Vultr Cloud Innovate Hackathon

Project Title - Autonomous Attendance Tracking System Using Machine Learning and Cloud Solutions

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Abstract

This project proposes an Autonomous Attendance Tracking System using Machine Learning (ML) techniques integrated with cloud services. The system automates attendance collection by recognizing faces using computer vision, storing attendance records in a real-time cloud database, and updating Google Sheets automatically. The project will utilise Vultr's cloud services to ensure scalability, secure data storage, and easy access for administrators. By reducing manual errors and offering a seamless attendance process, the project aims to streamline operations for educational institutions or corporate environments.

Problem Statement

"Manual attendance systems are time-consuming, error-prone, and susceptible to fraud. Institutions need an efficient way to automate attendance, especially in remote settings or large-scale environments. This project addresses the challenge of maintaining accurate attendance records while minimising administrative overhead."

Proposed Solution

- Uses **machine learning** for real-time face detection and recognition.
- Implements **OpenCV**, **Haar-Cascade**, and **HOG** features for face identification.
- Attendance data stored in **Firebase** and updates made to **Google Sheets**.
- Backend hosted on **Vultr's cloud services** to ensure fast processing and scalability.
- Key features: Real-time face recognition, Automatic attendance tracking, Cloud integration.

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Use of Vultr Services

The system will utilise **Vultr's computing instances** to deploy and run the machine learning model in real-time. **Vultr's Block Storage** will be used to store datasets and attendance records securely, while **Vultr's networking services** will ensure smooth integration with Firebase and other APIs.

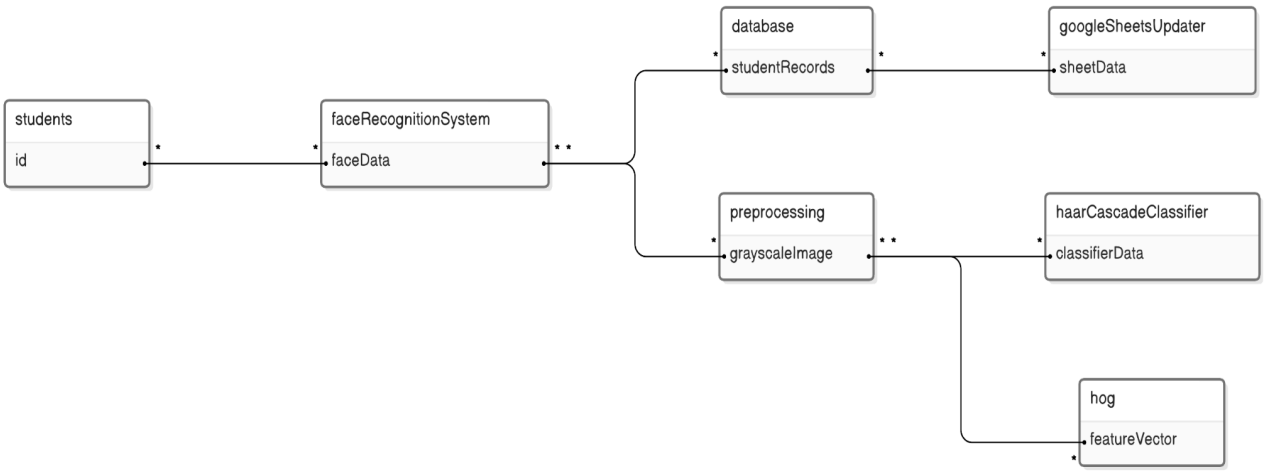
Target Audience

- **Educational institutions** and **corporate organisations** where attendance tracking is critical.
- Especially useful for large organisations and remote work environments.

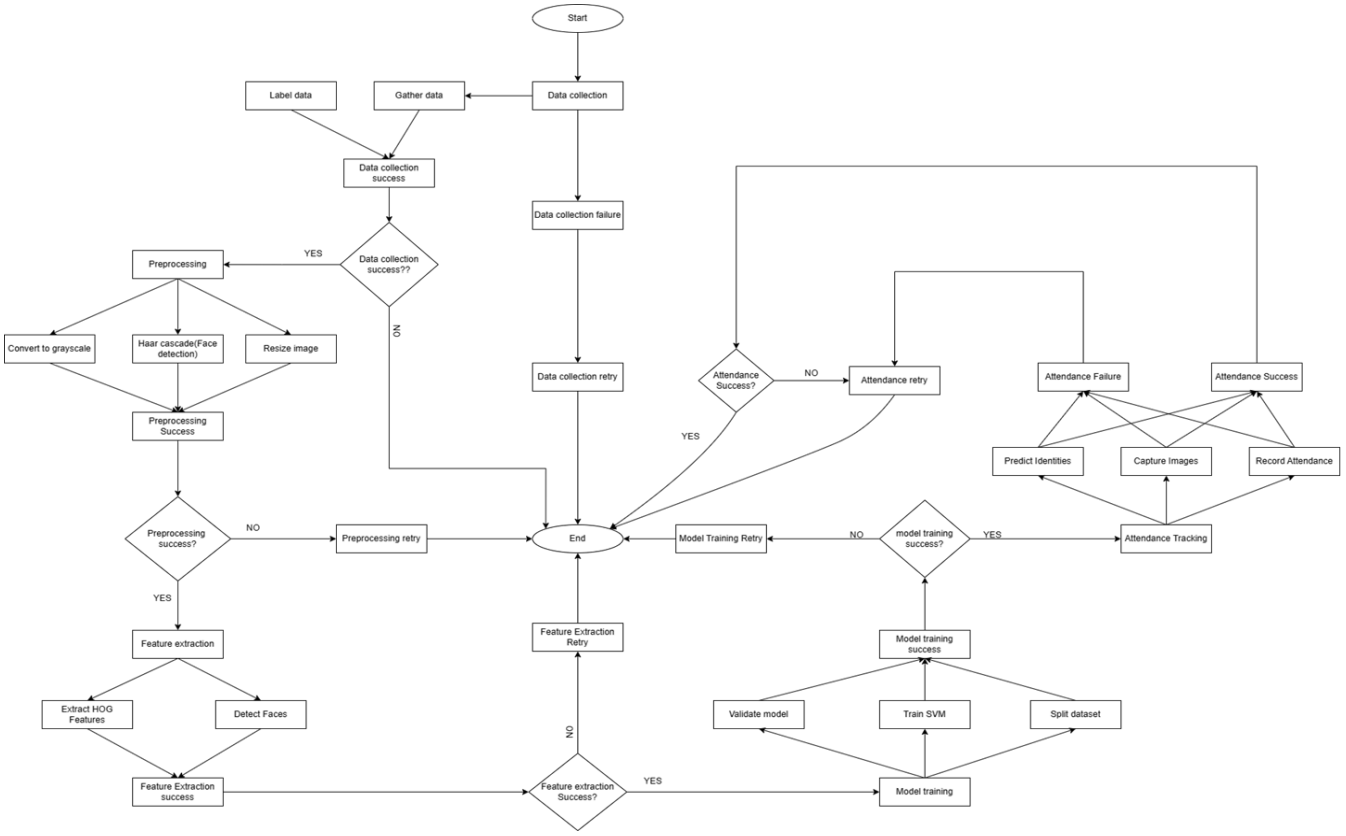
Feasibility Analysis

- Technically feasible with tools like **OpenCV**, **Firebase**, and **Vultr services**.
- ML models such as **Haar-Cascade** and **HOG** are widely documented and used in facial recognition.
- Initial dataset collection and cloud service costs might be a challenge.
- HThese challenges are manageable within the project timeline

Preliminary Diagram



UML Class Diagram



Design Workflow

Expected Outcomes

- Fully functional autonomous attendance tracking system.
- Reduces **administrative effort** and improves **accuracy**.
- Key outcomes:
    - **Real-time face recognition system**.
    - **Automated attendance log** for easy tracking.
    - **Seamless cloud integration** with Firebase and Google Sheets.

These outcomes ensure a streamlined and efficient attendance process.