Test Report

To: EC463

From: Howell Xia, Jilin Zheng, Anish Sinha, James Knee

Team: 2 – AI Coach

Date: 11/23/2024

Subject: 1st Prototype Test Report

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1 Equipment and Set-up

1.0 Hardware Equipment

1.0.1 A computer

1.0.2 Integrated or connected camera

1.0.3 Spacious and flat area

1.1 Software Equipment

1.1.1 Internet connection

1.1.2 Web browser that can run JavaScript

1.2 Set-up

1.2.1 Connect one of our laptops to the internet.

1.2.2 Place the laptop onto a desk or bench, with the integrated webcam facing forward.

1.2.3 Open the URL on our GitHub page.

1.2.4 Demonstrate our webapp, doing an exercise, and the live, computer-vision based feedback.

2 Metrics

2.0 The webapp should be able to run from any chosen computer.

- We were able to do this successfully via a setting up unique, public hostname

2.1 Users will be able to navigate through the different pages.

- We were able to successfully demonstrate this by demonstrating the webpage navigation across the webapp.

2.2 The camera module will display the live feed and computer vision model with negligible lag (<200ms)

- We got feedback from Professor Hirsch, who noted that the model performed impressively with minimal latency.

- Professor Hirsch and our group estimate the latency is around 50ms at worst, though we did not directly measure that.
- We do note that the lag increases noticeably when testing on a smartphone compared to our laptops. We do not have a way to measure this, but we estimate it around ~300ms.

2.3 The computer vision model will accurately detect limb and joint angles, with less than 5^{o} margin of error.
- We screenshotted different instances of a person conducting a squat exercise.
- We then manually measured the knee angle with a digital protractor.
- We compared our measured angle with the calculated angle on-screen, and found it was off by less than 2^{o}.

2.4 The feedback and rep count will change in real-time based on the camera feed, with less than 200ms of delay.
- We were able to successfully demonstrate the live audio and text feedback with chimes and on-screen text.

3 Conclusions

We believe our web app is at a good place in terms of navigation, usability, and latency on our laptops. There is almost no noticeable latency or lag (~50ms), and we have reached our MVP goal in this context. On mobile devices, we still need to improve fluidity, performance, and usability. The web app's features all work in a mobile context, but it is not as performant. We will need to spend time focusing on improving the mobile latency and UI; our current plan is to adapt our code into a mobile-native app, which we believe will improve our metrics on mobile devices significantly.

In terms of accuracy, our computer vision model does a great job of accurately detecting the human limbs and joints. Our manual measurements matched very closely with the angles calculated from the computer vision model. We do note that the computer vision model does make some invalid assumptions when limbs leave the frame. We are currently working on improving those edge cases by detecting when they happen, disabling the exercise feedback temporarily, and informing the user to bring themselves back in-frame to cooperate with the model.