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A Research Paper on Smart Authentication Systemfor Identity Verification

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***Abstract:** This research paper focuses on the creation of aweb application that employs modern techniques to authenticate and verify the identities of students and employees. In the era of digital transformation, conventional identification methods have become less effective. To overcome this challenge, the proposed solution leverages advanced biometric technologies like facial recognition and QR codes to ensure precise identification of individuals. Moreover, the application offers SMS and email notifications, along with a performance chart generated by machine learning to provide comprehensive user information. The objective of this project is to develop a trustworthy andsecure digital identity verification system that can cater to all citizens.*
***Index Terms:** Web Application, Bio-metric technologies, Au- thentication, Verification, Security, Face Recognition, QR Code, Machine Learning*

I. INTRODUCTION

An automated solution is proposed to address the chal- lenges of authenticating student identities and tracking their movements within a college campus. This system, called the Smart Identity Card, utilizes the latest technology in the form of QR codes and facial recognition to generate and verifystudent ID cards quickly and securely. The ID cards display the student's name, ID number, and emergency contact, while other details are hidden under the QR code. This not only ensures the security and confidentiality of the employee work environment but also saves time and money spent on manual ID card generation.

The Smart Identity Card system is designed to be user- friendly and easy to implement. Students can easily apply for an ID card on the web application, and once the applicationis approved, the ID card will be generated immediately and sent to the registered email id of the student. This eliminates the need for physical visits to the college office, making the process more convenient for students.

Security guards at the entrance gate scan the QR code and the student's face to grant access. The system is robustto changes in lighting conditions, glare, noise, contrast, and shadows, making it highly secure and reliable. Additionally, once the student enters the college campus, our SMS system will send a notification to their parents, and the time he enters the college campus will be updated on an excel sheet that will be accessible by the teacher. The same will be done once the student leaves the campus, ensuring complete transparencyand accountability.

The Smart Identity Card system also offers multiple benefits for the college administration. It eliminates the need for manual record-keeping, reducing the chances of errors and inaccuracies. The system also generates reports and analytics on student attendance and movements, which can be used bythe college administration for decision-making and planning.The reason we use QR codes is the amount of data they can store compared to traditional barcodes. A QR code is two-dimensional, unlike a one-dimensional barcode. This means that QR codes can contain more data, and QR codes can be up to 10 times smaller than barcodes and still be readable. This makes it an efficient and convenient solution for both students and staff. Overall, the Smart Identity Card system is a secure,time-saving, cost-effective, and user-friendly solution for au-thenticating student identities and tracking their movements within a college campus.

II. LITERATURE REVIEW

Technology is becoming increasingly intertwined with our daily lives, affecting how we learn, work, and play. One area where technology has had a significant impact is in security systems. With the advent of the internet, vast amounts ofinformation can be stored and moved quickly and easily. Many scholars have devoted significant effort to examining various features of human identification, and QR codes are seen as the next generation of barcodes, and our objectiveis to design a technology solution that utilizes QR codes in digital identity cards to create a new era of smart identity cards. Traditional identity cards can be prone to errors and mistakes, and barcode scanning can be hindered by scratches and requires a specialized device. QR codes, on the other hand, have a larger storage capacity, are more easily readable, and are less expensive to implement.

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The Smart Identity Card system will be designed to eliminate the need for carrying multiple cards by an individual. It will store all the necessary information of the student in a single card, making it more convenient and efficient. Manual card verification can be time-consuming and tedious, particularly in situations where a largenumber of users are entering a building at once. Educational institutions often opt for simple non-RFID identification cards, but this manual verification process can be unreliable andleads to security gaps. The use of manual verification also increases the chances of errors and inaccuracies in record- keeping, which can have serious consequences.

Our system aims to streamline the identification and autho- rization of users/students in a contactless manner, eliminating the need for manual verification and reducing the possibilityof image manipulation and fake cards. This system also offers a more efficient and secure approach to tackling unauthorized access. In addition, the system will also send notifications to parents and update time records for teachers, providing trans- parency and accountability. Moreover, the system can generatereports and analytics on student attendance and movements, which can be used by the college administration for decision- making and planning. The Smart Identity Card system isa comprehensive solution that addresses the challenges of identity verification and security in educational institutions.

Overall, the Smart Identity Card system is a secure, time- saving, cost-effective, and user-friendly solution for authenti- cating student identities and tracking their movements within acollege campus. It utilizes the latest technology in the form of QR codes and facial recognition to generate and verify student ID cards quickly and securely, while also providing additional features such as notifications, record-keeping and analytics.

III. SYSTEM DESIGN

The following section provides a detailed overview of how the software functions. As shown in Fig [1] The softwarecomprises three main user roles, namely students, securityguards, and administrators. Users register themselves on the platform, and their data is only accessible to the administrator, who is the super user. The platform also allows users to view their performance chart, which presents their data ina graphical format. The Security Guard is responsible for scanning the QR Code and the face of the user. Their scanningtasks are directly linked to the administrator, and they cannot modify any user data.

To create a facial recognition system, a diverse dataset of1000 images with various faces was compiled. This dataset contained pictures captured in various settings and lighting conditions. Optimal algorithms were used to extract faces precisely from any location. Facial recognition technologyinvolves image acquisition equipment that captures data on human faces and inputs it into a computer for program calculation. The computer algorithm technology processes the collected face data, analyzes it, and extracts features for identity recognition.

The software process flow starts with the client receiving ajob and assigning it to the server. The client processes theface image and sends the job to the processor for automated facial recognition. The processor retrieves the result of the image sequence and uses it to identify the user accurately and efficiently. This process is reliable and effective for tracking and authenticating student identities within a college campus. It is essential for maintaining campus security and ensuring that only authorized individuals can access certain resources. Overall, the software process flow is a dependable solution formanaging student identities.

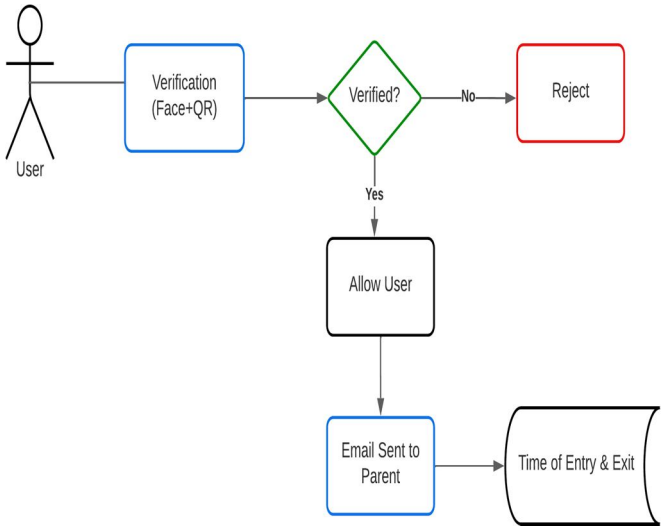


Fig. 1. High Level Working Diagram

A. System Design for Deep Face Library

Deepface is a cutting-edge framework for face recognition and analysis that has been designed to be lightweight and easyto use. It boasts an impressive array of state-of-the-art models, including VGG-Face, Google FaceNet, OpenFace, Facebook DeepFace, DeepID, ArcFace, Dlib and SFace, all of which have been integrated into the system to provide unparalleled accuracy and performance.

With its advanced facial attribute analysis capabilities, Deepface can accurately identify a person's age, gender, emo-tion and race with remarkable accuracy. In fact, experiments have shown that Deepface is capable of achieving a level of accuracy that surpasses even that of human beings, with a remarkable accuracy rate of 97.53%. One of the key features of Deepface is its powerful face verification function, which can be used to verify whether two faces belong to the same person or not. The function is capable of processing exact image paths, as well as numpy or base64 encoded images, making it incredibly versatile and easy to use.

Deepface is built on top of the TensorFlow library, whichis one of the most widely used deep learning libraries in the world. By leveraging the power of TensorFlow, Deepface is able to take advantage of cutting-edge algorithms and models to achieve exceptional performance and accuracy in its face recognition and analysis tasks.

TensorFlow provides a powerful platform for building and training deep neural networks, and its flexible architecture makes it well-suited for a wide range of applications. Withits robust set of tools and libraries, TensorFlow has becomea go-to choice for researchers and developers working in the field of deep learning. By incorporating TensorFlow into its framework, Deepface is able to benefit from the latest advancesin deep learning research, making it one of the most powerful and accurate face recognition and analysis tools available today. Deepface and TensorFlow provide the tools needed to achieve exceptional results in facial recognition and analysis.

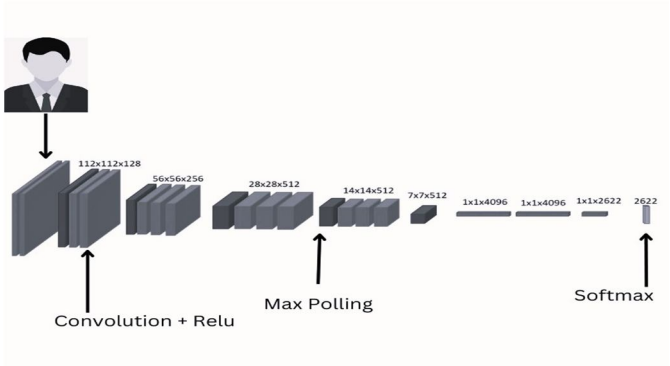


Fig. 2. Deep Face Neural Network

B. System Design for QR Code

The secure image generator employs a preprocessing stage that serves three critical functions. Firstly, the generator trans- forms picture data into character string data, which can thenbe modified as needed. The next step involves compressingthe text-based data to fit within the data capacity allowed by the QR code. Finally, the optimized data is encrypted usinga text-based encryption method to ensure its security before being used to generate a QR code-based secure picture.

QR codes are highly versatile in terms of the information they can store, and can encode a significant amount of datain a small area. This includes sensitive information such as authentication data and personal details of students. However, it is important to note that QR codes also pose potential se- curity risks. Unauthorized access to the information contained within QR codes is possible if appropriate security measures are not put in place. Thus, it is crucial to use QR codes onlyin situations where their benefits outweigh the risks, and to implement robust security protocols such as authentication andaccess controls to prevent data breaches.

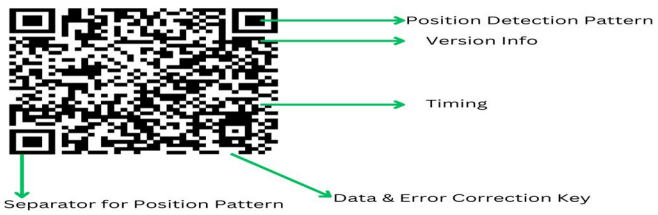


Fig. 3. QR Code Diagram

IV. UML CLASS DIAGRAMS

A. Class Diagram for User

To begin, the user needs to register for an account on the web application and provide their login information. Theymust provide their password and confirm it for the website, then click the register button. The web page will automaticallyadd their username and password to the database. To prevent unauthorized access, users can input the email ID provided by the institute. Once the account is created, the user will need to fill out the student form with all the necessary details, including uploading an image for verification. After submittingthe form, a QR Code will be generated.

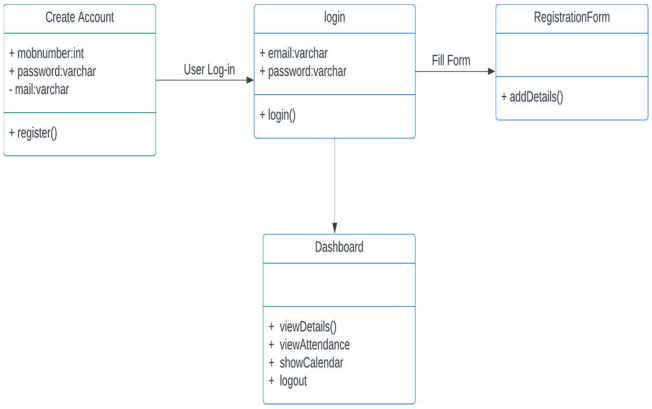


Fig. 4. UML Class Diagram - User

B. Class Diagram for Admin

The admin has the ability to view all user information, but only after creating an account with a unique username and password. Once logged in, the admin can access the relevant data. If a user leaves the session prematurely, the admin can delete their record from the database. The admin is also responsible for updating any necessary information. User privileges are limited to viewing records and data in Essentials.If the admin attempts to access the Admin Portal without the proper administrative privileges, an error message will appear. Additionally, the Admin Portal only displays information that is relevant to the admin's authorization level. The admin has the ability to add teacher details, and teachers are only per- mitted to access internal student data for attendance purposes.

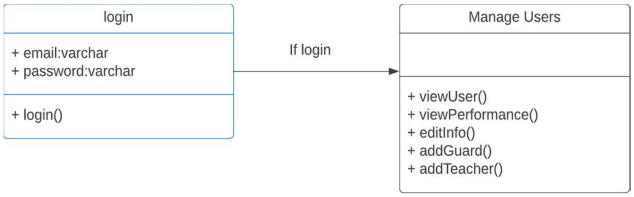


Fig.5. UML Class Diagram – Admin

C. Class Diagram for Security Guard

The security guard must first register to create their account. As there will only be one account, the admin is solely responsible for creating it. The security guard will have accessto a scanner through the web app, which is used to scan a student's face and QR code. Real-time data will be updated accordingly. If the verification process is successful, an SMS notification will be sent to the parent's cell phone, and the performance chart will be updated with the same information.

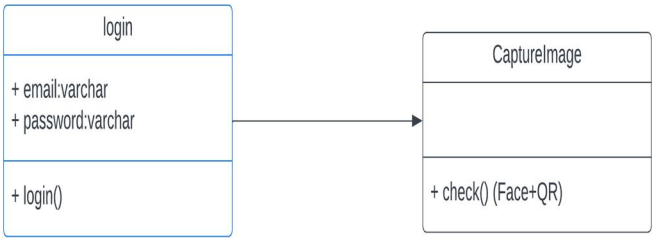


Fig. 6. UML Class Diagram - Guard

D. Class Diagram for Teacher

The admin has the exclusive authority to add teachers to the system. Once the teacher logs into their account, they will be presented with an interface containing filters to select the class and division. A table will then be displayed, showing the names of students and attendance mark columns. The teacher will mark the checkbox for each student who is present on that day and submit the attendance record

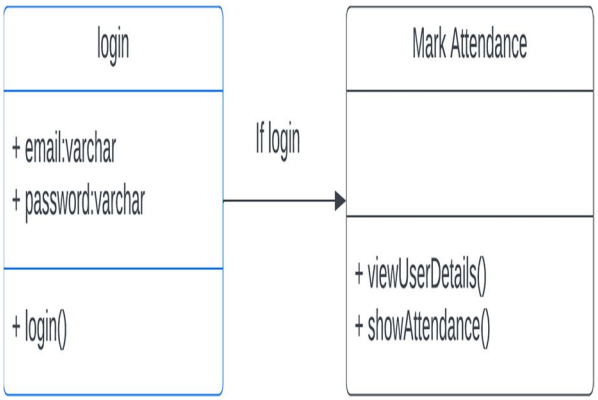


Fig. 7. UML Class Diagram - Teacher

V. DEVELOPMENT METHODOLOGIES

A. Technologies & Languages

1) Backend: Python (Flask / Flask-RESTful API).

Flask is an open-source web framework. It's a Python package that makes it simple to create web apps. It has a modest and simple core: it's a microframework without an ORM (Object Relational Manager) or other functionalities.

2) Frontend: ReactJs.

ReactJS is a JavaScript toolkit for creating reusable UI components that is declarative, fast, and versa- tile. It is an open-source, component-based front-end library that is exclusively responsible for the application's view layer.

3) Database: SQLite

SQLite is a software package that offers a serverless, transactional SQL database engine with zero setup. SQLite is the world's most popular SQL database engine.

4) Security/Authentication: JWT (JSON Web Token).

JWT, or JSON Web Token, is an open standard that allows two parties — a client and a server — to exchange security information. Each JWT includes encoded JSON objects as well as a set of assertions.

B. Features Included

1) Face-Recognition.
2) QR-Code verification.
3) Email Service.
4) Performance Chart.
5) Teacher Access.

VI. ACKNOWLEDGMENT

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VII. CONCLUSION

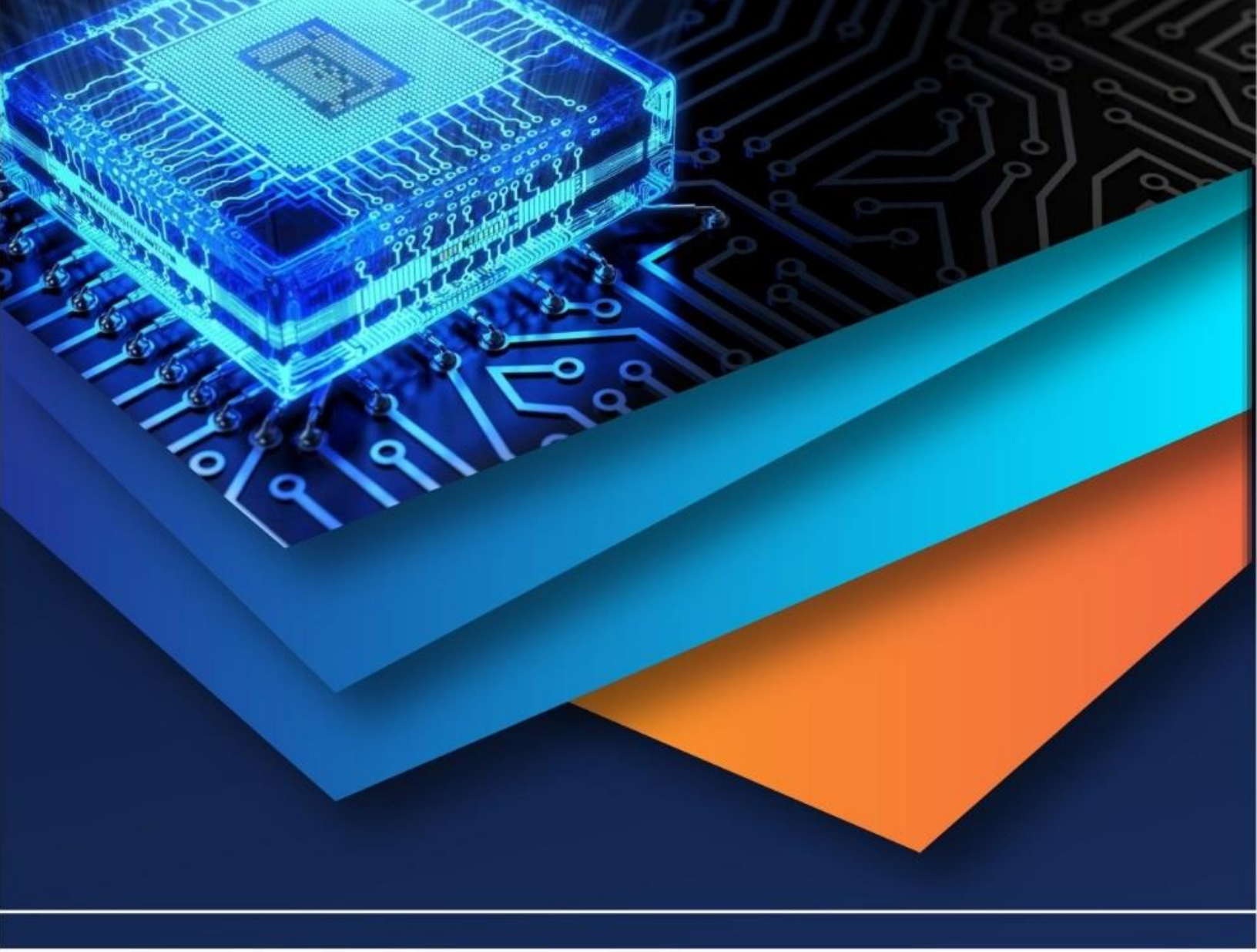
Our system helps to digitize the traditional methods of identifying and verifying individuals, and we can ensure that itovercomes the flaws of the existing system. By implementing a Smart Authentication System with Identity Verification, we aim to increase efficiency and reduce human error.

Computerizing this system is a significant step forward in modernizing the process of identification and verification, making it more accessible to a broader range of users. This technology is particularly advantageous for developing coun- tries, as they can introduce the system to various educational institutions and benefit from its efficiency and accuracy.

REFERENCES

[1] Young-Sae Kim, Jin-Hee Han, Geonwoo Kim, "Design of an efficient image protection method based on QR code"
[2] Praveen Kumar Singh1, Neeraj Kumar, Bineet Kumar Gupta, "Smart Cards with Biometric Influences: An Enhanced ID Authentication"
[3] Y. Chemla and C. Richard, “Security device, method and system for financial transactionas, based on the identification of an individual usinga biometric profile"
[4] A. Buriro, B. Crispo, and M. Conti, “Answer Auth: "A bimodal behavioralbiometric-based user authentication scheme for smart phones"
[5] Himanshu Thapliyal, Azhar Mohammad and S. Dinesh Kumar, —"EESP-FAL: A Novel Energy-Efficient Secure Positive Feedback Adiabatic Logic for DPA Resistant RFID and Smart Card"
[6] Jackson, Daniel, Fred Bargetzi, and Brian Donlan. "User identification and location determination in control applications"
[7] Qiuhui Yang, Xiaoyu Ji, Yanyan Liang, "Displacement detection method of QR code reference object based on computer vision"
[8] Zaman, Hasan U., et al. "RFID based attendance system." 2017 8th International Conference on Computing, Communication and Networking Technologies (ICCCNT). IEEE, 2017.
[9] C. L. Witham, “Automated face recognition of rhesus macaques,” J. Neurosci. Methods, vol. 300, pp. 157–165, 2018.
[10] A. A. Al-Saggaf, “Key binding biometrics-based remote user authen- tication scheme using smart cards,” IET Biometrics, vol. 7, no. 3, pp. 278–284, 2018.
[11] ISO/IEC 18004, “Information technology – Automatic identification and data capture techniques – QR Code bar code symbology specification”, 2015
[12] R. Amin "Cryptanalysis and Efficient Dynamic ID Based Remote User Authentication Scheme in Multi-server Environment Using Smart Card", International Journal of Network Security, vol. 18 no. 1 pp. 172-181, 2016.
[13] J. Zhao, Q. Qu, F. Zhang, C. Xu, S. Liu, “Spatio-temporal Analysis of Passenger Travel Patterns in Massive Smart Card Data”, IEEE Trans. Intell. Transp. Syst., vol. 18, pp. 3135-3146, 2017.
[14] A. K. Das, "Analysis and improvement on an efficient biometric- based remote user authentication scheme using smart cards" Information Security IET, vol. 5, no. 3, pp. 145-151, 2013.
[15] M. A. Sarrayrih and M. Ilyas, “Challenges of online exam, performances and problems for online university exam,” Int. J. Comput. Sci. Issues, vol. 10, no. 1, p. 439, 2013.
[16] C. Wick, C. Reul, and F. Puppe, “Improving OCR Accuracy on Early Printed Books using Deep Convolutional Networks,” arXivPrepr. arXiv1802.10033, 2018.
[17] Y. Chemla and C. Richard, “Security device, method and system for financial transactionas, based on the identification of an individual using a biometric profile"
[18] Bailey, Kyle O., James S. Okolica, and Gilbert L. Peterson. "User iden- tification and authentication using multi-modal behavioral biometrics." Computers & Security 43 (2014): 77-89.
[19] Praveen Kumar Singh, Neeraj Kumar, Bineet Kumar Gupta, "Smart Card ID: An Evolving and Viable Technology"
[20] R. Baran, P. Partila, and R. Wilk, “Automated text detection and character recognition in natural scenes based on local image features and contour processing techniques,” in International Conference on Intelligent Human Systems Integration, 2018, pp. 42–48.

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