Using AI for Accessibility

Android app to help people with visual impairment navigate *better*

Human AI Interaction Course Project - Track B

By Ruchita Maitri (rmaitri)

https://github.com/RuchitaMaitri/HumanAI_Interaction_Project.git

Pilot User Study - Learnings

Obvious UI Improvements

Getting more data for ‘Yellow’ class, improving data quality

Improving model prediction

Actual Real-Time, eliminating need of image capture

Famous Apps for Visually Impaired People

NavCog

Computer Vision based navigation application

Eye Note

U.S. paper Currency Detector application

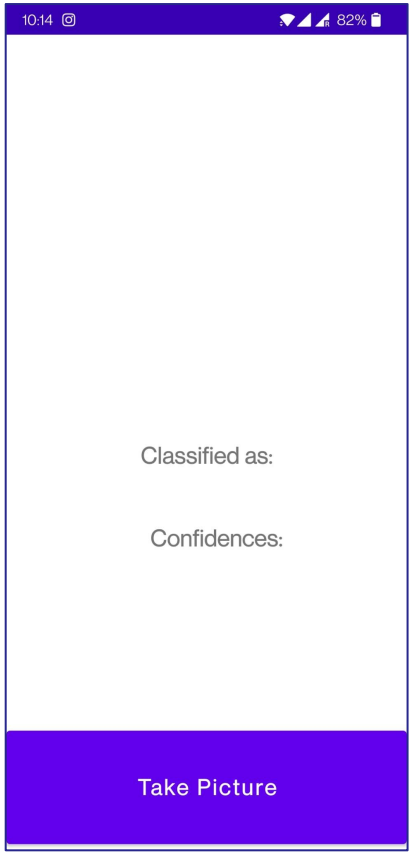
TapTapSee

Generic object detection application

https://www.keckmedicine.org/blog/top-10-apps-visually-impaired-people/

Traffic Signal Light Predictor

- Android application
- Real-time (almost) prediction of traffic signal light after image capture
- Audio output



Pilot User Study - Results

Success!

Classified as:

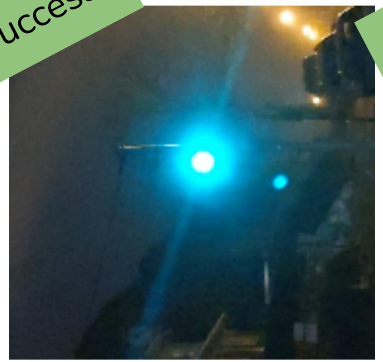
Red signal, please wait

Confidences:

Red: 99.9%
Yellow: 0.0%
Green: 0.1%

Take Picture

Success!



Classified as:

Green signal, you can cross the road now.

Confidences:

Red: 0.1%
Yellow: 0.1%
Green: 99.9%

Take Picture

Success??

Classified as:

Red signal, please wait

Confidences:

Red: 99.4%
Yellow: 0.6%
Green: 0.0%

Take Picture

Failure??

Classified as:

Not sure, please adjust the camera.

Confidences:

Red: 94.3%
Yellow: 0.0%
Green: 5.7%

Take Picture

About Visual Impairment

Almost 20 million Americans - 8% of the U.S. population - have visual impairments.

They find it particularly difficult to navigate unknown areas.

Necessitates a live surrounding captioning application.

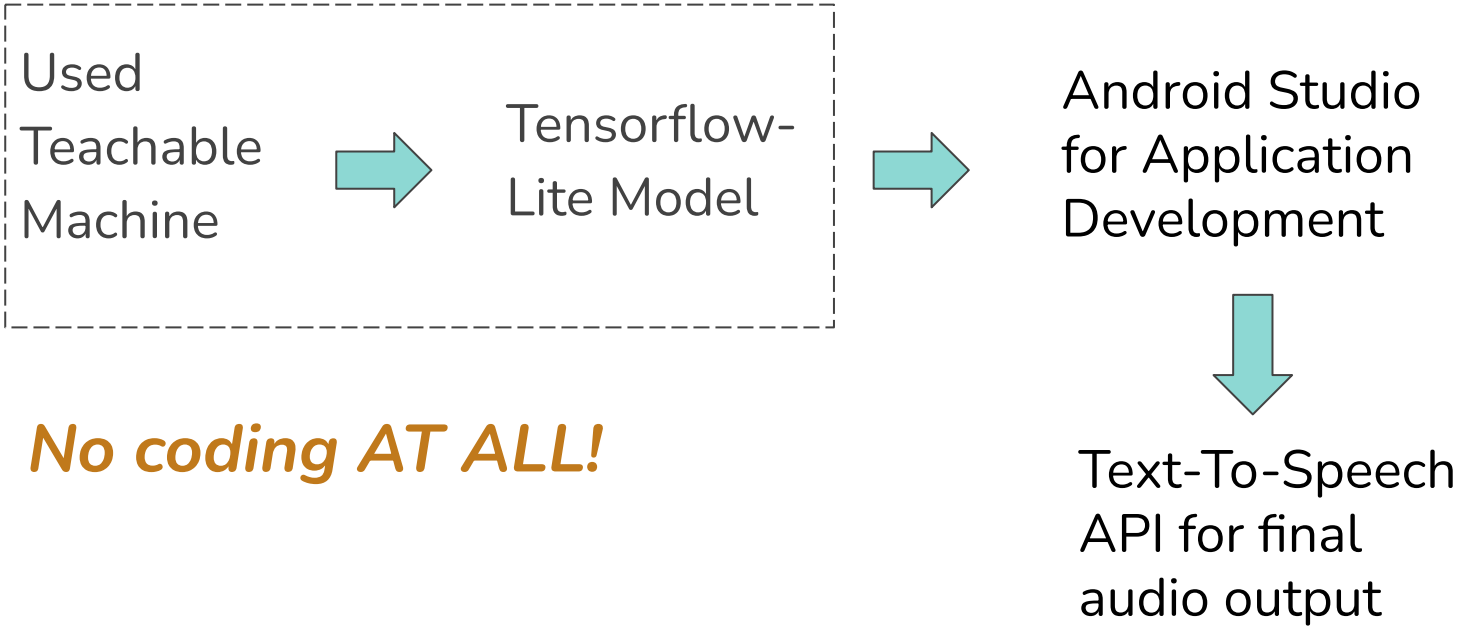
Health Policy Institute

Data Source

- Udacity's Intro to Self Driving Car Course
- Image classification problem
- Red, Yellow, Green Signals as classes
- Total ~1500 images (Red - 900, Green - 500, Yellow - 100)

https://github.com/kobbled/ITSDC-Udacity-Traffic-Light-Classifier

Model and Android Application Development



No coding AT ALL!

Design choices

Privacy: Protecting privacy of people in the surrounding by not storing the data at all

Usability: ‘Take a picture’ button is specifically made bigger keeping in mind the user base

Lacks model explainability: We know what the model does, but cannot completely eliminate the chances of erroneous prediction, nor can we explain them. (ModileNet network at the backend of Teachable Machine)

Thank you!