Project Proposal and Plan

DSC 412

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1 Foreword

I recently competed in a Datathon, where my team and I were able to successfully utilize the skills I have learned in this class (thanks!). While I am overall very happy with our results, I noticed we were outclassed by projects with a UI, rather than a collection of insights we presented with a PowerPoint. Because of this and my background in computer science, I changed the track of this project to include a UI element.

2 Proposal

2.1 The Problem

Inefficient studying can have a significant negative impact on a student's life. Wasted hours spent using ineffective methods can lead to frustration and burnout, making learning feel more like a chore than a rewarding process. Our time that we could be deepening our understanding or spending time with friends is wasted. The constant struggle to keep up with coursework, without seeing real progress, can take a toll on mental health and self-confidence. Inefficient studying doesn't just affect grades, it chips away at the time and energy students could be putting toward things that matter to them both academically and personally.

2.2 The Solution

Computer vision could offer a solution by analyzing a student's behavior in real time. By tracking patterns like eye movement, posture, and engagement, the system could detect when focus is slipping or when distractions are taking over. With this data, it could provide personalized feedback, helping students adjust their habits for better concentration. This kind of targeted insight could transform study sessions into more productive, focused experiences, allowing students to get more done in less time while minimizing burnout. In the long run, using technology to support better focus could help students reclaim valuable time and energy for other aspects of their lives.

Specifics - I will utilize a CNN for real-time head pose detection, detecting when the user is looking away or may be distracted. I will provide feedback, scoring their focus performance and depending on the demands of the project, implement additional features that could improve user performance.

2.3 Stakeholders

This technology could benefit a wide range of people, from high school students to university researchers to industry professionals. Anyone who struggles with staying focused during long study or work sessions could find value in personalized feedback that helps them optimize their time.

2.4 Obstacles

When working with previously unused technology, I always expect to run into numerous problems along the way. I find the best way I learn is through failure, and this project won't be any different. I will encounter issues creating the head pose estimation system and integrating it into an application.

2.5 Novelty

The majority of people use AI to study, but 99% of the time it's in the form of NLP such as LLMs. Utilizing the other fields of machine learning can optimize studying to a further degree, which is what I aim to accomplish with this project.

3 Plan

3.1 Datasets

I plan on sourcing the dataset from Kaggle, using one of their many highly usable sets that are created for the intention of head pose estimation. Because this technology is not new, it won't be hard to find a dataset for my purposes.

3.2 Organizing Data

I have worked with datasets before in the forms of .xlsv's or .csv's, but I have never worked with datasets of images. While these datasets should be fairly clean, I will have to take measures to ensure I comprehend how to work with this data before processing it.

3.3 Analyzing Data

Ultimately, I need my CNN to recognize various head positions, so I will need to use a dataset that includes labelled data, so I can partition it to create a test set for the fitting of the model. I eventually will need the model to run in real time, so creating a program that operates fast enough for that will be a challenge.

3.4 Accuracy

I know my model will be accurate if it can correctly map my movements in real time. This will hopefully include the labelling of different head positions.

3.5 Similar Models

There are similar models that estimate head poses, but none that I have found for my purpose. This means I will have other models to reference for the beginning stages of the project, but will have to research more in-depth later on when I start working in my niche.