HACKNOVA 2025 – PS-1

A. P. Shah Institute of Technology, Thane

Department of Computer Engineering

Presented by CSA x GDG x Coder's Club

PS-1: Attendance Anomaly System

Background

The Computer Engineering department maintains attendance records on paper sheets across faculty and multiple subjects. Manual processing—digitization, aggregation, and identifying defaulters or proxy entries—is slow, error-prone, and inconsistent. A practical solution is required that works reliably on limited resources, without depending on large datasets or high-performance computing, while still ensuring accuracy, scalability, and auditability.

Objective

Develop a streamlined system that:

- Digitizes paper-based attendance sheets into structured student-wise records.
- Identifies roll numbers, names, dates, subjects, and lecture-wise presence.
- Standardizes varied attendance notations into a uniform status.
- Aggregates subject-wise and department-level attendance, highlighting defaulters.
- Detects anomalies like duplicate entries or suspicious signatures.
- Produces clear reports for faculty and department use.

Technical Scope

- Input: scanned paper attendance sheets in image or PDF form.
- Processing: reliable extraction of tabular data, roll numbers, names, and marks.

- Normalization: unify diverse presence indicators (P/A/ticks/signs/dots) into clear attendance states.
- Validation: cross-check roll numbers, names, and entries for consistency.
- Aggregation: subject and department-level totals, percentages, and defaulter status.
- Anomaly detection: spot repeated entries, inconsistent markings, or duplicate signatures.
- Output: per-subject Excel reports, department summaries, anomaly and defaulter lists.

Detailed Description (Functional Workflow)

1. **Ingest & Preprocess**
    - Accept scanned images/PDFs.
    - Prepare sheets for structured reading and table region extraction.
2. **Extraction**
    - Detect and extract roll numbers, names, subjects, and lecture-wise markings.
    - Classify presence/absence symbols into standard categories.
3. **Signature Handling**
    - Compare and flag duplicate or mismatched signatures.
    - Group suspicious cases for manual verification.
4. **Normalization & Validation**
    - Convert varied notations into “Present / Absent / Unclear.”
    - Flag invalid or missing roll numbers and unusual patterns.
5. **Aggregation**
    - Create per-student, per-subject attendance records.

- Compute totals, percentages, and defaulter status.
- Compile department-wide rollups for overall percentages.

6. **Anomaly Detection**
    - Identify inconsistencies like duplicate entries or invalid marks.
    - Generate anomaly reports for staff review.
7. **Outputs & Reports**
    - Per-subject Excel files with lecture-wise and total attendance.
    - Department summary consolidating subject data.
    - Defaulter and anomaly lists for quick action.
8. **Usability**
    - Dashboard for uploading attendance, reviewing anomalies, and downloading reports.
    - Support for staff corrections with audit tracking.

Expected Solution

Deliverables include:

- Subject-wise Excel attendance reports (Roll No, Name, Lecture1..N, Total, %, Status, Anomaly Flag).
- Department summary sheets consolidating all subjects.
- Anomaly and defaulter reports for administrative action.
- A short documentation note describing symbol mapping, assumptions, and error-handling.

Conclusion

The project must deliver an efficient, auditable system that processes attendance sheets into actionable records without heavy resource requirements. It emphasizes reliability, consistency, and usability for faculty and staff, reducing manual effort while ensuring fair defaulter identification and anomaly checks. Success will be measured by extraction accuracy, ease of report usage, and robustness in real-world departmental workflows.