

Eye Tracking on iPad

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MOTIVATION

This project explored the feasibility of detecting dyslexia through eye-tracking on iPad, with the goal to eventually integrate it to Dyslexico.

By detecting eye movement patterns that are specific to people with dyslexia, we could potentially provide early detection and intervention for dyslexia. Our goal was to try to be as close as possible to a level of precision that would allow us to reliably detect dyslexia in a real-world setting.

METHODS

We developed a prototype of an eye-tracking application on iPad, using ARKit and Swift, that processes live video feeds to estimate the gaze points of the users.

Then, we explored calibration techniques, using Python on Jupyter notebooks, to improve the accuracy of the gaze point estimation. We tested different calibration methods, such as different types of average offsets or linear regression, and compared their performance. For the linear regression, we also extensively tested different splitting methods, for the training and testing data, and also different features combinations to use in the regression.

For this exploration, we had to gather data of the users from our prototype. Different setups with

different head position and distance to screen were recorded to train and test the calibration methods.

RESULTS

Our initial gaze computation, despite not being accurate enough, served as a good starting point. We were then able to increase the accuracy of the gaze estimation with the calibration techniques we tested.

We also highlighted the importance of the face orientation in the calibration.

With this project, we created a base for future research on eye-tracking on iPad. We prototyped a way to estimate the gaze point of the user and to calibrate it, that could be extended to other applications. The exploration we made on the different calibration methods could be a starting point to find new possibilities. More work could be done to see if this could be used in a real-world application, such as Dyslexico.

Result of the calibrator that had the lowest Root Mean Square Error on one target point:

