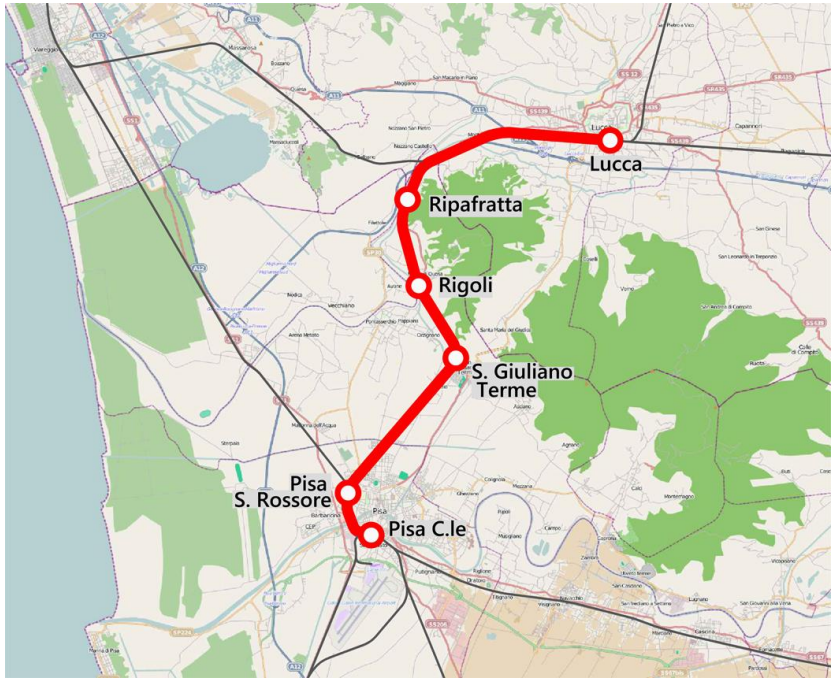
Projects
a.y. 2019/2020

An application to fight COVID-19

- We will implement an Android app aimed at fighting COVID-19
- The main goal of the app is to help reducing the transmission of the virus by
  - Keeping track of user's movements
    - This information can be useful to get in contact with other people in case the user becomes positive
    - Alerting the user if some of the places he visited in the last period experienced a significant presence of infected people
  - Helping the user in self-assessing his behavior
    - Computing a risk-index
    - Detecting when the user washes his hands
    - Comparing his risk-index with the one of people in the same area
- No sharing of sensitive information

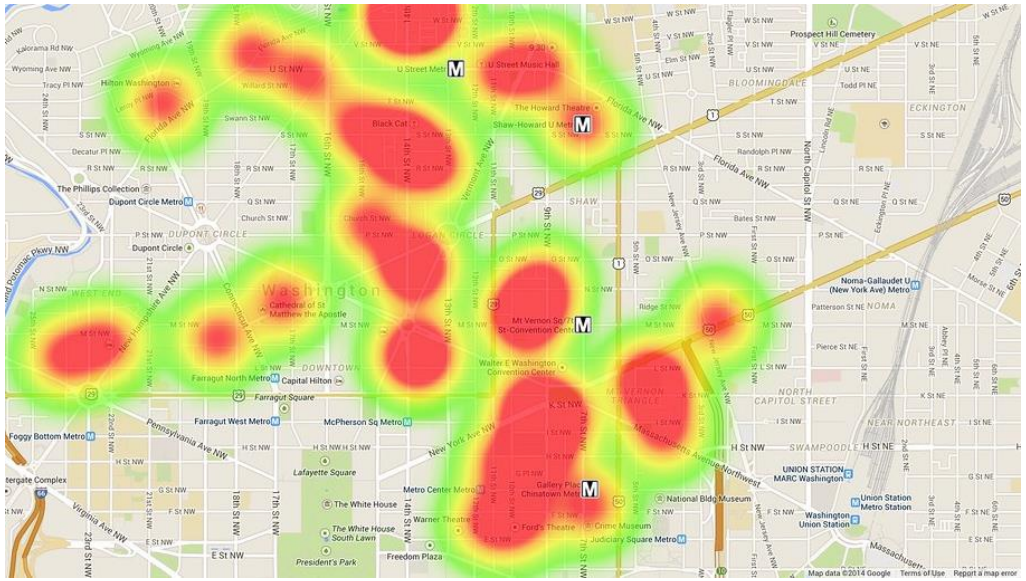
Storing user position

- User's position is monitored and stored locally (for privacy reasons)
- Traces are automatically removed after a given amount of time (e.g. three weeks) or can be removed on user's request
- Traces can be shared by the user, if he wish to do so
- User can edit traces to remove privacy-violating details, e.g. if the trace leads to his home



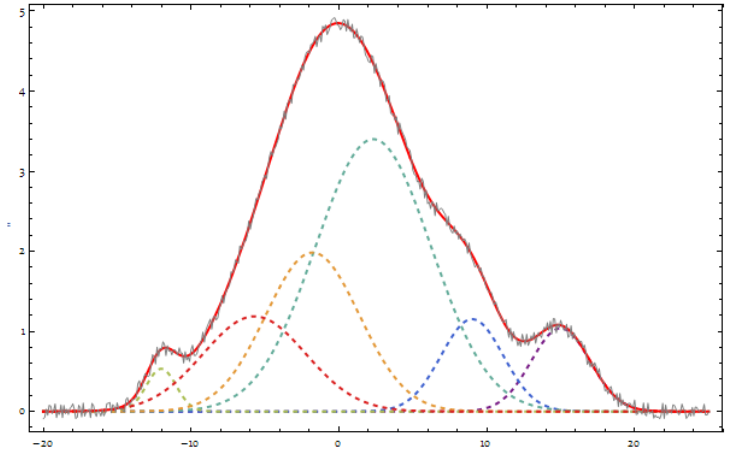
Comparing user's traces with hotspots

- Authorities may provide lists of places characterized by increased contagion
- This module automatically downloads and compares the list with users' stored positions
- In case of significant overlap the user is alerted



Evaluating user's behavior

- Social distancing is one of the most effective methods to fight spreading
- Help the user to self-assess his behavior
- Risk index computed by observing how much time he spends outside home
- Visited places contribute to risk index depending on category, e.g. bars and restaurants -> high risk, supermarkets -> medium risk, small shops -> small risk, mountain trail -> no risk
- Take into account both number of people in the nearby and duration of contact
- Washing hands helps in reducing risk
- Always home alone -> risk index=0, etc

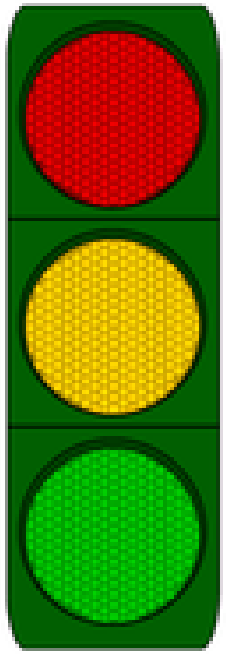


Washing hands

- Suppose the user wears a smartwatch or an activity tracker
- Automatic recognition of washing hands by using accelerometer and gyroscope
- If the user washes hands frequently, reduce risk index
- Check if user wash hands when going back home

Comparing risk-index with others’

- Risk-index of every individual is uploaded to a central database
- No personal information is uploaded
- Risk-indexes of users are grouped according to municipality and sorted
- Every day, each user receives an indication of his behavior
  - Green light: best 33%, behaved properly
  - Yellow light: middle 33%, behavior can be improved
  - Red light: worst 33%, provide suggestions about possible improvements



Projects groups

Group1 A and B:

- Collect location traces and store them locally
- Edit location traces (e.g. remove first 30 s, delete parts higlighted on a map, etc)

Group 2 A and B:

- Share location traces (upload to central database)
- Download location traces provided by other users or authorities and compare to local ones, in case alert the user

Group 3 A and B:

- Compute risk-index taking into account the amount of people in the nearby, the category of visited places, and the time spent outside home

Group 4 A and B:

- Upload personal risk-index to central database, aggregate at province level
- Provide feedback to the user about his beavior

Group 5 A and B:

- Detect when the user washes his hands
- If the user washes hands frequently, reduce risk index
- Check if user wash hands when going back home

A and B

- Same functionalities **independently** implemended by two groups
- **A** groups
  - Use google-based technologies and libraries avaliable in Android
- **B** groups
  - Use opensource, free technologies (e.g. openstreatmap instead of google maps)
- We will use 2 different repositories
- At the end, we will obtain 2 apps with the same functionalities but based on different technologies
- All code will be made available according to an open source license

Keep track of your activities

- **Student's log**: each student must keep track of his contribution to his group
  - Number of commits
  - Lines of code
  - Diary of non coding activities (e.g. collecting data from familiy members and analyze data)
- **Group's log**:
  - Document containing a description of the most noteworthy features and choices. E.g. functionality X has been implemented this way because Y and Z, or there are X, Y, Z libraries useful to implement functionality W and we selected X because…