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Automated Facial Recognition Attendance System

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Abstract: *Artificial Intelligence (AI) has fundamentally transformed administrative methodologies within educational and corporate institutions. This paper details the development and analysis of an Automated Facial Recognition Attendance System designed to address the inefficiencies and security vulnerabilities inherent in traditional manual roll calls. By integrating computer vision with machine learning (ML)—specifically utilizing Haar Cascade Classifiers for detection and Local Binary Pattern Histograms (LBPH) for recognition—we developed a contactless, hygienic identity verification solution. The system was implemented using a standard desktop architecture powered by Python and OpenCV to ensure broad accessibility. Rigorous testing was conducted to evaluate performance under real-world variables, including low-light conditions, varying distances, and angular variations. Furthermore, a comparative analysis was performed against algorithms such as Eigenfaces, Fisherfaces, and Convolutional Neural Networks (CNNs). Our findings indicate that while Deep Learning models offer higher accuracy, they are computationally intensive. In contrast, the Haar Cascade and LBPH combination offers an optimal balance between efficiency and reliability on standard hardware, achieving accuracy rates between 85% and 98% in controlled environments. This report outlines the system architecture, performance metrics, and potential future enhancements, including liveness detection to mitigate spoofing attempts.*

Keywords: *Artificial Intelligence.*

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