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# Initial Analysis: Smart Attendance System with Face Recognition using OpenCV

## Introduction

The incremental development of the system in this project will require a little bit of work upfront to understand in a wider perspective the system design, before going into the details of some aspects to deliver specific features/functionalities. By doing this, design decisions will change based on the most current information and refactoring will be incorporated to remove duplication. As this project is ongoing research in its field of study and will require small iterations complemented by evaluations and client feedback. Also, the development of this project using this method gives the client a clear idea of user interaction with the system.

## 1. Goal of the project

- Verification - a one-to-one matching of an unknown face alongside a claim of identity, to ascertain the face of the individual claiming to be the one on the image.
- Identification - which is also a one-to-one matching, given an input image of a face for an individual (unknown), to determine their identity by comparing the image against a database of images with known individuals.
- To help the lecturers, improve, and organize the process of tracking and managing student attendance.
- Provides a valuable attentive service for both teachers and students.
- Reduce manual process errors by providing automated and reliable attendance systems.
- Produce monthly reports for lecturers.
- Flexibility, lectures capability of editing attendance records.
- Reducing time losses as it is a very valuable resource.

## 2. Brainstorming and Planning

- Selecting the right development process
  - The development of life-cycle depends heavily on the process adopted.
  - The research methodology, waterfall model, agile methodology, iterative spiral approach are all proven ways of achieving success.
  - Making a small prototype to study feasibility and explore new technology.

- Define Smaller Milestones
  - Bigger projects and major milestones are complemented with smaller -milestones as it offers better tractability, improved-control, and better risk mitigation.
  - Align these mini-milestones with the bigger milestones to meet the overall schedule and reduce inter-dependency delays.

- Define Requirements
  - Defined primary, derived, and implicit requirements, both functional and non-functional. Functionality was captured via the data-flow scenarios.
  - Effective requirements gathered, formed the basis of aligning the finished product

- Define System Architecture
  - Ensure that the suitable architecture is selected, keeping in mind the requirements as well as the limitations and constraints

- Best practices such as identifying the threats and anti-patterns in the system proved out to be very helpful

- Optimizing Design
  - Balancing and distributing functionality over modules is crucial for a project.
  - The object-oriented approach is one such technique that ensures modularity.
  - Ensure that the selected approach is applied well toachieve “maximum cohesion, minimal coupling”.
  - Code reusability is often an under-utilized aspect in design, as it was leveraged well, it saved a lot of effort and reduced costs in the long run.

- Effective Code Implementation
  - Using smaller modules that are coded, self-tested, unit tested, and continuously integrated.
  - The code will be easily comprehensible to users.
  - Ensuring Proper documentation of code with indentation and comments.

- Rigorous Testing and Validation
  - Test planning, test set creation, and testing are very important to validate the developed functionality.
  - Test planning is done parallel with code implementation.
  - Unit testing, integration testing, functionality testing, system testing, and performance testing are some of the levels of testing which was performed at its time.
  - A well-established set of processes for these ensured that bugs were caught at the earliest possible stage

- Complete Documentation
  - Just as important as the actual software itself, are the documents that support it –project plan, requirement specifications, test plans, test reports, status reports, and user documentation.
  - These documents help to maintain an understanding of the software and ensure traceability.
  - It can be used as a reference in the future.

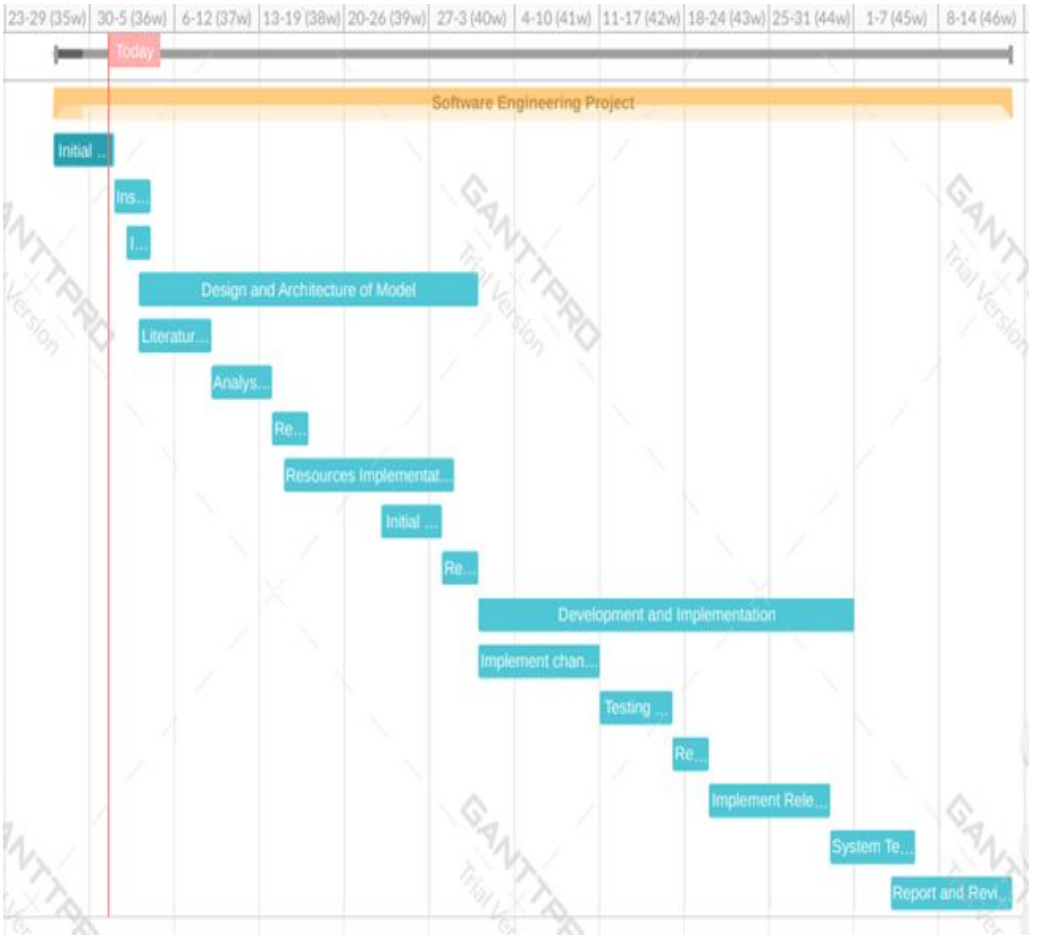
- Effective Project Management
  - Effective project management and leadership to ensure the accountability and support of the team.
  - Risk management and process adherence were achieved through good project management.

## 3. Work Division concerning time

| Sr. no. | Task | Date |
|---|---|---|
| 1. | Installations of Pycharm ((python environment) along with OpenCV libraries | 2 Sept |
| 2. | Conduct a literature survey to identify the algorithms suitable for developing our model | 8 Sept |
| 3. | Developing Design and Architecture of our model, by resource implementation and initial prototyping | 27 Sept |
| 4. | Implementing necessary changes with given feedback to counter underlying problems and tackle necessities | 10 Oct |
| 5. | Review and Evaluation of our model with full-scale testing and corrections | 19 Oct |
| 6. | System testing to improve the features | 5 Nov |
| 7. | Complete documentation of the project with details in the Project Report | 10 Nov |

## 4. Gantt Chart

| | Task name | Start date | End date | Duration |
|---|---|---|---|---|
| | | **27/08/2020** | **13/11/2020** | **632h** |
| 1 | **Software Engineering Project** | **27/08/2020** | **13/11/2020** | **632h** |
| 1.1 | Initial Project Proposal | 27/08/2020 | 31/08/2020 | 40h |
| 1.2 | Installations of Python Env... | 01/09/2020 | 03/09/2020 | 24h |
| 1.3 | Install and Enable OpenCV | 02/09/2020 | 03/09/2020 | 16h |
| 1.4 | Design and Architecture of... | 03/09/2020 | 30/09/2020 | 224h |
| 1.5 | Literature Survey of Variou... | 03/09/2020 | 08/09/2020 | 48h |
| 1.6 | Analysis of Methodology | 09/09/2020 | 13/09/2020 | 40h |
| 1.7 | Review and Evaluation of ... | 14/09/2020 | 16/09/2020 | 24h |
| 1.8 | Resources Implementation | 15/09/2020 | 28/09/2020 | 112h |
| 1.9 | Initial Prototyping | 23/09/2020 | 27/09/2020 | 40h |
| 1.10 | Review and Evaluation Fa... | 28/09/2020 | 30/09/2020 | 24h |
| 1.11 | Development and Impleme... | 01/10/2020 | 31/10/2020 | 248h |
| 1.12 | Implement changes with fe... | 01/10/2020 | 10/10/2020 | 80h |
| 1.13 | Testing and Implementation | 11/10/2020 | 16/10/2020 | 48h |
| 1.14 | Review and Evaluation of ... | 17/10/2020 | 19/10/2020 | 24h |
| 1.15 | Implement Relevant Chan... | 20/10/2020 | 29/10/2020 | 80h |
| 1.16 | System Testing | 30/10/2020 | 05/11/2020 | 56h |
| 1.17 | Report and Review | 04/11/2020 | 13/11/2020 | 80h |




## 5. Project Scope and Direction

The main intention of this project is to solve the issues encountered in the old attendance system while reproducing a brand new innovative smart system that can provide convenience to the institution. In this project, a smart device will be developed which is capable of recognizing the identity of each individual and eventually record down the data into a database system. Apart from that, a website will be developed to provide visual access to the information. The followings are the project scopes:

- The targeted groups of the attendance monitoring system are the students and staff of an educational institution.
- Users should be able to register through their already existing accounts.
- The user's face should be sensed and captured by the camera
- The database of the attendance management system can hold an individual's information.
- The detected face's data should be matched with the database
- The facial recognition process can only be done for one person at a time.

## 6. Expected Outcomes

- The system stores the faces that are detected and automatically marks attendance.
- Ease of use is manipulated and recognizes the faces in real-time using multiple face detection. Multipurpose software Can be used in different places.
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