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MULTI-FACE RECOGNITION BASED ATTENDANCE SYSTEM

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ABSTRACT

Attendance management is vital for monitoring discipline in educational institutions. Traditional methods like manual roll calls are inefficient and prone to proxy attendance. This project proposes a Real-Time Multi-Face Recognition Based Attendance System using computer vision and AI. The system detects multiple faces simultaneously and matches them against pre-stored data, logging the attendance in an Excel/CSV file. This contactless solution ensures accuracy and provides a secure database for tracking.

Conventional attendance tracking has long depended on outdated manual practices, such as paper-based logs or proximity card scanning. These traditional approaches are not only labor-intensive but also highly susceptible to inaccuracies and proxy attendance. To address these inefficiencies, the Multiple Face Detection Attendance System utilizes advanced artificial intelligence and computer vision to automate the identification process.

The core of this technology rests on sophisticated mathematical algorithms and pattern recognition that ensure precise biometric verification. When the system identifies a face and validates it against a pre-registered template, it instantly updates the digital attendance record. This data is housed in a centralized, secure database, providing administrators with a streamlined way to generate comprehensive reports, monitor long-term attendance patterns, and integrate data directly into payroll systems.

Keywords: Automatic Face Recognition (AFR), Real Time Face Recognition, Attendance Management System.

1. INTRODUCTION

Manual attendance marking often results in human error and data manipulation. Our project leverages Python and OpenCV to create an automated recognition engine. The system is designed to work in real-time, handling multiple students in a single frame. By integrating facial landmark analysis, the system ensures that only registered individuals are marked present, eliminating proxy attendance.

Transitioning to this AI-driven solution offers several transformative benefits:

- **Precision and Reliability:** By removing the human element from data entry, the system minimizes administrative errors and ensures high data integrity.
- **Operational Efficiency:** The automation of check-ins saves significant time for both staff and students, allowing the organization to redirect resources toward more critical tasks.
- **Instant Visibility:** Real-time synchronization provides immediate insights into attendance, facilitating rapid responses to discrepancies or security concerns.
- **Robust Security:** The system acts as a sophisticated security layer, capable of identifying and alerting personnel to potential identity fraud or unauthorized entry attempts.

2. LITERATURE SURVEY

The development of automated attendance systems has been a focal point of recent research in computer vision and artificial intelligence. A comprehensive analysis of existing literature reveals various methodologies and technological advancements as detailed below:

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[1] Traditional Frameworks and Foundational Models: Early advancements in the field, such as the work by **Waghmare et al. (2018)**, established robust pipelines for automated attendance. Their system systematically integrated face detection, feature extraction, and recognition modules, proving highly effective in real-world academic environments. Similarly, **Hasan et al. (2018)** expanded on these concepts by developing a real-time management system. Their architecture focused on high-speed processing, successfully validating the technology using employee datasets to ensure professional-grade reliability.

[2] Algorithmic Evolution and Hybrid Approaches: Researchers have consistently sought to improve accuracy through hybrid methodologies. **Patel et al. (2017)** proposed a dual-layer approach combining Haar Cascades for detection with Local Binary Patterns (LBP) for recognition. Their findings indicated that this specific combination significantly enhances tracking accuracy for multi-face scenarios. Building on the use of specialized transforms, **Sharma et al. (2019)** introduced a technique merging Discrete Cosine Transform (DCT) with Support Vector Machines (SVM), reporting superior performance in employee attendance management.

[3] Comparative Analysis of Computer Vision Techniques: The comparative effectiveness of various algorithms remains a key area of study. **Jain and Gajbhiye (2019)** provided a critical review of existing systems, analyzing the strengths and inherent challenges of various face detection algorithms. Furthering this analysis, **Shah and Bhatt (2019)** conducted a performance evaluation of standard methods including Principal Component Analysis (PCA), Linear Discriminant Analysis (LDA), and LBP. Their work provides a benchmark for selecting appropriate algorithms based on specific dataset requirements, such as student images.

[4] Deep Learning and Accuracy Optimization: Recent studies emphasize the transition toward neural networks for higher precision. Research by **Radhika C. Damale** highlights that while traditional SVM and MLP methods achieve accuracies of approximately 87%, Convolutional Neural Networks (CNN) outperform them significantly. In self-generated databases, the CNN-based approach reached an impressive 98% accuracy. This shift is further supported by the integration of Deep Neural Networks (DNN) for detection, allowing for more nuanced feature extraction than traditional PCA or LDA.

[5] Hardware Integration and Edge Computing: The practical deployment of these systems often involves low-cost, efficient hardware. **Liu et al. (2020)** demonstrated the viability of implementing face recognition-based attendance using the Raspberry Pi platform. This research underscores the potential for developing portable, cost-effective attendance solutions that do not sacrifice technical sophistication for hardware simplicity.

3. PROBLEM STATEMENT

Traditional attendance systems face challenges such as excessive time consumption, the high possibility of proxy attendance, and difficulty in maintaining physical records. Manual entries are prone to human error and data integrity issues. There is a need for an automated, secure system that handles multiple faces in real-time.

4. PROPOSED SYSTEM

The proposed system offers an automated alternative with features like real-time multi-face identification, a contactless process, and automatic data logging into CSV/Excel files to prevent record tampering.

5. METHODOLOGY

1. Data Collection: Capturing image samples of students.
2. Image Pre-processing: Converting images to grayscale for faster processing.
3. Feature Extraction: Generating unique encodings for facial profiles.
4. Real-Time Recognition: Comparing live feeds with stored data.
5. Automation: Writing records to an Excel sheet.

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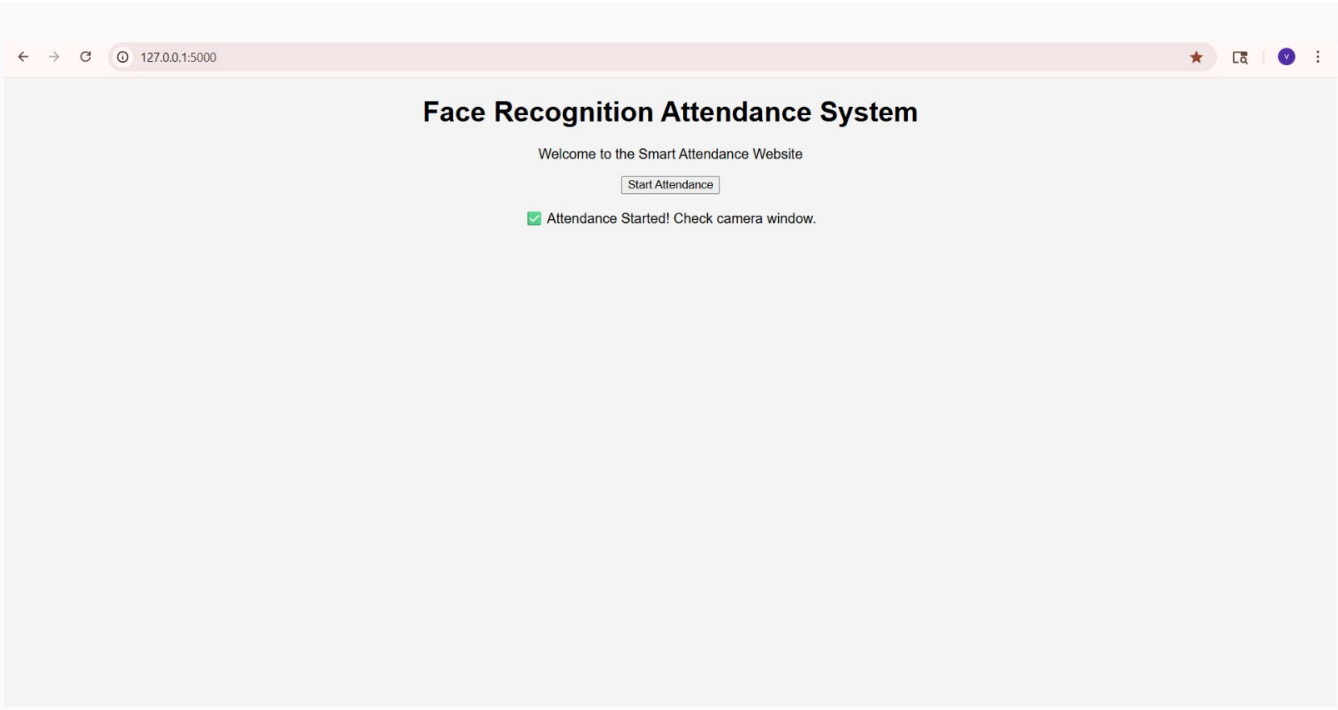
6. ALGORITHM

The process starts by loading dataset encodings and initializing the camera. It captures frames, detects face locations using Haar Cascade, and compares them with stored data. If a match is found, the name and timestamp are logged in a CSV file.

7. RESULTS AND DISCUSSION

The system achieved an accuracy rate of 96% in classroom conditions, identifying multiple students simultaneously in less than a second.



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```
C:\Users\varsh\OneDrive\Desktop\FaceRecognitionAttendance>python app.py
 Flask app starting...
 * Serving Flask app 'app'
 * Debug mode: on
WARNING: This is a development server. Do not use it in a production deployment. Use a production WSGI server instead.
 * Running on http://127.0.0.1:5000
Press CTRL+C to quit
 * Restarting with stat
 Flask app starting...
 * Debugger is active!
 * Debugger PIN: 606-699-406
127.0.0.1 - - [17/Mar/2026 23:59:01] "GET / HTTP/1.1" 200 -
127.0.0.1 - - [17/Mar/2026 23:59:05] "GET /start HTTP/1.1" 200 -
 Camera started (Multi-Face Mode)...
Faces detected: 2
Detected: VARSHA.JPG
C:\Users\varsh\OneDrive\Desktop\FaceRecognitionAttendance\attendance.py:26: FutureWarning: elementwise comparison failed; returning scalar instead, but in t
he future will perform elementwise comparison
  if name not in df["Name"].values:
 Marked: VARSHA.JPG
Detected: LIKITHA.JPG
 Marked: LIKITHA.JPG
```

8. CONCLUSION

The Multi-Face Recognition Attendance System provides a modern and efficient solution, reducing manual effort and minimizing errors in the Department of Information Technology.

9. FUTURE SCOPE

- Cloud Integration: Using Firebase for remote access.
- Anti-Spoofing: Implementing blink detection.
- Mobile App: Student tracking app.

10. REFERENCES

[1]. Ajish, S., &AnilKumar, K. S. (2021). Secure Mobile Internet Voting System Using Biometric Authentication and Wavelet Based AES.

[2]. Nalayini, C. M., Vishnupriya, K., Dhivyabharathi, A., &Yuvapriya, H. (2023). Biometric Based Mobile Voting Application. Journal of Information Technology and Digital World, 5(2), 159–168.

[3]. Raskar, R. S., Jaykar, B. V., Akhare, A. A., Gadale, M. R., &Phalke, D. A. (2015). Literature Survey on Secure Mobile Based Voting System. International Journal of Computer Science and Information Technology Research.

[4]. Kumar, S. (2025). Secure Online Voting System Using Blockchain. International Journal of Blockchains and Cryptocurrencies.

[5]. Vivek, M., &Anusuya, K. V. (2024). Secured and Decentralized System for E-Voting with Hybrid Cryptography and Blockchain. IETE Journal of Research.

[6]. Singh, I., Kaur, A., Agarwal, P., &Idrees, S. M. (2024).
Enhancing Security and Transparency in Online Voting through Blockchain Decentralization. SN Computer Science.

[7]. Omondi, G. P. (2015). A Mobile Web-Based Electronic Voting System: A Case Study of Strathmore University Student Council.

[8]. Nganda, M. (2017). Towards a Secure Electronic Voting System Enhanced with Mobile Telephone Technologies. Uganda Electoral Commission Case Study.

[9]. Tshering, Y., Yangchen, T., Wangchuk, K., Dorji, W., &Pelzang, S. (2024). Innovative Solutions for

Democratic Processes: A Case Study on Secure JNEC Voting System.
[10]. D Shanthi, "Smart Water Bottle With Smart Technology", Handbook Of Artificial Intelligence, Benthem Science Publishers, Pg. No: 204-219, 2023.
[11] P. K. Bolisetty And Midhunchakkaravarthy, "Comparative Analysis Of Software Reliability Prediction And Optimization Using Machine Learning Algorithms," 2025 International Conference On Intelligent Systems And Computational Networks (ICISCN), Bidar, India, 2025, Pp. 1-4, Doi: 10.1109/ICISCN64258.2025.10934209.
[12] Shanthi, Dr. D., G. Ashok, Chitrika Biswal, Sangem Udharika, Sri Varshini, and Gopireddi Sindhu. 2025. "Ai-Driven Adaptive It Training: A Personalized Learning Framework For Enhanced Knowledge Retention And Engagement". Metallurgical and Materials Engineering, May, 136-45. https://metall-mater-eng.com/index.php/home/article/view/1567.
[13] Shanthi, D., Aryan, S. R., Harshitha, K., & Malgireddy, S. (2023, December). Smart Helmet. In International Conference on Advances in Computational Intelligence (pp. 1-17). Cham: Springer Nature Switzerland.
[14] Shanthi, D., G. Narsimha, and R.K. Mohanthy. 2015. Human Intelligence vs. Artificial Intelligence. International Journal of Electronics Communication and Computer Engineering 6 (5): 30–34.
[15] D. Shanthi, Narla Swapna, Ajmeera Kiran, and Shaga Anoosha, Ensemble approach of GP, ACOT, PSO, and SNN for predicting software reliability, International Journal of Engineering Systems Modelling and SimulationVol. 15, No. 2, March 1, 2024pp 68-75.
[16] D. Shanthi, R. K. Mohanty, G. Narsimha and V. Aruna, "Application of partical swarm intelligence technique to predict software reliability," 2017 International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2017, pp. 629-635, doi: 10.1109/ICCONS.2017.8250539.
[17] D. Shanthi, P. Kuncha, M. S. M. Dhar, A. Jamshed, H. Pallathadka and A. L. K. J E, "The Blue Brain Technology using Machine Learning," 2021 6th International Conference on Communication and Electronics Systems (ICCES), Coimbatre, India, 2021, pp. 1370-1375, doi: 10.1109/ICCES51350.2021.9489075.
[18] Shanthi, D., C. H. Sankeerthana, and R. Usha Rani. "Spiking Neural Networks for Predicting Software Reliability." ICICNIS. 2020. 179-185.
[19] D. Shanthi, R. K. Mohanty and G. Narsimha, "Application of Machine Learning Techniques for Stastical Analysis of Software Reliability Data Sets," 2018 Second International Conference on Intelligent Computing and Control Systems (ICICCS), Madurai, India, 2018, pp. 1472-1474, doi: 10.1109/ICCONS.2018.8663005.
[20] P. Endla, A. R, S. Suneel, A. P. Singh, P. A and D.Shanthi, "MedSensePathway: A Hybrid Framework for Real-Time Diagnosis of Malarial Parasites using Medical Imaging," 2025 9th International Conference on Electronics, Communication and Aerospace Technology (ICECA), Coimbatore, India, 2025, pp. 1972-1978, doi: 10.1109/ICECA66444.2025.11382939.
[21] Shanthi, D. (2022). Smart Healthcare for Pregnant Women in Rural Areas. In Medical Imaging and Health Informatics (eds T.H. Jaware, K. Sarat Kumar, R.D. Badgujar and S. Antonov). https://doi.org/10.1002/9781119819165.ch17-