Text Plan
For
Automatic Attendance Marker

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ChangeLog

Version	Change Date	By	Description
version number	Date of Change	Name of person who made changes	Description of the changes made
001	04-11-2023	Tushar Sharma	Initial Draft
002	06-11-2023	Shaurya Awasthi	Methodology

1 Introduction

Attendance tracking is a fundamental aspect of educational institutions, serving as a critical tool for monitoring and ensuring students' academic progress. While the methods for tracking attendance vary across institutions, they generally fall into two categories: traditional paper-based systems and modern, automated approaches, such as biometric solutions. Among the innovative technological advancements in attendance management, facial recognition systems have emerged as a powerful tool. This paper explores the utility of facial recognition technology as an inventive way to enhance attendance management, comparing it with other biometric methods and discussing its applications in educational institutions. Academic institutions have a vested interest in monitoring student attendance. Regular attendance is often directly correlated with a student's academic success. Consistent attendance allows educators to gauge student engagement, ensure compliance with attendance policies, and identify students who may need additional support. Historically, attendance was tracked manually using paper records or files, which were susceptible to errors, manipulation, and inefficiencies. As technology has advanced, institutions have sought more efficient and reliable methods of tracking attendance. Biometric systems have gained popularity in various sectors, including education. Biometrics involves the use of unique physiological or behavioral characteristics to identify individuals. Examples of biometric methods include fingerprint recognition, ocular biometrics, and facial recognition. Biometric systems are highly accurate and difficult to manipulate, making them an ideal choice for attendance tracking. Facial recognition technology is a subset of biometrics that has garnered significant attention and progress in recent years. It operates by comparing patterns in an individual's facial features to validate or identify that person. The key components of a facial recognition system include capturing an image of the face, analyzing key facial landmarks, and comparing these features with a database of known individuals. When a match is found, the system can mark the student as "present".

1.1 Scope

1.1.1 In Scope

The scope for an "Automatic Attendance Marker" system would encompass various features and requirements that need to be tested to ensure the system functions correctly and meets

user needs. Here is a broad outline of potential features and requirements that might be included in the scope:

Functional Requirements:

1.**Dataset Creation**:
- Ability to create users dataset accurately.
-Student's Images are saved into a dedicated folder with their name and roll_number.

2.**Face Detection:**
-Ability to detect faces automatically.
- The Haar Cascade Classifier is used to identify faces in the photos.

3. **Face Recognition::**
- Ability to recognize faces during attendance marking.
- The process of face recognition entails teaching a model to recognize faces with Opencv library and KNN algorithm.

5. **Attendance Updation:**
- Ability to mark attendance in excel-sheet with respective dates.
-Attendance records were updated in an Excel or CSV file when faces were found and identified.A recognized face was marked as "present" for the particular session if it was determined that the person was registered.

6. **Data Management:**
- Storage and retrieval of attendance records.
- Data Integrity: Error management and duplicate entry prevention are two steps taken to guarantee data integrity.

7. **User Interface:**
- Display the marked attendance on the website interface along with name,roll number and time in the form of a table..
- Mobile and web access for remote attendance marking and monitoring.

Non-Functional Requirements:

1. Performance:
- Speed and reliability of attendance marking.
- Scalability to handle multiple simultaneous classes.

2. Security:
- Protection of personal and biometric data.
- Compliance with privacy laws and regulations.

3. Usability:
- Ease of use for all types of users.

4. Reliability:
- Accuracy in attendance marking.
- System uptime and failover capabilities.

5. Support and Maintenance:
- Regular updates and patches.
- Technical support for users.

Testing these features and requirements would involve a series of steps, including unit testing, integration testing, system testing, and acceptance testing, to validate that the system works as intended, is user-friendly, secure, and reliable. It's also essential to test the system under different conditions and loads to ensure it performs well when deployed in a real-world environment.

1.1.2 Out of Scope

Out of Scope elements for an "Automatic Attendance Marker" system are those features and requirements that have been deliberately excluded from the current testing phase or project deliverables. Here are examples of what might be considered out of scope:

1. Advanced Biometric Analysis:
- Iris or fingerprint scanning might be out of scope if the system is only intended to use facial recognition.

2. Non-Attendance Related Features:
- Features like grade management, assignment tracking, or other academic tools may not be included if the system is solely for attendance.

3. Hardware Integration:
- Integration with certain hardware such as turnstiles, electronic door locks, or other security systems might not be covered.

4. Real-Time Location Tracking:
- GPS tracking or real-time location services for attendance marking outside of the classroom environment.

5. Third-party Software Integrations:
- Integration with external systems not related to attendance, like cafeteria management or library systems.

6. Data Analysis Beyond Attendance:
- Use of attendance data for predictive analytics or detailed student behavior analysis could be out of scope.

7. Extensive Customization:

- Highly customizable interfaces for each user role might not be included if the system is designed with a one-size-fits-all approach.

8. Multi-language Support:

- Support for multiple languages may be out of scope if the system is intended for use in a mono-lingual institution.

9. Legacy System Data Migration:

- Migrating historical attendance data from legacy systems might not be covered.

10. Sophisticated Security Measures:

- Advanced cybersecurity measures like intrusion detection systems, while important, might not be part of the initial scope.

11. Offline Functionality:

- The ability to mark attendance without an internet connection might not be supported.

12. Parental Access:

- Features that allow parents to monitor attendance might be out of scope if the system is only designed for administrators and teachers.

13. Large-scale Data Export and Reporting:

- Complex reporting capabilities, such as exporting data for use with other analytical tools, may not be included.

14. Extensive Accessibility Features:

- While basic accessibility features should be included, extensive accessibility options for differently-abled users might be out of scope.

15. Long-term Data Storage:

- Storing attendance data for periods longer than the current academic year may not be included.

16. Extensive Interoperability:

- Compatibility with all possible devices and operating systems may be limited to the most commonly used ones.

17. 24/7 Support:

- Round-the-clock technical support might not be included, with support limited to business hours.

1.2 Quality Objective

The overall objective of testing for an "Automatic Attendance Marker" system is to ensure that the system is reliable, efficient, user-friendly, and fulfills all the specified requirements. Here's a more detailed breakdown of the objectives:

- **1. Reliability:** To validate that the system accurately marks attendance without errors over extended periods and under various conditions.
- **2. Accuracy:** To confirm that the system correctly identifies and records the presence of authorized individuals (students, faculty, etc.) and minimizes false positives and false negatives, particularly when using biometric or face recognition technologies.
- **3. Performance:** To ensure that the system operates swiftly and can handle the expected load, such as marking attendance for multiple individuals in a short time span, without system degradation.
- **4. Usability:** To verify that the system is user-friendly and accessible by all intended users, including students, teachers, and administrators, with minimal training required.
- **5. Security and Compliance:** To ensure that the system securely handles and stores sensitive data, complies with privacy laws and institutional policies, and has robust authentication mechanisms.
- **6. Integration**: To test the system's ability to integrate seamlessly with existing school management systems or databases, ensuring data consistency and reliability.
- **7. Scalability**: To check whether the system can scale up to accommodate a growing number of users and additional classrooms or institutions.
- **8. Flexibility:** To assess the system's ability to adapt to different classroom settings, teaching schedules, and potential changes in enrollment.
- **9. Robustness:** To evaluate the system's capacity to handle edge cases and unusual scenarios without failure, such as late arrivals, early departures, and substitute teachers.
- **11. Support and Maintenance:** To confirm that the system is maintainable, with the ability to update and patch the system as needed with minimal disruption.

1.3 Roles and Responsibilities

Detail description of the Roles and responsibilities of different team members like

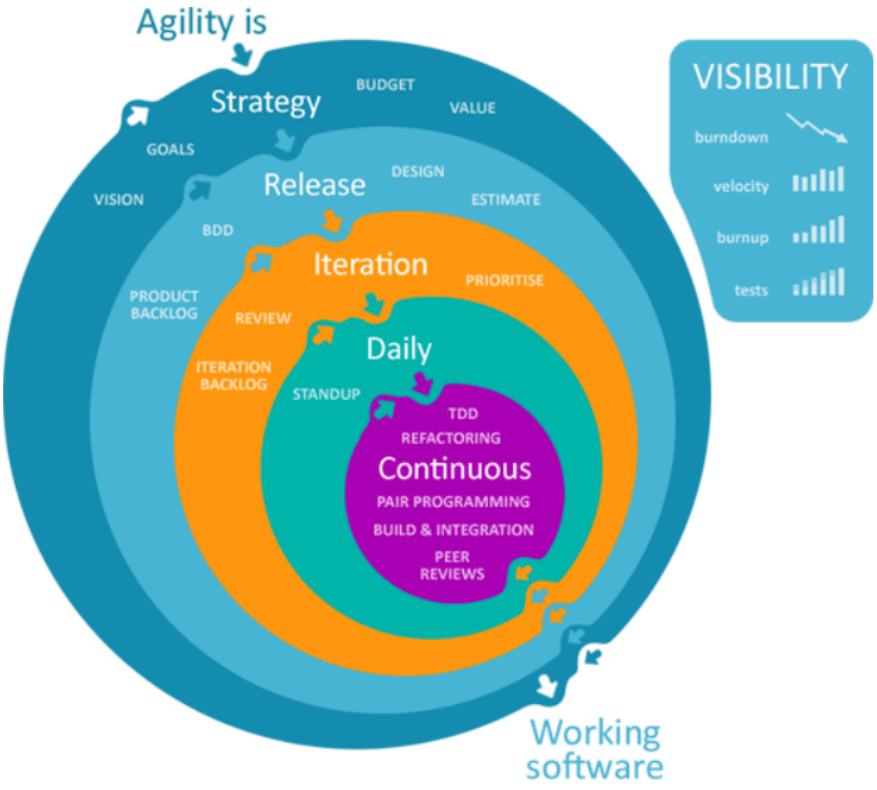
- QA Analyst-Tushar Sharma
- Test Manager-Mrs. Shreela Parikh
- Configuration Manager-Mrs Neha Sukla

- Developers-Tushar Sharma, Shaurya Awasthi , Sparsh Verma, Mr. Harsh Vardhan
- Installation Team Amongst others

2 Test Methodology

2.1 Overview

Agile Software Development



Agile Software Development is a software development methodology that values flexibility, collaboration, and customer satisfaction. It is based on the Agile Manifesto, a set of principles for software development that prioritize individuals and interactions, working software, customer collaboration, and responding to change.

Agile Software Development is an iterative and incremental approach to software development that emphasizes the importance of delivering a working product quickly and frequently. It involves close collaboration between the development team and the customer to ensure that the product meets their needs and expectations.

The Agile Software Development process typically consists of the following steps:

1. Requirements Gathering: The customer's requirements for the software are gathered and prioritized.
2. Planning: The development team creates a plan for delivering the software, including the features that will be delivered in each iteration.
3. Development: The development team works to build the software, using frequent and rapid iterations.
4. Testing: The software is thoroughly tested to ensure that it meets the customer's requirements and is of high quality.
5. Deployment: The software is deployed and put into use.
6. Maintenance: The software is maintained to ensure that it continues to meet the customer's needs and expectations.

2.2 Test Levels

For an "Automatic Attendance Marker" system, the test levels can be organized to ensure thorough validation at different stages of development, from individual components to the full, integrated system. Here's how the test levels could be structured:

Unit Testing
- Purpose: To verify the functionality of individual components or units of code in isolation from the rest of the system.
- Scope: Testing the smallest testable parts of the application, such as functions or methods. For instance, unit tests could be written for the face detection algorithm or the method that matches detected faces with student records.

Integration Testing
- Purpose: To ensure that multiple components or systems work together as intended.
- Scope: Testing the interactions between different units of the application. This includes how the face detection integrates with the database, how the system interacts with other school management software, and how different modules of the attendance system communicate with each other.

System Testing
- Purpose: To validate the complete and integrated software product against the specified requirements.

- Scope: Testing the entire system's functionality, performance, and security. This level of testing would cover scenarios such as the end-to-end process of marking attendance for a class, generating attendance reports, and managing user roles and permissions.

Acceptance Testing
- Purpose: To confirm that the system meets the business requirements and is ready for use by the end-user.
- Scope: Testing with real-world scenarios to validate the system against user requirements. This often involves Beta testing with actual users (students and faculty) to ensure the system is effective in a live classroom setting and meets user expectations.

Regression Testing
- Purpose: To ensure that new changes have not adversely affected the existing functionality of the system.
- Scope: Performed after patches, enhancements, or configuration changes to guarantee that the system remains stable. This could be especially important for an attendance system that may regularly update to adapt to new hardware or software environments.

2.3 Test Completeness

For instance, a few criteria to check Test Completeness would be

- 100% test coverage
- All Manual & Automated Test cases executed
- All open bugs are fixed or will be fixed in next release

3 Test Deliverables

Here mention all the Test Artifacts that will be delivered during different phases of the testing lifecycle.

Here are the sample deliverables

- Test Plan

- Test Cases
- Bug Reports
- Test Strategy

Test Cases:

For DataSet Creation:

No of Test Cases	Input Name	Input Roll	Expected Output	Actual Output	Result
1	Shaurya	142	TRUE	TRUE	Pass
2	Tushar	awasthi	FALSE	FALSE	Pass
3	Tushar	-200	FALSE	TRUE	Fail
4	Sparsh	164	TRUE	TRUE	Pass
5	12345	177	FALSE	FALSE	Pass
6	@345	123	FALSE	FALSE	Pass
7	sha123	456	FALSE	TRUE	Fail
8	Sparsh@129	-200	FALSE	TRUE	Fail
9	Tushar	20009	TRUE	TRUE	pass
10	Shaurya	20001	TRUE	TRUE	Pass

FOR ATTENDANCE TAKING:

No of Test Cases	Input	Belong to Dataset	Expected Output	Actual Output	Result
1	Image	Y	Present	Present	Pass
2	Image	N	Not Found	Not Found	Pass
3	Image	Y	Present	Present	Pass
4	Image	N	Absent	Present	Fail
5	Image	Y	Present	Absent	Fail
6	Image	Y	Present	Present	Pass
7	Image	Y	Present	Present	Pass

1) Here is the revised decision table with the remaining conditions and corresponding actions:

DECISION TABLE FOR ATTENDANCE TAKING:

Condition/Rule	Face Detected	Face Recognized	Action
Rule 1	Yes	Yes	Mark Present
Rule 2	Yes	No	Flag for Review
Rule 3	No	-	Mark Absent
Rule 4	-	-	No Action

Explanation of Rules:

- Rule 1: If a face is detected and recognized, the student is marked present.
- Rule 2: If a face is detected but not recognized, it is flagged for manual review.
- Rule 3: If no face is detected, the student is marked absent.
- Rule 4: If the conditions for face detection and recognition are not applicable or cannot be determined, no action is taken.

2) DECISION TABLE FOR ATTENDANCE DATA CREATION:

Condition/Rule	Name Provided	Roll Number Provided	Valid Name Format	Valid Roll Number Format	Action
Rule 1	Yes	Yes	Yes	Yes	Create Entry, Ready for Detection
Rule 2	No	Yes	-	Yes	Prompt for Name, No Detection
Rule 3	Yes	No	Yes	-	Prompt for Roll Number, No Detection
Rule 4	Yes	Yes	No	Yes	Flag Invalid Name, No Detection
Rule 5	Yes	Yes	Yes	No	Flag Invalid Roll Number, No Detection
Rule 6	No	No	-	-	Prompt for Name and Roll Number, No Detection
Rule 7	Yes	Yes	No	No	Flag Invalid Name and Roll Number, No Detection
Rule 8	No	Yes	-	No	Prompt for Name, Flag Invalid Roll Number, No Detection

Explanation of Rules:

- Rule 1: If a valid name and roll number are provided, create an entry in the dataset, and the system is ready to detect the person.

- Rule 2: If no name is provided, but a valid roll number is, prompt the user to provide a name; the person cannot be detected until a name is given.
- Rule 3: If a name is provided without a roll number, prompt the user to provide a roll number; the person cannot be detected until a roll number is given.
- Rule 4: If an invalid name format is provided along with a valid roll number, flag the name as invalid and do not proceed with detection.
- Rule 5: If a valid name is provided with an invalid roll number format, flag the roll number as invalid and do not proceed with detection.
- Rule 6: If neither a name nor a roll number is provided, prompt for both; the person cannot be detected until both are given.
- Rule 7: If both name and roll number are provided but both formats are invalid, flag both as invalid and do not proceed with detection.
- Rule 8: If no name is provided and the roll number is invalid, prompt for a name and flag the roll number as invalid; the person cannot be detected.

3.1 Testing Tools

A list of Tools like

- Selenium
- Postman API

3.2 Test Environment

Following **software is** required in addition to client-specific software.

- Windows 8 and above
- MS Excel
- VSCode
- Python
- Flask

4 Terms/Acronyms

Make a mention of any terms or acronyms used in the project

TERM/ACRONYM	DEFINITION
ATM	Automatic Attendance Marker