**Coursera Capstone Course**

**Week 5**

**Foursquare Report**

**Using Foursquare to Assist First Responders After An Earthquake**



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**Introduction**

This project is intended to provide first responders with location data related to the number of people at populated locations near the epicenter of an earthquake. This project will help first responders to plan resources effectively and be proactive in the event of an emergency, rather than waiting or searching for phone calls or door-to-door search and rescue for people needing assistance. While this project will not eliminate the need for phone calls and door-to-door searches due to lack of use by all of the check-in features of the application, it is intended to provide the best available data to the administrations to make the best use of limited resources during disasters.

**Data**

Foursquare is a mobile application that provides search results for users based on users’ “previous browsing history, purchases, or check-in history”. (Wikipedia, n.d.) This project will make use of Foursquare’s API, or application programming interface. Specifically, making use of the “trending” end point of the API in relation to the latitude and longitude of the earthquake, the information returned will provide venues with the most users checked in at that time. Foursquare’s Trending end point “returns a list of venues near the current location with **the most people currently checked in**.” (Foursquare, n.d.)

In addition to the Foursquare data, the initial project will provide real-time earthquake data from California Institute of Technology’s (CalTech) Southern California Earthquake Data Center website, namely <http://service.scedc.caltech.edu/eq-catalogs/date_mag_loc.php>. This website provides real-time earthquake data that includes datetime, magnitude, latitude and longitude, and depth information.

**Methodology**

With the recent fires and flooding, the always-on-alert for the next ‘big one’ earthquake, and natural disasters in states including and in addition to California, Foursquare provides a great mechanism to use social media technology for the benefit of society during natural disasters. Earthquakes, unlike hurricanes and other natural disasters, do not provide any type of early warning detection system. Earthquakes around the Pacific Rim are occurring many times throughout the day. Unfortunately, if ‘the big one’ hits, it will take us all by surprise and first responders will be required to determine where to send their resources, and in what priority.

First, data is collected from CalTech’s earthquake website to provide real-time data on an on-going basis. This project will require pulling this data on a frequent basis, preferably every 10-15 minutes to ensure the latest data is collected for future use, if needed. The data required is based on the largest magnitude earthquake for the time period pulled, storing latitude and longitude data points for use with Foursquare.

Next, Foursquare will use the latitude and longitude data points to show a map plot using Folium to show the earthquake with a red dot, and the surrounding most populated Foursquare venues, based on check-in data.

Machine learning is not required for this exercise due to pulling the data in real-time using social media data and earthquake data.

**Results**

The data shows there is only one earthquake greater than a 5.0 magnitude, occurring on 4/5/2018, with a magnitude of 5.31, depth of 9.9 km, latitude of 33.83750 and longitude of -119.72583. As of 11/11/2018 at 3:24pm PST, the only earthquake greater than 5.0 was located off the coast of Los Angeles, so no most populated venues via check-ins on the Foursquare mobile application exist. The application/project is showing venues for the Los Angeles area as a simulation if this were a current real-time event. If this were an actual earthquake, first responders would likely want to respond to the most populated venue, as it could benefit most from first responders’ ability to lend aid to the most populated venues first. Second, the check-in feature would also help in identifying who may be lost, recovered, or missing from a venue during a disaster. This would help not only the first responders, but the individual’s loved ones as well in identifying people who were at that location quickly.

**Discussion**

There are two main points to consider with this project:

1. Users must use the check-in feature of Foursquare for the data to be relevant
2. Due to the real-time nature of the events (i.e. earthquakes), the application and any associated servers or technology must be up 24x7 to ensure the data is both collected timely and presented to first responders when they need it, namely immediately upon notification of an event.

If users do not use the check-in feature, this project will not work since there will not be any data to provide to first responders. Further, first responders will need to develop a plan not only for an initial event but also any subsequent events like aftershocks. Many times, aftershocks are greater in magnitude than the initial earthquake, so first responders may need to adjust resources and response plans accordingly. This project should take both into consideration and ensure that data remains updated to show number of users checked in, as well as any subsequent check-ins.

Another observation is that first responders could also create their own “event” for users to check into, show status, and potentially create additional information for family members and government agencies to use. For example, triage sites could be setup as an event venue on Foursquare following a disaster event, if any venues are not able to house the first responders and temporary locations need to be created to treat people and disseminate information.

Following the successful implementation of this project to expand it to other locations worldwide and to include other natural disasters for which data is available. If no data is available, I would recommend creating a site to collect and upload this data going forward to include in this project/application. For example, the flooding following recent hurricanes on the East Coast of the United States. The National Oceanic and Atmosphere Administration’s (NOAA) website, <https://www.nhc.noaa.gov/>, appears to be gearing up to provide additional data via the website.

A recommendation would be to either create or assign a central relief agency to lead the effort to provide real-time data and analytics with Foursquare latitude/longitude data for future disaster efforts to be able to respond quickly to any disaster with the greatest amount of planning possible.

**Conclusion**

While this project focuses on earthquakes in the Los Angeles region, the project could be expanded to include any major disaster that has real-time data that can be uploaded to the application and correlated with the Foursquare mobile application in the event of a disaster. The capabilities of Foursquare’s social mobile application partner well with today’s users who want to check in with their friends, earn points, etc. However, for the project to work, users will need to check-in to show first responders the most populated venues to respond to first, when the event arises.

**References**

Wikipedia. (n.d.) Retrieved from: <https://en.wikipedia.org/wiki/Foursquare>

Foursquare. (n.d.) Retrieved from: <https://developer.foursquare.com/docs/api/venues/trending>