



Introduction

Prof. Maja Matarić's Interaction Lab involves using Socially Assistive Robotics (SAR) to provide social assistance to users through Human Robot Interaction (HRI). Because children with ASD get distracted so easily, it can be hard for them to learn, so her PhD student (my mentor), Zhonghao Shi, is working on developing a SAR that can detect the learning engagement of a child with ASD, and then provide an appropriate stimulus to get them back on track.

Objective & Impact of Professor's Research

Prof. Maja Matarić's Interaction Lab focuses on developing personalized human-robot interaction methods for behavior change aimed at health, wellness, rehabilitation, training and education. The primary means of doing so is through socially assistive robots, which are immensely helpful for those with special needs. Her lab focuses on aiding people primarily through social interaction rather than through physical contact.

Socially Assistive Robot



Skills Learned

I've worked on developing / refactoring a backend ML pipeline to determine if a child with ASD is engaged while they are learning. In addition, I've worked on turning this into a downloadable application that high school and college students can use to determine their own engagement levels while studying.

Skills I have learned through this project:

- Mediapipe and PyAudio library to extract facial and audio features
- XGB Classifier Model
- Windowing data in ML
- PyQt5 to create an application interface for the app
- py2app to create a downloadable application
- Working a front and back-end in python
- Threading in Python
- Navigating a virtual environment in terminal



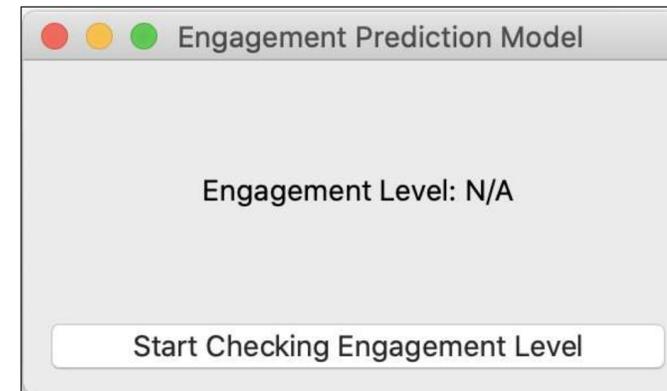
pyAudio Logo, <https://pypi.org/project/PyAudio/>



MediaPipe Logo, <https://mediapipe.dev/>



PC: Allen Wang, Mediapipe Python Library



PC: Allen Wang, PyQt5 GUI Library

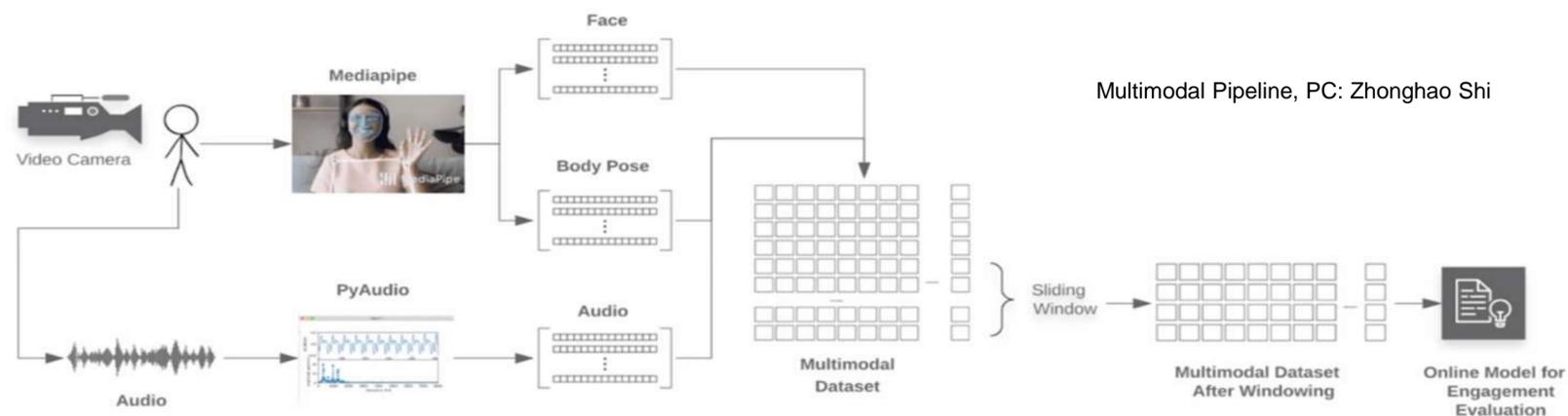
Next Steps

I would like to continue turning the research into a usable app, as well as help improve upon the engagement model after SHINE is over. In addition, I would like to visit the lab once Covid protocol is lifted to see how successful the model /SAR is for children with ASD. In the future, I will continue to build upon the ML skills I picked up, and build further applications. Eventually, I hope to build an AI based app that will benefit others like Professor Matarić's research does.

My STEM Coursework

SHINE has helped me to expand upon basic programming concepts that I learned from my AP CSP and CSA class and showed me real life research applications for them. Previous experience with online coding courses and personal projects had also helped me immensely in figuring things out on my own. It allowed me to stay resilient and solve the many technical errors I encountered with patience.

Multimodal Machine Learning Pipeline for Detecting Engagement



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