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SMART VOTING SYSTEM USING FACE RECOGNITION AND OTP

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Abstract: Deep learning, a subfield of machine learning, has revolutionized various domains by enabling computers to learn from large amounts of data and make accurate predictions or decisions. **.** The new method does not force the person's physical appearance to vote, which makes the things easier. This paper focusses on a system where the user can vote remotely from anywhere using his/her computer or mobile phone and doesn't require the voter to got to the polling station through two step authentication of face recognition and OTP system. This project also allows the user to vote offline as well if he/she feels that is comfortable. The face scanning system is used to record the voters face prior to the election and is useful at the time of voting. The offline voting system is improvised with the help of RFID tags instead of voter id. This system also enables the user the citizens to see the results anytime which can avoid situations that pave way to vote tampering.

Keywords: Online voting system, Face recognition, OTP authentication, Biometric authentication, Secure voting, Fraud prevention, Voter verification, Identity authentication, Electronic voting, Democracy, Election security, Digital voting, Biometric recognition, Two-factor authentication.

I. INTRODUCTION

Voting plays a very important role in any democratic country .Voting is the system where citizens choose and replace government by doing elections. Hence these elections must be accurate and transparent. When elections are happening there is need for lot of man power for completion of elections properly and with desired security. Although lot of man power is used in elections there is no guarantee that elections will be done with no fake votes. Sometimes there are chances that fake votes can be done. Also for voting voter has to go to the voting booth and stand in line for long time. Due to this the percentage of voting reduced in some amount. Currently used voting system consumes much time and it is a very hectic process. Application for Online Voting System using Android Device (AOVSAD) provides the facility of casting votes without visiting the booth to the voters. The facial recognition secures the system by allowing the authentic voter for voting. One time password (OTP) provides another level of security to the system. To avoid fake voting and for providing voter an extra comfort by doing vote from remote place so that voter inspired to cast his vote and voting percentage will increase phenomenally. A new technique as Mobile based Facial Recognition can be implemented. This system provides extra bandwidth utilization for voting system.

II. RELATED WORKS

A Secure and Efficient e-Voting System Based on Face Recognition and OTPl. [10] Ganesh Prabhu.S, K. Vinotha, M. Shanthala, S. Subhashini, S. Vishnu, "IOT Based Home Automation and Security System", SSRG International Journal of Electronics and Communication Engineering (SSRG-IJECE), vol. 4, no. 3, pp. 19-22, 2017.This paper presents a secure e-voting system that combines face recognition technology with OTP authentication. It highlights the system's ability to prevent impersonation and ensure efficient vote processing using the proposed authentication mechanisms. Biometric Authentication for Secure Voting Systems. [2] S.Ganesh Prabhu,Rachel, Agnes Shiny, and A. R. Roshinee. "Tracking Real Time Vehicle And Locking System Using Labview Applications." In 2020 6th International Conference on Advanced Computing and Communication Systems (ICACCS), pp. 55-57. IEEE, 2020.This study explores the integration of biometric authentication techniques, including face recognition, into secure voting systems. It discusses the advantages, challenges, and considerations of using biometrics to authenticate voters and emphasizes the need for privacy and accuracy in such systems. Secure and Transparent Voting System Based on Blockchain and Biometric Authentication. [3] Annoshmitha Das "VOT-EL: Three Tier Secured StateOf-The-Art EVM Design Using Pragmatic Fingerprint Detection Annexed with NFC Enabled Voter -ID Card"(2016)IEEE This research presents a voting system that combines blockchain technology with biometric authentication, including face recognition. The study focuses on

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achieving transparency, immutability, and security in the voting process, highlighting the potential benefits of integrating these technologies. A Facial Recognition-Based E-Voting System with OTP Verification. [1] AMNA Qureshi ‘‘SEVEP: Verifiable, secure and privacy preserving remote polling with untrusted computing devices,” in Future Network Systems and Security Feb 22(2019) iEe E. This work proposes a facial recognition-based e-voting system that incorporates OTP verification for enhanced security. It outlines the system architecture, algorithms, and protocols used for voter authentication, vote casting, and result generation.

III. EXISTING SYSTEM

The Currently, voting systems are Electronic Voting Machines (EVM) and Secret Ballet Voting which require man-power and are time-consuming processes. Individuals above age 18 are eligible to vote. Voter’s Id and others details are validated manually and only after confirmation he/she will be allowed to vote. The EVMs have to checked and transported to different parts of the country wherever the election is taking place. It also needs manual power and security. The counting of the votes casted in EVMs also needs manpower and takes an entire day and ballet voting is entirely manual. So, there are a lot of ways the counting and the voting to not be clean. Hence the current system can be made a lot better, more accessible and more efficient.

IV. PROPOSED SYSTEM

The proposed system, Enhanced Face Recognition: The proposed system will utilize more advanced and accurate face recognition algorithms to improve the authentication process. Biometric Data Encryption: The proposed system will implement stronger encryption methods to protect the biometric data, including facial images, stored in the system's database. Voter Accessibility: The proposed system will focus on enhancing accessibility for individuals with disabilities. Multi-Factor Authentication: In addition to face recognition and OTP, the proposed system will introduce additional layers of authentication Blockchain Technology: The proposed system will explore the integration of blockchain technology to enhance transparency and immutability in the voting process. Post-Voting Verification: The proposed system will incorporate mechanisms for post-voting verification.Fig-4.1 shows the architecture diagram of proposed system.

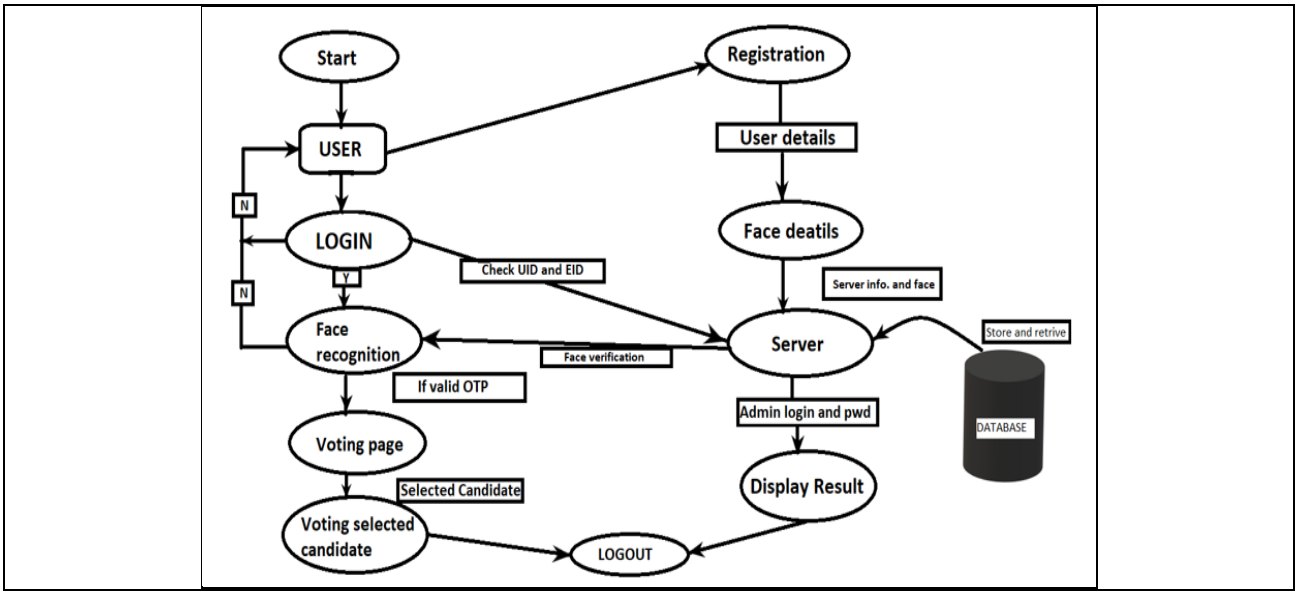

Fig-4.1:Proposed System Architecture

V. IMPLEMENTATION

System Design and Planning:Define the system requirements, including functionality, security measures, and scalability.Identify the technologies and frameworks to be used for face recognition, OTP generation, and database management. Design the system architecture, including the various modules and their interactions.

Voter Registration: Develop a registration module to collect voter information, including personal details and biometric data (facial images). Implement validation mechanisms to ensure the accuracy and integrity of the registered data. Store the registered voter data securely in a database.

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Face Recognition: Choose a suitable face recognition algorithm or library (e.g., OpenCV, dlib) to perform face detection, feature extraction, and matching. Develop the face recognition module to authenticate voters' identities using the registered biometric data. Test and fine-tune the face recognition algorithm to achieve accurate and reliable results.

OTP Authentication: Implement an OTP generation mechanism that generates unique passwords for each voter. Design a secure delivery mechanism for sending the OTPs to voters' registered mobile devices or email addresses. Develop an OTP authentication module that verifies the OTP entered by voters during the authentication process.

Voting Process: Design and develop a user-friendly interface for presenting the ballot to authenticated voters. Implement mechanisms to ensure the privacy and integrity of votes during transmission and storage. Develop algorithms to handle various voting scenarios (e.g., single or multiple candidate selection, voting on issues).

Result Tabulation: Create a results module that collects and tabulates the votes cast by voters. Implement algorithms to calculate and display the final voting results. Ensure the security and integrity of the result data.

Security and Privacy Measures: Incorporate encryption protocols to protect data transmission and storage. Implement access controls and user authentication mechanisms to prevent unauthorized access. Apply security best practices to prevent tampering, fraud, and data breaches. Address privacy concerns by implementing privacy-preserving techniques for biometric data and complying with relevant regulations.

Testing and Deployment: Conduct rigorous testing to ensure the functionality, accuracy, and security of the system. Perform scalability and performance testing to handle a large number of concurrent users. Deploy the system on a secure and reliable infrastructure, considering factors such as server capacity, data backups, and disaster recovery.

Ongoing Maintenance and Updates: Monitor the system for any vulnerabilities or issues and apply timely patches and updates. Continuously improve the system based on user feedback and changing security requirements. Conduct regular audits to ensure compliance with legal and regulatory standards.Fig 5.1 shows the implementation.

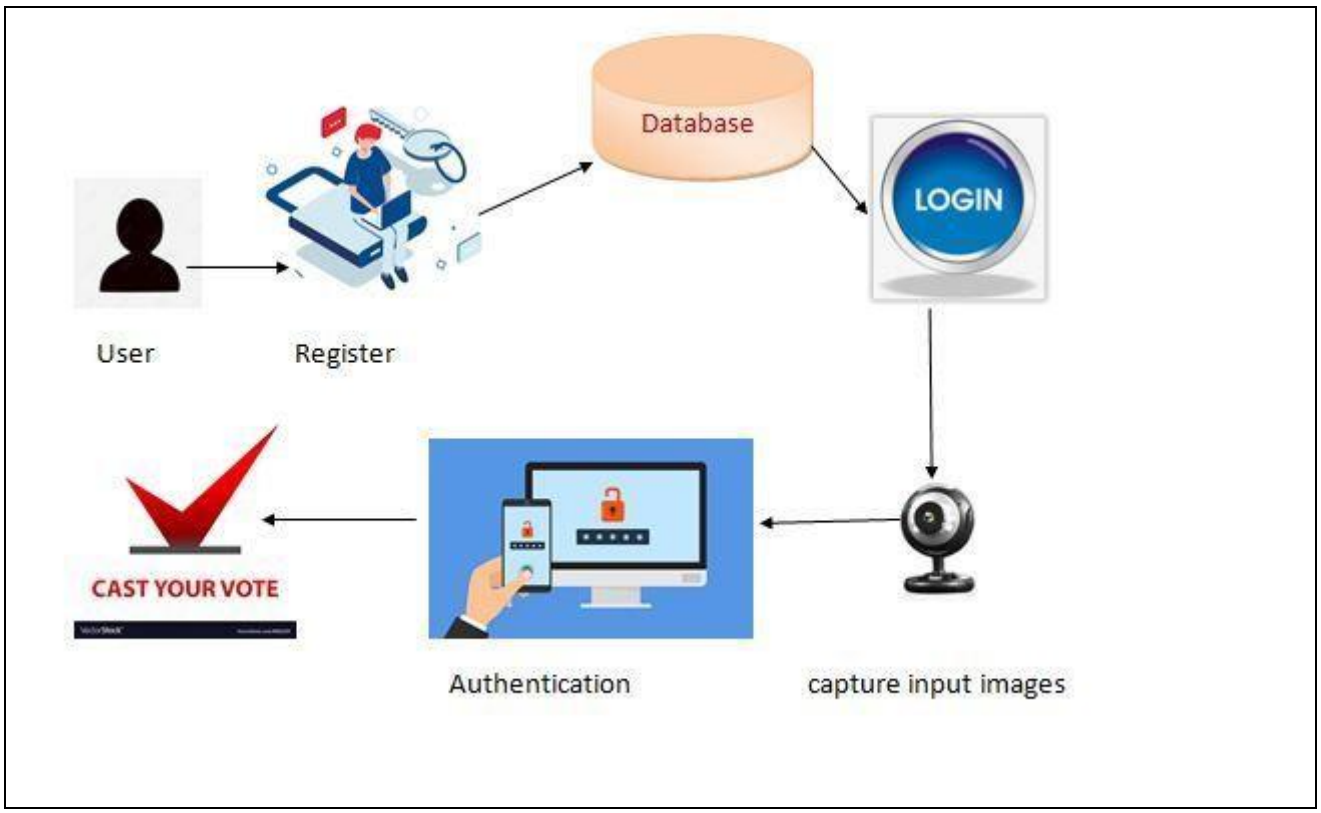

Fig-5.1: Work Flow Diagram

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VI. RESULTS AND DISCUSSION

The implementation of an Online Voting System using Face Recognition and OTP presents several advantages and considerations. By combining face recognition and OTP authentication, the system offers enhanced security and accuracy in the voting process. Face recognition algorithms provide reliable identity verification, reducing the risk of impersonation and ensuring the integrity of the system. OTP authentication adds an extra layer of protection by generating unique passwords for each voter, preventing unauthorized access. This dual authentication mechanism significantly enhances the security of the online voting system.

Additionally, the system improves accessibility and convenience for voters. By eliminating the need for physical presence at polling stations, voters can participate in the electoral process from anywhere, enabling a broader and more inclusive participation. The combination of face recognition and OTP authentication streamlines the voting process, saving time and effort for both voters and election officials. Moreover, the online nature of the system allows for scalability, accommodating a large number of voters without significant infrastructure investments.

The implementation of privacy-preserving techniques ensures the protection of voters' privacy. Biometric data is securely stored and encrypted, mitigating the risk of unauthorized access. The OTP authentication process also safeguards voter confidentiality by delivering unique passwords directly to the authorized individuals. These measures address privacy concerns and build trust among voters regarding the security of their personal information. Furthermore, an Online Voting System using Face Recognition and OTP contributes to transparent and verifiable elections. The system maintains a digital record of votes, facilitating auditability and ensuring the accuracy of the election outcomes. The ability to trace votes back to individual voters and the inclusion of timestamps enhance transparency and accountability in the electoral process. Fig-6.1 The home page of a website or application is typically the main entry point for users.Fig-6.2 User registration is a process in which individuals create an account or profile on a website, application, or platform. Fig-6.3 User login is a process that allows registered users to access their accounts on a website, application, or platform. Fig-6.4

OTP (One-Time Password) verification is a security mechanism that involves the generation and validation of a unique password for a single-use authentication process. Fig-6.5 Face recognition is a technology that involves identifying and verifying individuals based on their unique facial features Face recognition algorithms have diverse applications, including identity verification, access control, surveillance systems, and personalized user experiences. The continuous advancements in deep learning and computer vision have significantly improved the accuracy and reliability of face recognition systems in various real-world scenarios. Fig-6.6 A successful webpage is one that effectively meets its intended goals and provides a positive user experience.

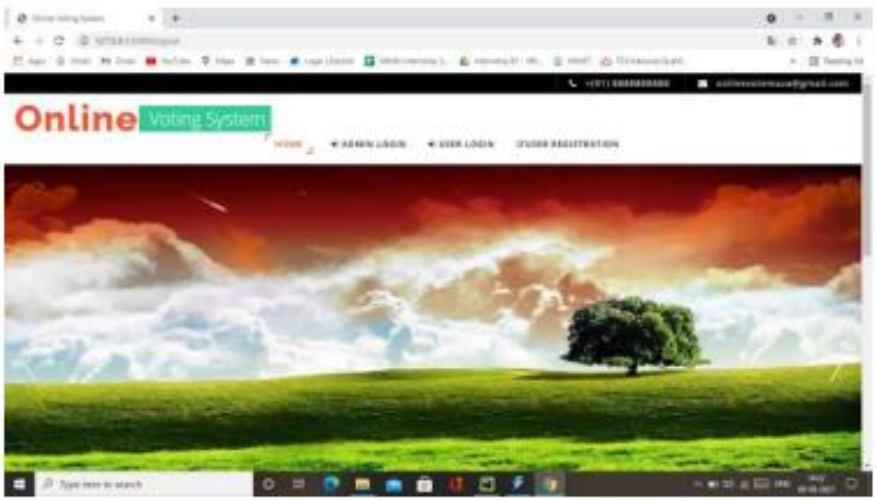

Fig-6.1:Home Page

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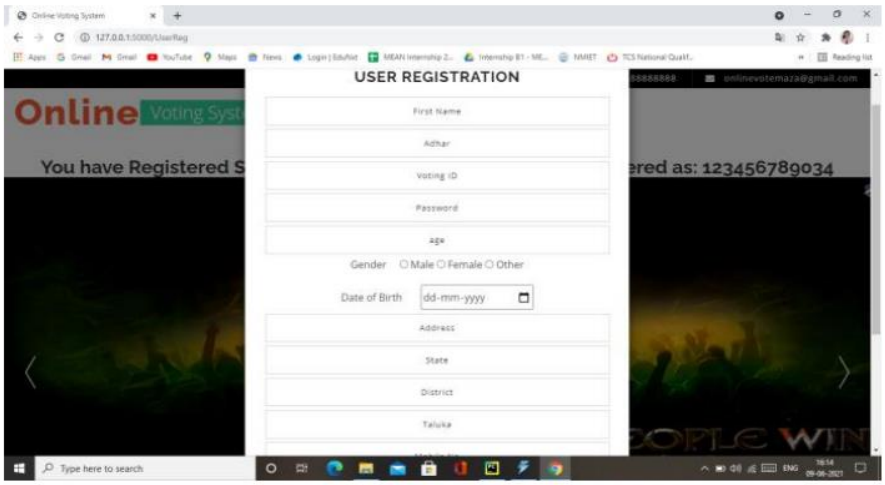

Fig-6.2:User Registration

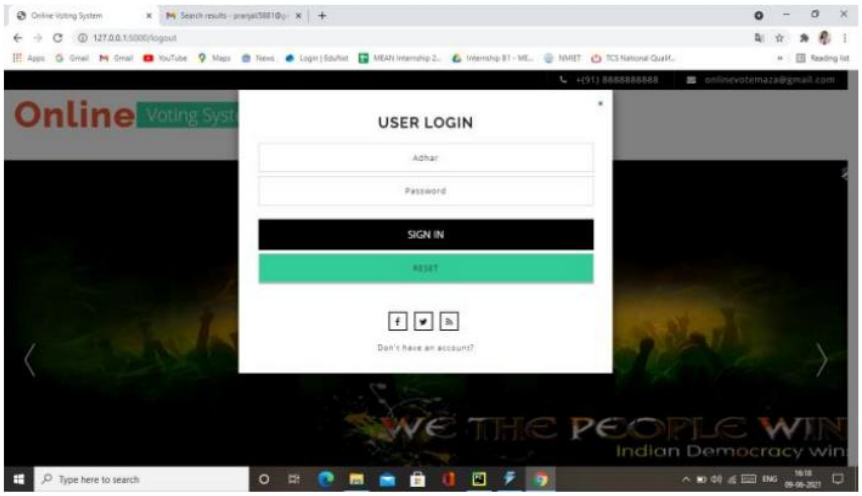

Fig-6.3:User Login

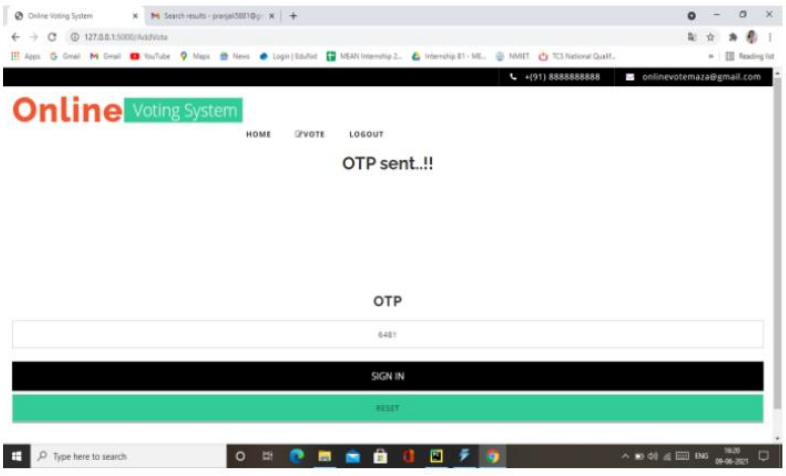

Fig-6.4:OTP Verification Page

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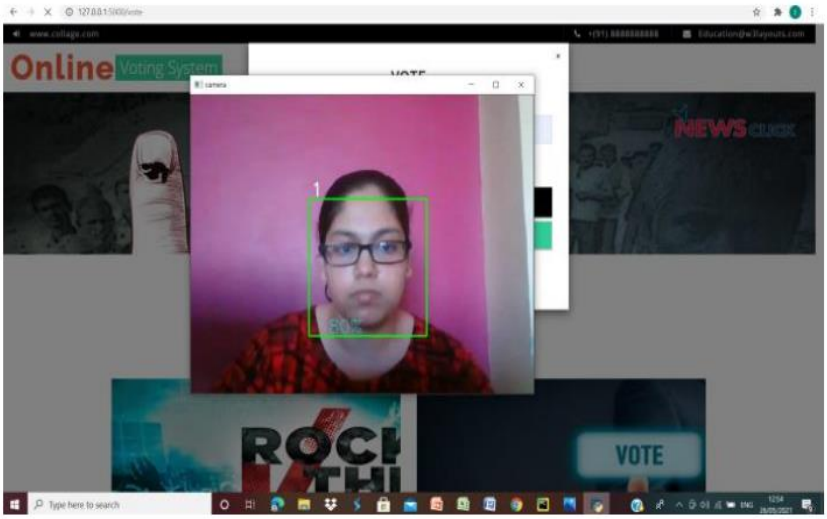

Fig-6.5:Face Verification

Fig-6.6:Vote Successful Page

VII. CONCLUSION

Moreover, the online voting system offers real-time vote counting and result generation, streamlining the overall election process. It eliminates the manual counting and potential errors, providing faster and more accurate results. This efficiency enables quicker dissemination of election outcomes and enhances public trust in the electoral system. However, it is important to note that the successful implementation of an online voting system using face recognition and OTP authentication relies on robust cybersecurity measures. Adequate safeguards must be in place to protect the integrity and privacy of voter data, ensuring that it is not vulnerable to hacking or unauthorized access. In conclusion, the adoption of an online voting system incorporating face recognition and OTP authentication can revolutionize the electoral process, offering enhanced security, convenience, efficiency, and inclusivity. Continued advancements in technology and a strong focus on cybersecurity will further strengthen the integrity of such systems, leading to a more transparent and trusted democratic process

VIII. FUTURE ENHANCEMENTS

Future enhancements should focus on advancing the accuracy and robustness of face recognition algorithms. Leveraging deep learning techniques, such as convolutional neural networks (CNNs) or recurrent neural networks (RNNs), can help improve the system's ability to detect and verify facial features with higher precision and resilience against spoofing

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attacks. Integrating anti-spoofing measures into the face recognition module is essential to prevent fraudulent activities. Future enhancements can include the development of advanced techniques like liveness detection, which can differentiate between real faces and fake or manipulated images or videos. This ensures that only genuine voters can access the system.

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