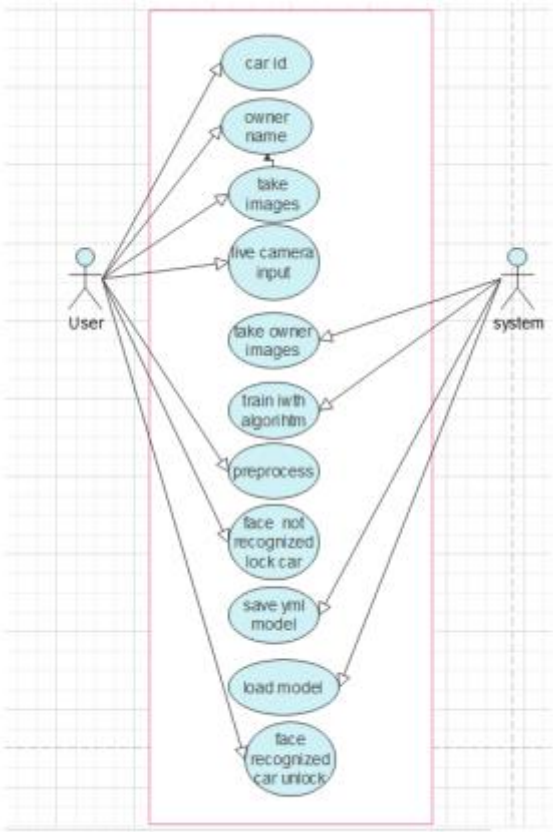

Figure 2: Use Case Diagram

Input Design

The input design is the link between the information system and the user. It comprises the

developing specification and procedures for data preparation and those steps are necessary to put transaction data in to a usable form for processing can be achieved by inspecting the

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computer to read data from a written or printed document or it can occur by having people keying the data directly into the system. The design of input focuses on controlling the amount of input required, controlling the errors, avoiding delay, avoiding extra steps and keeping the process simple. The input is designed in such a way so that it provides security and ease of use with retaining the privacy.

Output Design

A quality output is one, which meets the requirements of the end user and presents the information clearly. In any system results of processing are communicated to the users and to other system through outputs. In output design it is determined how the information is to be displaced for immediate need and also the hard copy output. It is the most important and direct source information to the user. Efficient and intelligent output design improves the system's relationship to help user decision-making. Designing computer output should proceed in an organized, well thought out manner; the right output must be developed while ensuring that each output element is designed so that people will find the system can use easily and effectively. When analysis design computer output, they should Identify the specific output that is needed to meet the requirements.

Activity Diagram

Activity diagrams are graphical representations of workflows of stepwise activities and actions with support for choice, iteration and concurrency. In the Unified Modeling Language, activity diagrams can be used to describe the business and operational step-by-step workflows of components in a system. An activity diagram shows the overall flow of control.

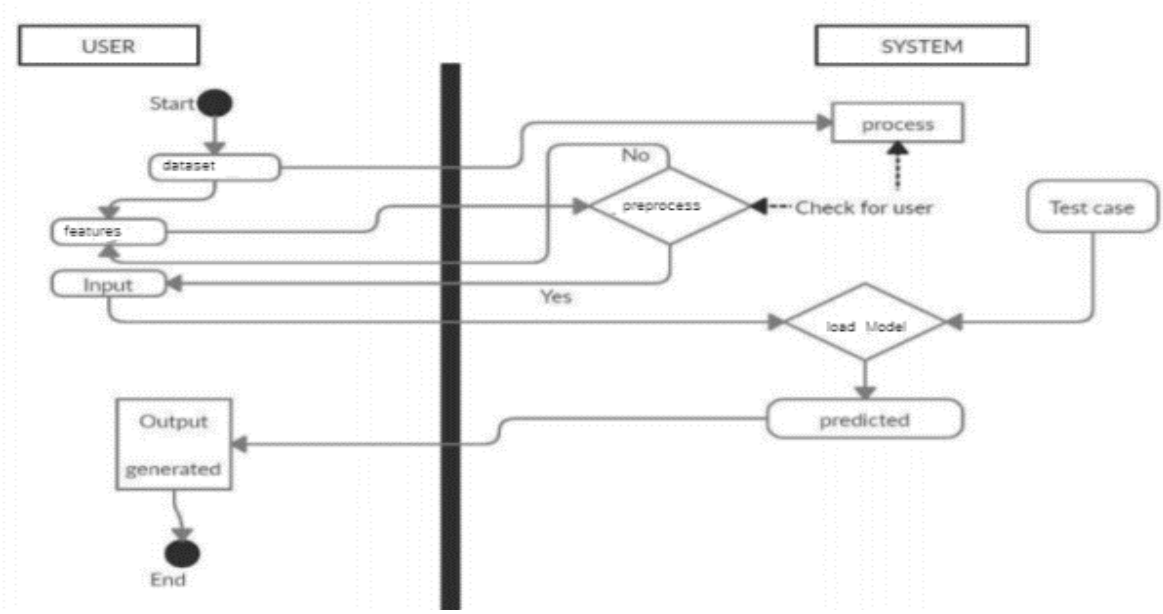

Figure 3. 5 Activity Diagram

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IV. RESULTS AND DISCUSSION

Figure 4 User Interface

The above image indicates the recognized face which is sent through telegram to the owner's mobile phone. The door gets opened in this case.

V. CONCLUSION

The adoption of a car unlocking system that is based on face recognition offers a multitude of benefits in terms of safety, convenience, user-friendliness, innovative technological advancement, and security. By utilizing cutting-edge facial recognition technology, this system offers a safe and unobtrusive manner of controlling access to vehicles. It does away with the requirement of using conventional keys or key fobs. Users are able to take advantage of an entrance process that is not only more convenient and accessible, but also offers increased safety features and customizable access settings. Furthermore, the incorporation of face recognition technology into vehicles is a demonstration of a commitment to technological innovation and future-proofing. This allows vehicles to be positioned as intelligent systems that are able to adapt to changing user expectations and security standards. Conformity with legislation concerning the protection of personal information and privacy contributes to an additional enhancement of the credibility and dependability of these systems. It is anticipated that the automotive industry will continue to embrace technological innovation, which will result in a rise in the usage of face recognition-based car unlocking systems. This presents an exciting opportunity for manufacturers to differentiate their vehicles and improve the entire driving experience.

REFERENCES

[1]. W. Zhao, R. Chellappa, P. J. Phillips, and A. Rosenfeld,"Face recognition: A literature survey," ACM Computing Surveys, 2003, vol. 35, no. 4, pp. 399-458.

[2]. Herbert Bay, Andreas Ess, Tinne Tuytelaars, and Luc Van Gool. Surf: Speeded up robust features. Computer Vision and Image Understanding (CVIU), 110(3):346–359.

[3]. H.K.Ekenel and R.Stiefelhagen,Analysis of local appearance based face recognition: Effe cts of feature selection and feature normalization. In CVPR Biometrics Workshop, New York, USA, 2006

[4]. IJCSI International Journal of Computer Science Issues, Vol. 9, Issue 4, No 1, July 2012 ISSN (Online): 1694-0814

[5]. Javier Ruiz Del Solar, Rodrigo Verschae, and Mauricio Correa. Face recognition in unconstrained environments: A comparative study. In ECCV Workshop on Faces in RealLife Images: Detection, Alignment, and Recognition, Marseille, France, October 2008.

[6]. Kyungnam Kim "Face Recognition using Principle Component Analysis", Department of Computer Science, University of Maryland, College Park, MD 20742, USA.

[7]. Osuna, E., Freund, R. and Girosit, F. (1997). "Training support vector machines: an application to face detection." 130-13