Roavoid Project Proposal

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Motivation

COVID has completely changed our world. According to the CDC, in only the United States, there have been 27.9 million cases with 493K deaths. This pandemic has re-defined how we live our lives and how we travel. To reduce risk of COVID exposure, many people are taking road trips rather than flying or other high risk methods. However, even with road trips, there are still large risks. A person could decide to fill gas in a COVID hot spot, and significantly increase their risk for exposure. This is where my app, Roavoid, comes in.

Roavoid will be a two-tab application. The first tab is where a user will input a start and an end destination. A route will be generated on a map that is color-coded based on COVID hot spots. If a part of the map is red, that means that there is a high number of cases in that area, but if the part of the map is green, that means that there is a low number of cases in the area. The second tab will be where the user can search for places along their route, and the places will be listed in order from least risk of exposure to most risk of exposure.

Starting Point

Luckily, there are a lot of APIs out there that hold useful data that can be used to build Roavoid.

a. **Google Maps:**
   Google Maps will help us generate the route between the two places. It will also be used to search for places along the route. Also, Google Maps allows us to make a customized, color-coded map based on developer specifications, which in our case is risk of COVID exposure.

b. **COVID Act Now API:**
   This API has metrics that will come in handy when determining the risk of COVID exposure in an area. The metrics are: daily new cases per 100K, Infection Growth Rate, Test Positivity Rate, ICU Headroom, and Tracers Hired. I believe the first three metrics (daily new cases per 100K, Infection Growth Rate, and Test Positivity Rate) will be essential in determining the safety of an area.

c. **Flutter:**
   This application will be built using Flutter so that it is cross-platform for various phones and models.

d. **Google Cloud:**
   The backend of the application will be built using Google Cloud services, for example, Google functions would handle specific one off code executions in a serverless environment. This pairs well with other technology choices I've made as these technologies are all designed by the same Developers at Google.

End Point

Algorithm to determine the risk of COVID exposure
To determine the risk of COVID exposure, I will use the three metrics from the COVID Act Now API (daily new cases per 100K, Infection Growth Rate, and Test Positivity Rate) to determine the risk of COVID exposure in an area. I will be able to categorize locations, points of interests, and the destination off of the information provided by this algorithm.

Color-coded map based on risk of COVID exposure
Based on the algorithm, parts of the map can have 3 different colors (red, yellow, and green). If an area is marked in red, that will be where the highest risk of exposure will be on the route. If an area is marked in yellow, that will be where there is a medium risk of exposure. Lastly, the areas marked in green will have the lowest risk of exposure on the route.

Search for places along the route
If a user wishes to search for places along the route, such as "Walmart", the results will be listed from least risk of exposure (so any Walmart's in a "green" area) to the most risk of exposure (so any Walmart's in a "red" area).

Design and Implementation Plans

This application will be built using Flutter in the frontend and Google Cloud for the backend. The schedule is as follows:

Tasks	Deadline
Design: A mockup of the application using Adobe XD	2/24
Research: Integrations and Map build with Google Maps API	2/27
Research: Search for how to best evaluate a place for risk of COVID exposure	3/1
Design: Create the algorithm to determine whether an area should be considered a high risk, a medium risk, or a low risk	3/5
Implement: Implement the algorithm in the code	3/7
Implementation: Build the application and add in	3/10

Google Maps to see a map view	
Implementation: Using Google Maps, create a color-coded map based on the information generated from the algorithm	3/15
Implementation: Build the second tab where users can search for places along their route	3/25
Implementation: Sort the places that appear on the second tab using the created algorithm	4/5
Get feedback on application from friends, peers, instructors	4/15
Finish documentation	4/17
Finish final presentation	4/19
Turn in deliverables	4/22

Testing Plans

Some intermittent, basic testing will be done on each feature throughout the build process.

Test cases	
Ensure that the algorithm works in determining the COVID risk of places	Test on 3/6 If pass, continue to next task If fail, go back and fix the algorithm
Generate a map on the application using Google Maps	Test on 3/9 If pass, continue to next task If fail, go back and fix
Generate a color coded map using the algorithm	Test on 3/14 If pass, continue to next task If fail, go back and fix
Test if users can search for places along their route on the second tab	Test on 3/19 If pass, continue to next task If fail, go back and fix
Test if the places are being sorted correctly, where the topmost is least risk of exposure and bottom is most risk of exposure	Test on 3/23 If pass, continue to next task If fail, go back and fix

Deliverables

    a. Software source code
    b. Documentation of the application
    c. Final Presentation
    d. Final Presentation video

References

1. CDC's COVID Data Tracker: https://covid.cdc.gov/covid-data-tracker/#datatracker-home
2. Covid Act Now API: https://apidocs.covidactnow.org/
3. Google Cloud: https://cloud.google.com/