School of Computing
CA326 Year 3 Project Proposal Form

SECTION A

Project Title: Classroom Analysis using Computer Vision
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Staff Member Consulted: Michael Scriney

Introduction:

Our project is a web app analysis tool, it is aimed at helping lecturers and teachers with analysing how their lectures are being received by students. Our application will provide tools to help organise users' timetables and classes and keep track of how they are doing. It will provide a library of recordings for users to look back at previous classes, view statistics, review the recording and see attendance. This analysis will be provided by our computer vision microservice which will be able to analyse real-time in the lecture and display information such as how many students are in attendance and how many are actively engaged with the lecture.

Outline:

Our project consists of the following parts:
Computer Vision Microservice: This will allow us to record and do analysis using the webcam of the computer in use, this will feed data back to the backend.
Backend Rest Service & Database: This will power the frontend web page and will store the data required to run the webpage as well as the recordings and analysis provided by the computer vision component.
Frontend Web Page: This will be the main point of contact for our users, it will contain the features accessible to users and will display our data and analysis for the users to look at and interpret.

Background:

This project started as a project idea we found on Michael's website, which detailed using a webcam and rudimentary facial recognition to convey to the educator which students are paying attention.

We initially were interested in the project idea because of the idea of computer vision and facial recognition as something we had never learned or tried before and wanted to see how it could work. We also had the idea to flesh out the project into a full formed webpage as we both enjoyed full stack development, bringing together the backend computer vision service with a fully styled frontend with extra functionality for the end user.
After more discussion and brainstorming together with the help of Michael we came up with the project idea presented here.

Goals:

Our project will provide the ability for users to :

- setup classes and student lists
- organise their schedule and lecture times
- check their timetable on the website
- see past lesson recordings
- see live attendance for their lectures
- see how many students are engaged with the lecture live
- look back on analytics of previous lectures

Programming Languages and tools:

The main language we will be using will be Python, it will be used in the computer vision aspect of the project and also will make up the backend of our web app. We will also be using Javascript alongside HTML and CSS to style up and implement our webpage.

Computer Vision Microservice:

Python + OpenCV + Flask or FastAPI

Front-end:

Node + HTML5 + CSS3 + ES6

Backend:

Python + Django + SQLite

Breakdown of Work:

The main two parts of the project that we have identified are the computer vision and camera part of the project, and then the design and development of the web app and all its components. We have divided this among the group members, however, we will still be working closely together at all parts, learning together, making decisions as a team and keeping track of how we are each doing with our workloads.

Gareth:

We have decided that Gareth will focus on the computer vision part of the project, learning how to set up a webcam for real-time analysis, learning the frameworks and libraries such as OpenCV and then developing it into a Flask or FastAPI service that we can integrate with our web app. Gareth will also be testing the project throughout the development.

Josh:

Josh will work to design and implement the Django REST framework for the backend, the front end of the web page using Node JS, the networking between the front end and the backend, and how we will link all our parts together. Josh will also be testing the project throughout the development.

Learning Challenges:

The main challenge we face when attempting this project is the new tools we need to learn how to use and also the networking and linking of it altogether. In isolation each part is achievable but a big challenge we will face is bridging and linking all the parts together into the final web app interface.

The main tool we are unfamiliar with is computer vision technology using the OpenCV library which provides us with tools to develop the real-time computer vision part of our project, we will also then need to integrate that microservice into our webpage.

Hardware/Software Platform:

Our project will be developed on our own laptops utilising Linux OS, and then also will be tested on native Ubuntu using Lab Machines.

Special Requirements:

There are no special software or hardware requirements for this project, everything used will be programmed ourselves or open source libraries and resources such as OpenCV.