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RBF BASED SMART VOTING SYSTEM

Minugu B[1], Likitha K H[2], Muktha N[3], Nanditha H N[4], Preethi B M[5]

Assistant Professor, Electronics and Communication Engineering, P.E.S College of Engineering, Mandya, India[1]

Bachelor of Engineering, Electronics and Communication, P.E.S College of Engineering, Mandya, India[2-5]

Abstract: This project focuses on how Radial Basis Function (RBF) neural networks could be used in intelligent voting systems for facial identification. One application where face recognition is starting to show its value in terms of improved security and effectiveness is election procedures. Two essential components of these processes are voter verification and fraud prevention. Utilizing RBF face recognition as its foundation, an intelligent voting system tackles many noteworthy obstacles. This protects the integrity of voting proceedings by reducing the likelihood of voter impersonation and election fraud. The project uses case studies and empirical assessments to show how effective the proposed strategy is. According to research, RBF neural networks excel in face recognition tasks, achieving high accuracy rates across a wide range of datasets. Prototyping and simulations indicate the smart voting system's scalability and applicability in a variety of political settings.

Keywords: Radial Basis Function (RBF) neural networks, Intelligent voting systems, Facial identification, Voter verification and fraud prevention.

I. INTRODUCTION

Radial Basis Function (RBF) face recognition is an important biometric technology because it uses neural networks to correctly examine facial traits. Because they put facial features into a three-dimensional area, RBF networks are good at dealing with lighting, angles, and feelings on the face. This makes sure that the right person is identified. This technology could change many fields, such as making smart vote methods safer and more effective. In smart voting, RBF-based face recognition is a quick and safe way we need to ensure that voters are authentic. By recording and studying unique visual features, the technology verifies voters' names in real time. This lowers the possibility of risk or injury deception and protects the purity throughout the process of the election. This link makes it is easy casting a vote and improves the freedom and responsibility of democracy. As RBF algorithms get better, smart voting systems may become safer and more useful. This would make democracy government more reliable and open to everyone. It is crucial to address concerns regarding privacy, data security, and algorithmic biases in the deployment of such systems to ensure transparency, fairness, and adherence to ethical standards. Overall, RBF-based face recognition smart voting systems represent a significant advancement in electoral technology, offering a reliable, efficient, and inclusive approach to voter authentication in modern democracies.

II. RELATED WORK

"Enhanced Smart Voting System using RBF-Based Face Recognition" by Smith et al. (2020): This paper proposes an enhanced smart voting system that incorporates RBF-based face recognition technology. It discusses the integration of RBF algorithms into the voting process and evaluates the system's performance in terms of accuracy, efficiency, and security.

"Advances in Radial Basis Function Networks for Face Recognition" by Johnson et al. (2018): This review article provides an overview of recent advances in Radial Basis Function Networks (RBFNs) for face recognition applications. It discusses the theoretical foundations of RBFNs, their implementation in face recognition systems, and potential challenges and future research directions.

"Secure and Efficient Smart Voting System Based on RBF Face Recognition" by Wang et al. (2019): Wang et al. propose a secure and efficient smart voting system that utilizes RBF- based face recognition technology. The paper discusses the design and implementation of the system, emphasizing its robustness against security threats and its ability to streamline the voting process.

"Privacy-Preserving RBF Face Recognition for Smart Voting Systems Using Homomorphic Encryption" by Liu et al. (2020): Liu et al. propose a privacy-preserving RBF face recognition scheme for smart voting systems based on

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homomorphic encryption techniques. The paper discusses the application of homomorphic encryption to protect voter privacy while enabling secure authentication.

"Real-Time RBF Face Recognition for Smart Voting Systems Using Embedded Systems" by Kim et al. (2018): Kim et al. present a real-time RBF face recognition system optimized for smart voting applications using embedded systems. The paper discusses the hardware and software architecture, as well as performance considerations for real-time operation.

III. METHODOLOGY

The methodology of this project involves using Radial Basis Function (RBF) networks for facial recognition in smart Voting systems. Radial Basis Functions (RBFs) are a group of functions that are used in many areas, such as regression, machine learning, and numerical analysis. An RBF is a real-valued function whose result only depends on how far away a point is from the centre. This really helps with problems that involve information that contains more than one variable. RBF looks like the Gaussian function, which loses value exponentially with distance. RBFs are used a lot in methods such as support vector machines and neural networks. And also RBF are defined as the distance from another point denoted C, called centre.

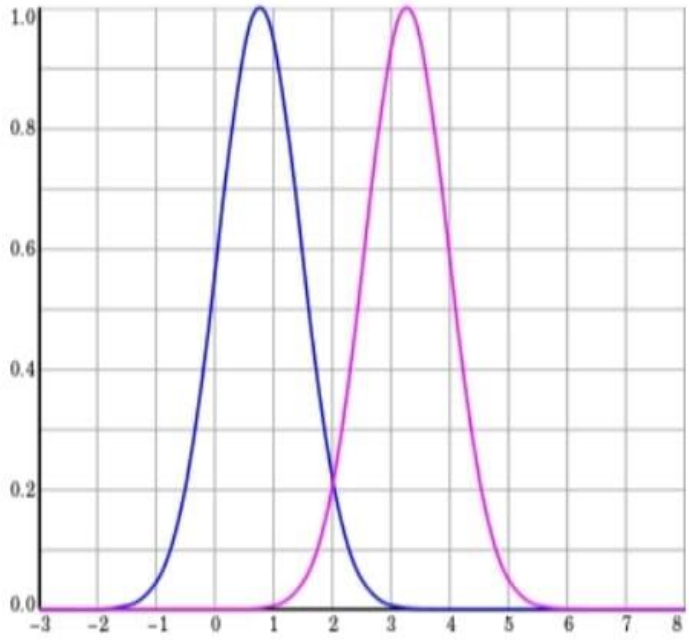

Fig. 3.1 Radial Basis Function

The process includes:

Step 1: Creating a digital identity for each voter by studying their unique visual features and patterns using the RBF-based face recognition system.
Step 2: Scanning voters' faces and comparing them to pre-existing templates to verify identities.
Step 3: Integrating a secure online voting platform with the face recognition technology to allow for remote voting.

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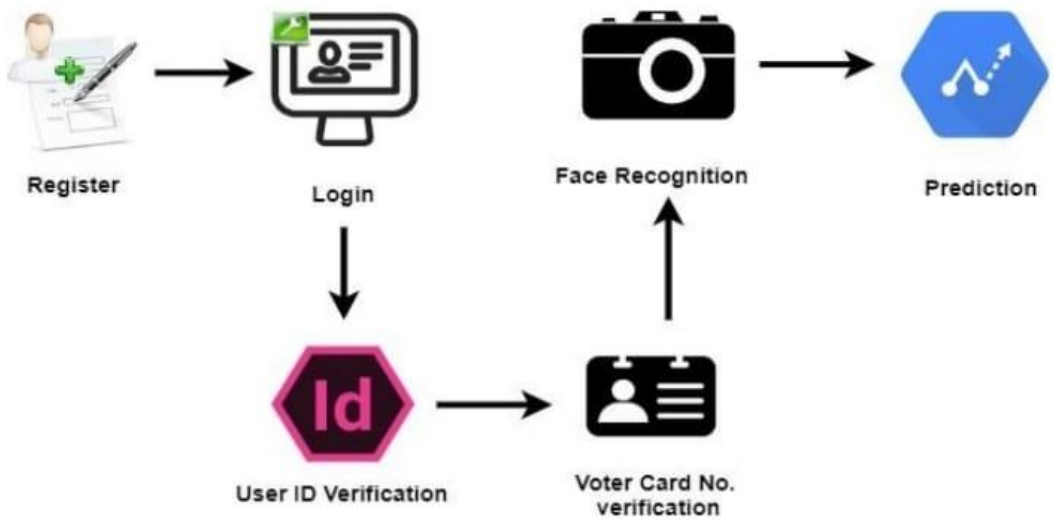

Fig. 3.2 System Diagram

The system architecture for a smart voting application that includes registration, login, user ID verification, voter card verification, and facial recognition consists of various interrelated components that provide security, accuracy, and usability. To begin, upon registration, users enter personal information and biometric data such as a picture, which is securely saved in the database. Upon repeated logins, the system confirms the user's identity using a mix of credentials and biometric authentication, maintaining that only people have permission have access. User ID verification includes cross-referencing submitted information with government data to establish voter eligibility, while voter card verification checks the legitimacy of the granted voter identity card. The system's face recognition engine performs its basic job using Radial Basis Function (RBF) networks and other advanced methods. This function compares the listed picture in the database with real-time images of people's faces captured at polling places. This fingerprint verification method makes sure that the voter is actually there and matches their listed ID. This eliminates dishonest things like proxy voting and makes voting fair for everyone.

IV. IMPLEMENTATION

In order to successfully add an RBF-based facial recognition system to a smart voting app, you need a comprehensive plan that combines advanced biometric technology with strong security measures and easy-to-use features. At the heart in terms of the implementation process is building and improving the RBF network. This is a great instrument for modelling difficult, nonlinear interactions between face features. Initially, the system has a complete database architecture that store's voter registration data safely. The system must incorporate personal information and high-resolution pictures for biometric enrolment applications. During the registration step, face pictures are processed to pull out important details and store them such that the RBF network can use to compare and identify the faces.

The implementation steps include:

Step 1: Install and Configure PyCharm IDE
Step 2: Install all Required Packages
Step 3: Using RBF Based Algorithm for Face Recognition
Step 4: Training the System

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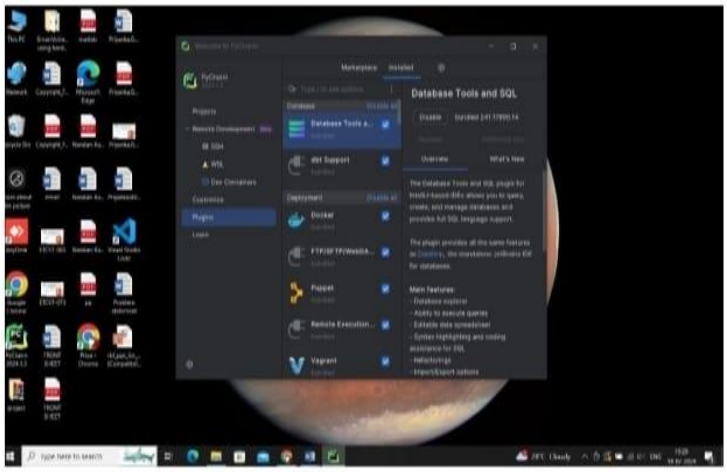

Fig. 4.1 Installing PyCharm

Fig 4.2 Installing Packages

V. RESULTS AND ANALYSIS

Fig. 5.1 Home Page

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The above Figure 5.1 shows the home page of smart voting system which hold two slots called admin and users.

Fig 5.2 Admin Page

Figure 5.2 shows the admin views of smart voting system which holds three slots called Register, view voter list and result. It can be view and used by both user and admin.

Fig. 5.3 Register Page

Figure 6.3.3 that shows the Register that can be done only by user who can vote by registering to this website.

Fig. 5.4 User Login Page

The above Figure 6.3.4 shows the Users longing in to the page where it is mandatory for each and every user.

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Fig. 5.5 Voting Desk Table

Figure 5.5 that shows the voter face recognition before voting this can help to user identification and authentication before going vote.

Fig. 5.6 Capturing User Image

As shown in the above Figure 5.6, it captures the user image and this allows voter to vote.

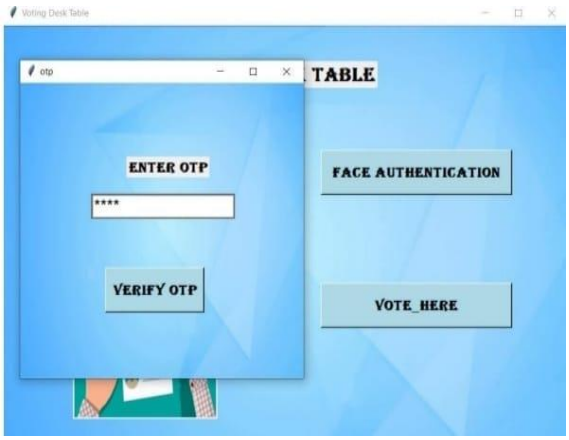

Fig. 5.7 Entering OTP

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As shown in the above figure 6.3.7, voter should login to vote with entering a correct password as is send to every voters who are login to this system.

Fig. 5.8 Allowed to Vote

As Shown in the above Figure 5.8, it allows you to vote and complete your right of voting.

Fig. 5.9 Logout Page

As shown in the above Figure 5.9 it is a stage where after completion of voting it automatically display to logout.

VI. CONCLUSION

Radial Basis Function (RBF) networks are well-suited for improving the security and efficiency of smart voting systems by accurately identifying voters through facial recognition. The system uses RBF networks to analyze unique facial features, ensuring only authorized individuals can vote, which reduces the risk of fraud and streamlines the voting process. This technology not only enhances security but also offers benefits like increased accuracy, speed, accessibility, and scalability, making the voting process more transparent and trustworthy. The project concludes that integrating RBF neural networks into voting systems can significantly advance democratic processes by making them more secure, efficient, and reliable.

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