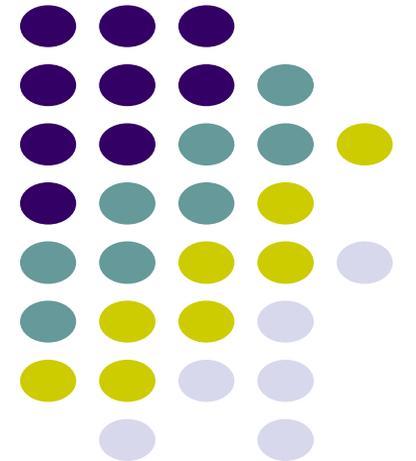
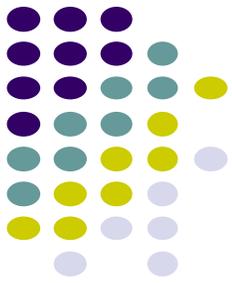


COVID Traveler

Andrew Nolan, Lokesh Gangaramaney
Christopher Micek, Kevin Fortier, Joseph Petitti

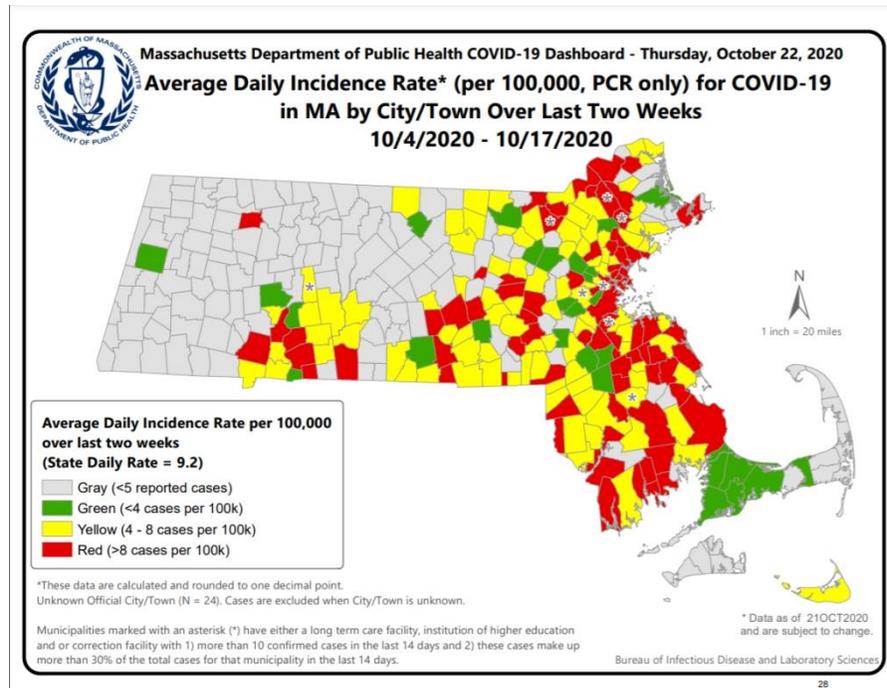
*Computer Science Dept.
Worcester Polytechnic Institute (WPI)*





Problem

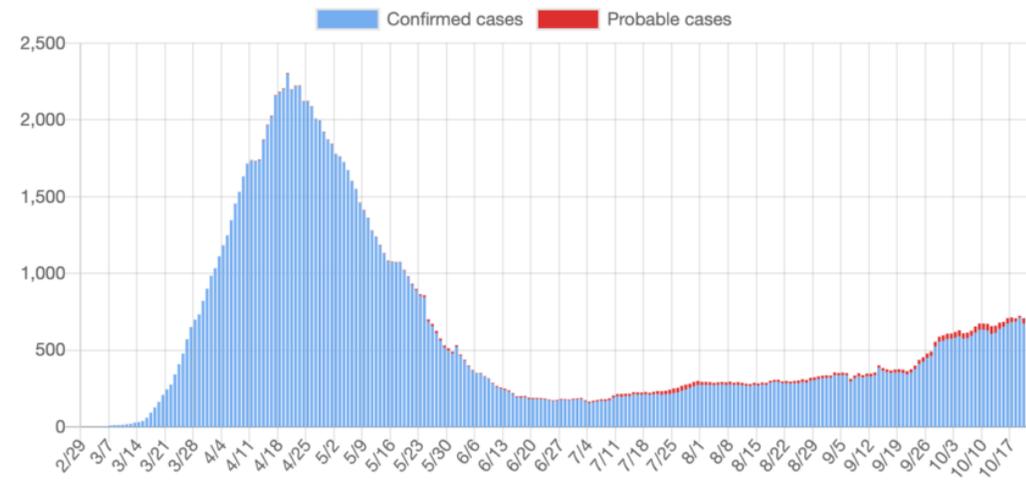
- COVID is still a risk in Massachusetts and across the country. In general, people are unaware of the risk of infection within specific locations across MA.



Coronavirus Cases In Massachusetts

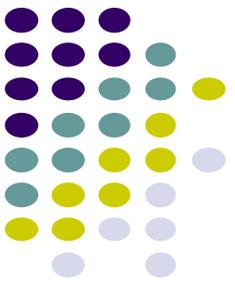
Rolling average Total cases Daily cases

Here's the 7-day rolling average of new cases each day:



SOURCE: [Mass. Department of Public Health](#)

Solution



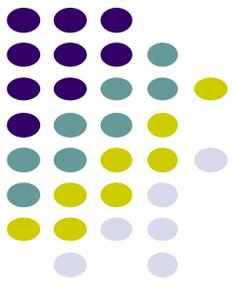
- An app to inform users in real-time about how COVID-safe their environment is and incentivize preventative actions.
 - Use location data to alert users about the COVID level in their environment.
 - Allow users to search locations of interest for COVID-safety measures
 - Incentivize wearing masks with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



Why use mobile/ubicmp?

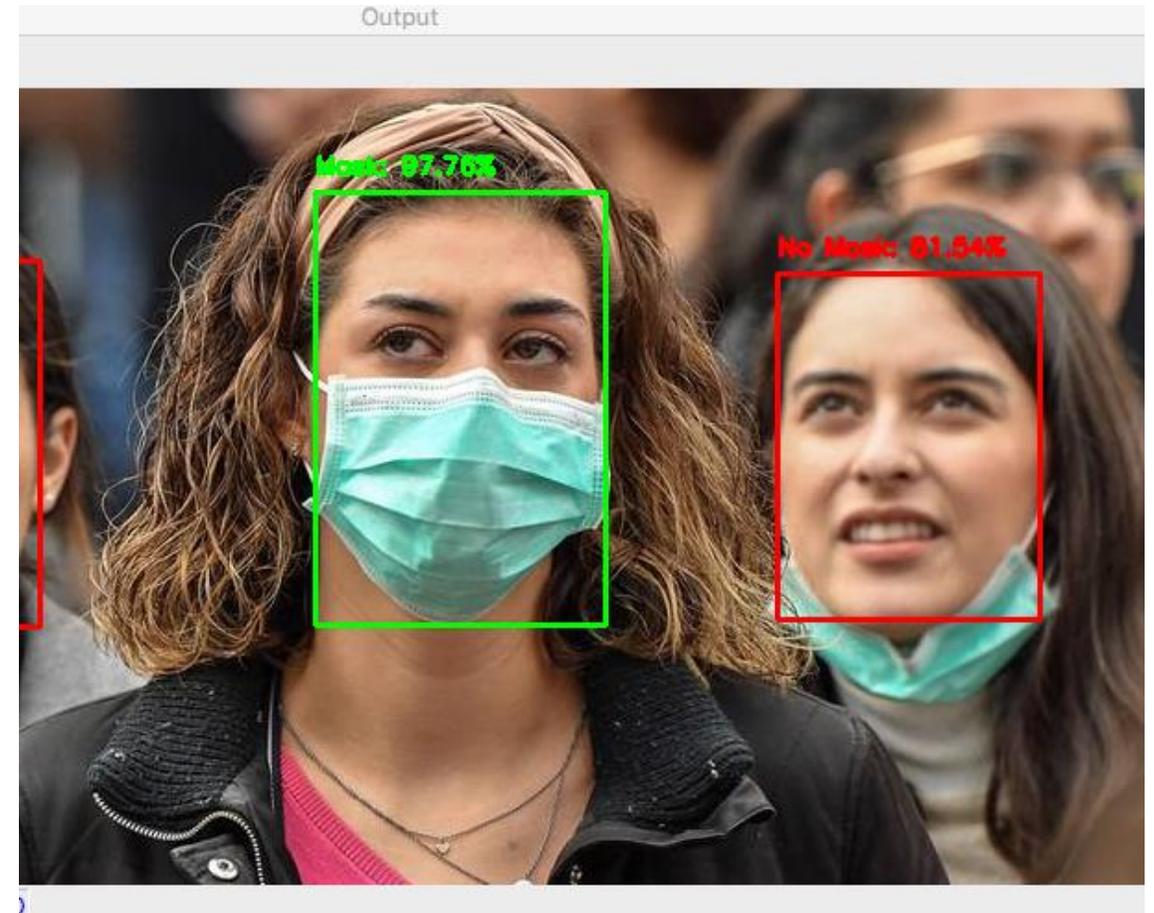
- Location aware
- Constant camera access
- Always with you so you can always know the safety info





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

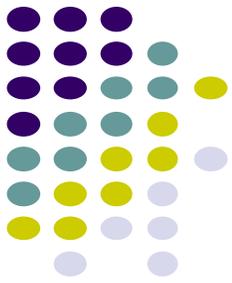
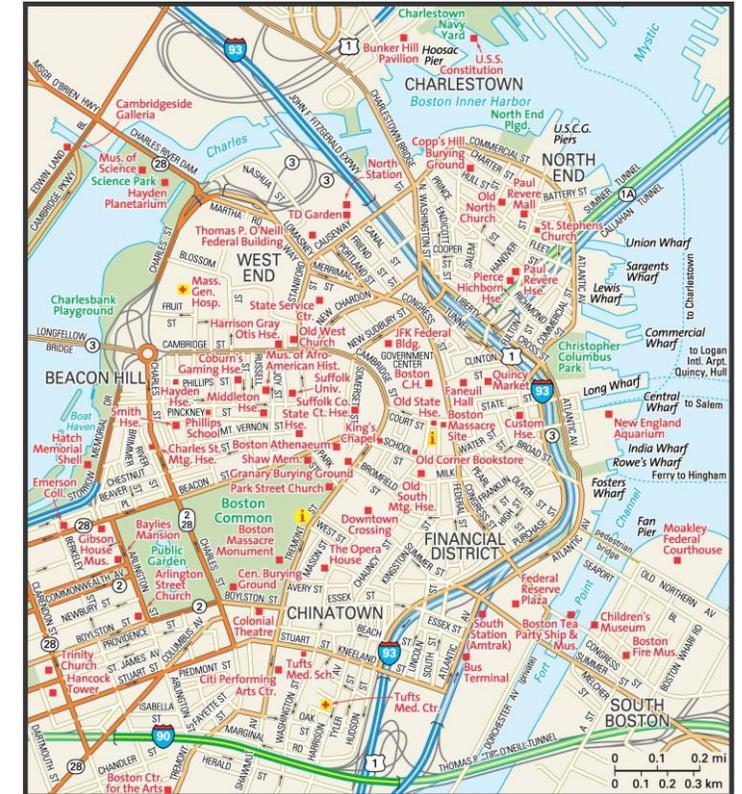




How will it work?
Some scenarios...

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

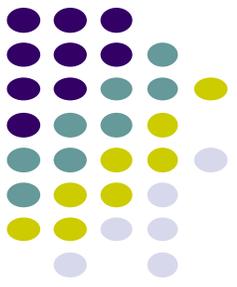
- Patrick is vegan. He's planning on making a stir-fry later, so he decides to drive over to Whole Foods in Shrewsbury because they have some of the best tofu.
- When he crosses the bridge into Shrewsbury, his phone vibrates, and notifies him that he has entered a COVID hot zone! Now he knows to be extra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





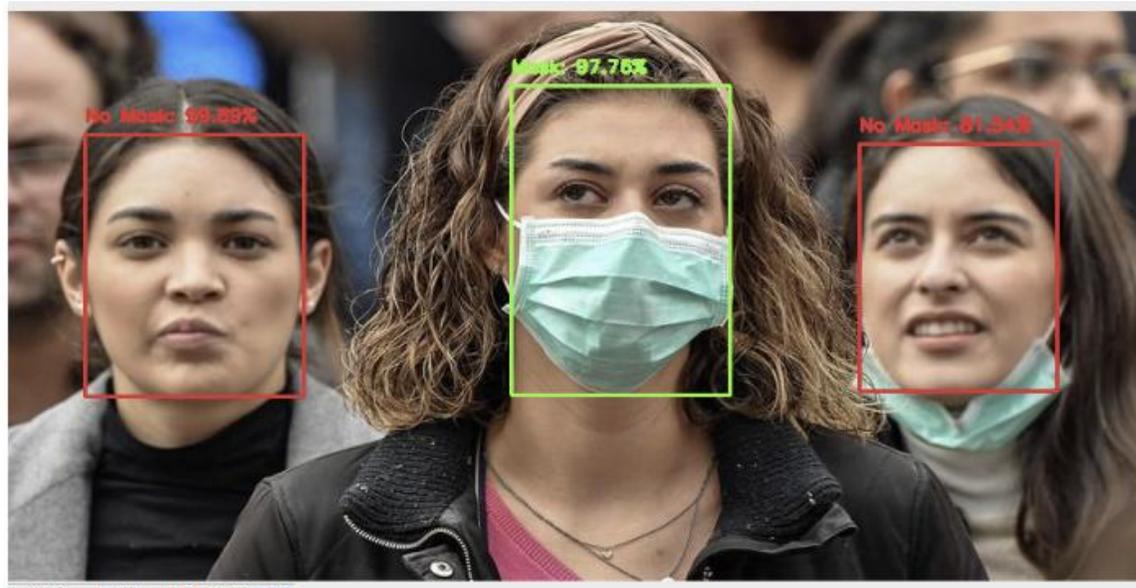
Case 2 (cont.): Mask Usage

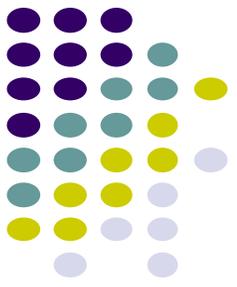
- When Patrick arrives at the store, the app alerts him that the store is safe: no reports of any maskless people have been made in the past hour.
- The app also asks Patrick to take a picture of himself wearing his mask before entering the store. The people who wear masks most often whenever they enter 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



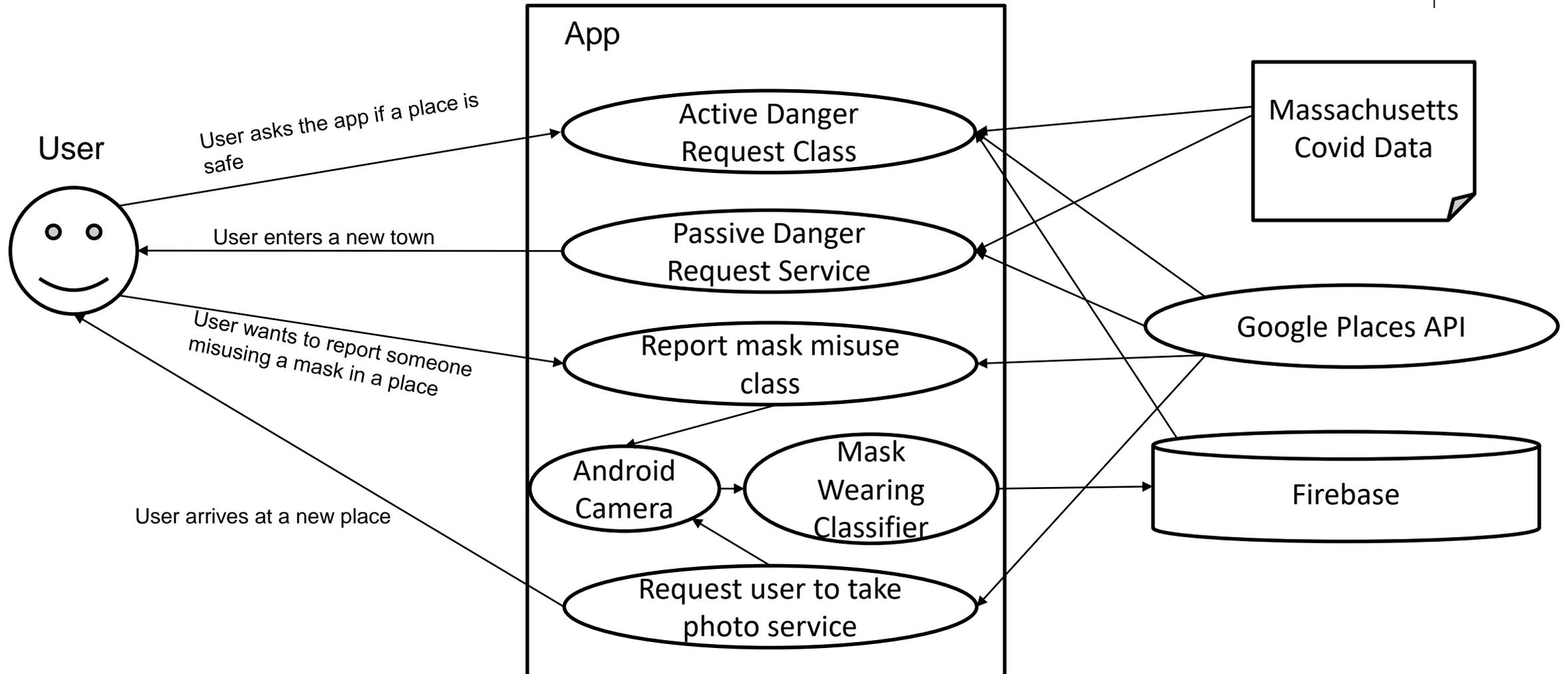


Android Modules/3rd party libraries

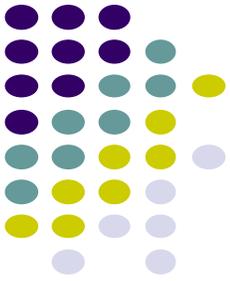
- Android Camera
- Google Places API
- Firebase API
- Covid data- Mass.gov
- Machine learning- pytorch; Detectron2



Software Architecture



UI Mockups



× **Sign Up** LOG IN

Full Name

Email

User Name

Password

Confirm Password

SIGN UP

By continuing, you agree to accept our
Privacy Policy & Terms of Service.

COVID Traveler

Log In

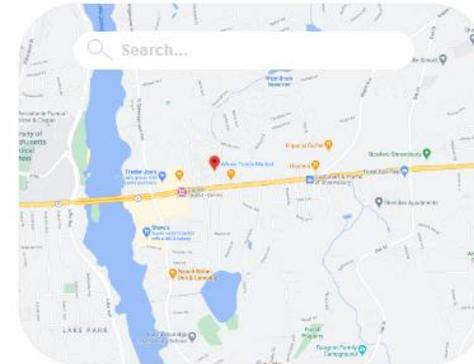
Username or Email

Password

LOG IN !

**DON'T HAVE AN ACCOUNT ?
SIGN UP INSTEAD**

Check In



COVID Safety



Red Zone

There were 100 positive cases of COVID - 19 reported in the last day.

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

Home

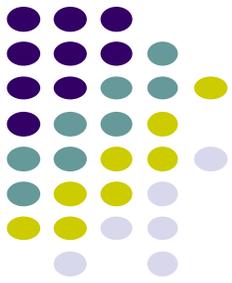
Report

Profile

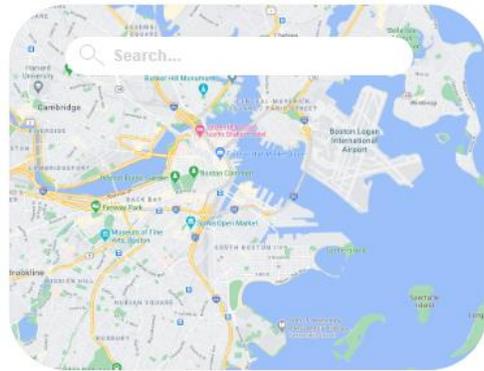
Upload

COVID -19
Information

UI Mockups Continued



Check In



COVID Safety



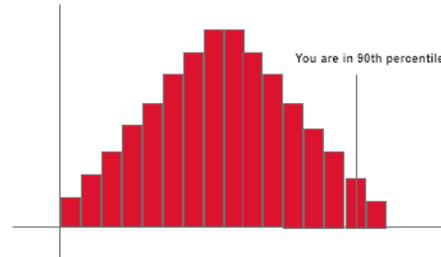
Green Zone

There were 25 positive cases of COVID - 19 reported in the last day.

There are no reports of any maskless people at your destination



Percentile

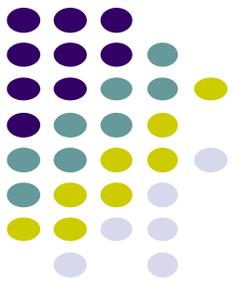


Keep it going ! You have uploaded a picture of yourself wearing a mask 90% of the time you have checked into a store !



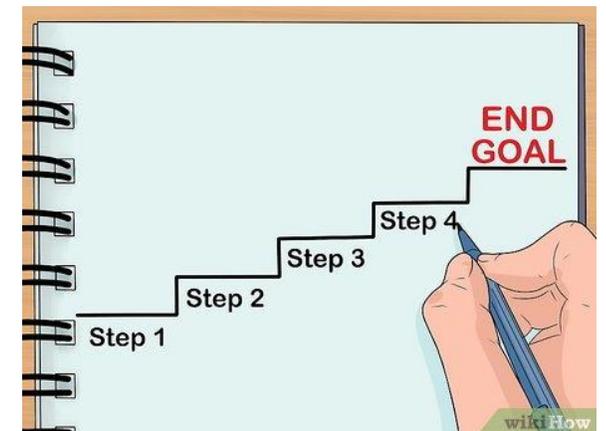
Report

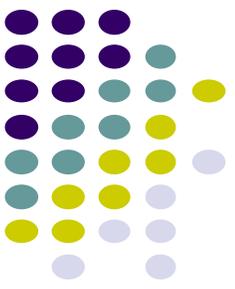




Development Timeline

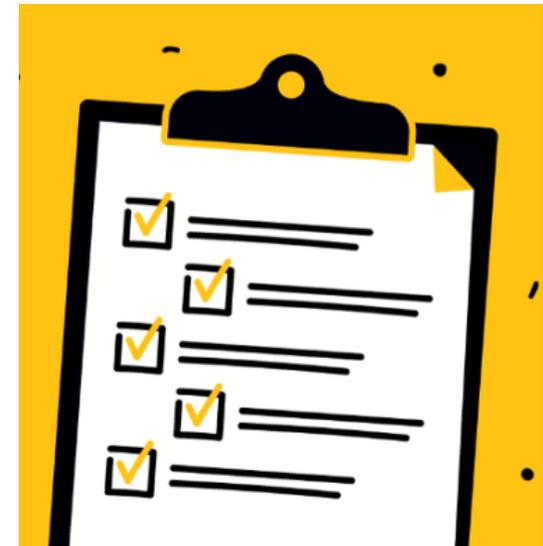
- 10/28: Research and planning, submit proposal
- 11/11: Front end development
- 11/18: Set up location awareness services, connect to database
- 11/25: Machine learning to detect masked faces
- 12/2: Conduct user testing and fix bugs
- 12/9: Finalize Report and Project

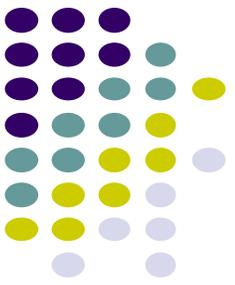




Evaluation Plan

- 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



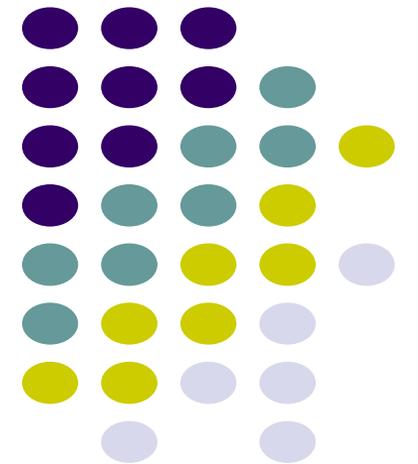


Difficulty Points

- 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://www.wcjb.com/2020/09/01/local-teen-creates-app-to-help-you-track-covid-safety-in-bars-restaurants-stores-and-more/>
- <https://github.com/chandrikadeb7/Face-Mask-Detection>
- <https://play.google.com/store/apps/details?id=com.mmm.facemaskdetection&hl=en&gl=US>
- <https://developers.google.com/places/web-service/overview>
- <https://www.mass.gov/info-details/covid-19-response-reporting>
- <https://firebase.google.com/docs/reference>
- <https://pytorch.org/docs/stable/index.html>