COVID Traveler

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Problem

- COVID is still a risk in Massachusetts and across the country. In general, people are unaware of the risk of infection within specific locations across MA.
Solution

- An app to inform users in real-time about how COVID-safe their environment is and incentivize preventative actions.
  - Use location data to alert users about the COVID level in their environment.
  - Allow users to search locations of interest for COVID-safety measures.
  - Incentivize wearing masks with mask detection image technology and a point-based system.
  - Report people who are not wearing masks.
Why use mobile/ubicomp?

- Location aware
- Constant camera access
- Always with you so you can always know the safety info
Related Work

- **Prober**
  - App lets users rate stores/restaurants

- **Face-Mask-Detection**
  - Python ML library for face mask detection

- **Face Mask Detection App**
  - Android app for face mask detection
How will it work?
Some scenarios...
Case 1: Active Alert

- Allie wants to visit some friends in Boston.
- Before she leaves, she inputs her destination into the app’s COVID case map. The app tells her that her destination is in a green zone, so she feels reasonably comfortable with making the trip.
Case 2: Passive Alert

- Patrick is vegan. He’s planning on making a stir-fry later, so he decides to drive over to Whole Foods in Shrewsbury because they have some of the best tofu.
- When he crosses the bridge into Shrewsbury, his phone vibrates, and notifies him that he has entered a COVID hot zone! Now he knows to be extra cautious when he gets to the store.
Case 2 (cont.): Mask Usage

- When Patrick arrives at the store, the app alerts him that the store is safe: no reports of any maskless people have been made in the past hour.
- The app also asks Patrick to take a picture of himself wearing his mask before entering the store. The people who wear masks most often whenever they enter a place of interest have a chance of winning a prize at the end of the month, so Patrick eagerly does so.
- Inside the store, Patrick notices a man not wearing a mask, so he takes a picture of him using the app. The app detects that the man is not wearing a mask, and records the incident to report it to other users going to this location.
Machine Learning Details

- Mask Classification Model or Object Detection model developed using Detectron2
- Multiple Datasets available
- Model pre-trained on Mobile enabled model such as MobileNetV2
Android Modules/3rd party libraries

- Android Camera
- Google Places API
- Firebase API
- Covid data- Mass.gov
- Machine learning- pytorch; Detectron2
Software Architecture

User

1. User asks the app if a place is safe
2. User enters a new town
3. User wants to report someone misusing a mask in a place
4. User arrives at a new place

App

- Active Danger Request Class
- Passive Danger Request Service
- Report mask misuse class
- Android Camera
- Mask Wearing Classifier
- Request user to take photo service

- Massachusetts Covid Data
- Google Places API
- Firebase
UI Mockups

Sign Up

Full Name

Email

User Name

Password

Must be at least 6 characters

Confirm Password

Must be at least 6 characters

SIGN UP

Log In

Login with Email or User Name

Password

Log In

DON'T HAVE AN ACCOUNT ?
SIGN UP INSTEAD

Check In

COVID Traveler

COVID Safety

Red Zone

There were 180 positive cases of COVID-19 reported in the last day.

There are no reports of any maskless people at Whole Foods.

Home  Report  Profile  Upload  COVID-19

Public Health
UI Mockups Continued

Check In

COVID Safety

- **Green Zone**
  - There were 25 positive cases of COVID-19 reported in the last day.
  - There are no reports of any maskless people at your destination.

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Percentile

- You are in 85th percentile

- Keep it going! You have uploaded a picture of yourself wearing a mask.
- 90% of the time you have checked into a store!

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Report

- Location ....
- `Date and time ...
- No of people ...

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SUBMIT!
Development Timeline

- 10/28: Research and planning, submit proposal
- 11/11: Front end development
- 11/18: Set up location awareness services, connect to database
- 11/25: Machine learning to detect masked faces
- 12/2: Conduct user testing and fix bugs
- 12/9: Finalize Report and Project
Evaluation Plan

● App functionality
  ● Testing correctness for COVID location data (emulator, real world)
  ● User surveys, with both closed-ended and open-ended questions, e.g.
    ● On a scale from 1 (not at all) to 7 (extremely), how intuitive was the app to use?
    ● Were there any aspects of the app you found confusing? Is there any extra functionality you wish was included?

● Machine learning
  ● Cross Validation
  ● Average Precision
Difficulty Points

- Location sensing (4 points)
- Camera taking photos (4 points)
- Firebase API (4 points)
- API to get the Covid data (4 points)
- Machine Learning – classifying masked/unmasked faces (10 points)

Total: 26 Points!
Questions ?
References

- [https://github.com/chandrikadeb7/Face-Mask-Detection](https://github.com/chandrikadeb7/Face-Mask-Detection)
- [https://developers.google.com/places/web-service/overview](https://developers.google.com/places/web-service/overview)
- [https://firebase.google.com/docs/reference](https://firebase.google.com/docs/reference)