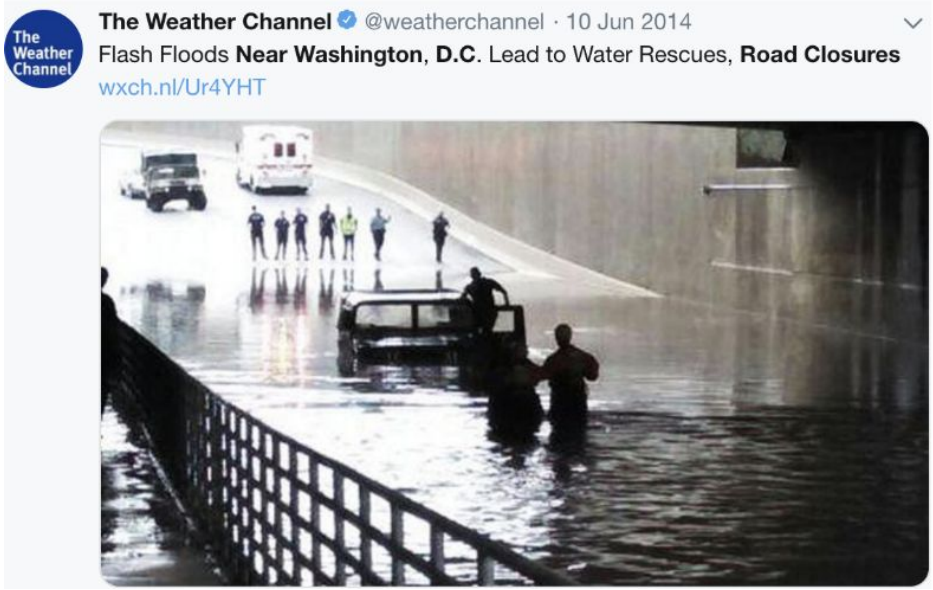
# Disaster Response Maps

## Identify road closures using social media

# Problem Statement




**North Carolina officials warn about using GPS apps like Waze after Florence**

# Problem Statement

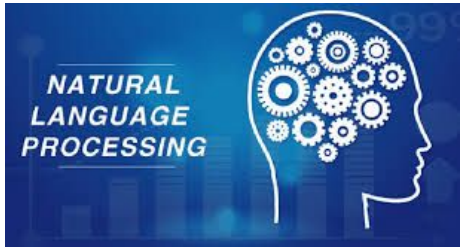
- During disasters, search and rescue teams need to find the fastest and most effective routes.
- Current navigation systems are falling short-- even those that rely on real-time data.
- New Light Technologies has asked us to provide first responders more accurate travel information about road closures.

# Our Solution

## Real Time Social Media


Twitter live API

## Natural Language Processing

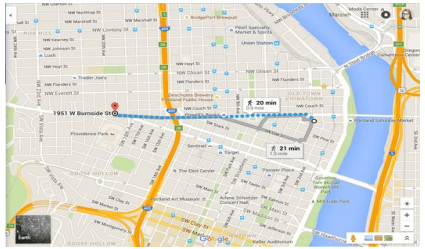



Twitter live API

## Real Time Road Closure

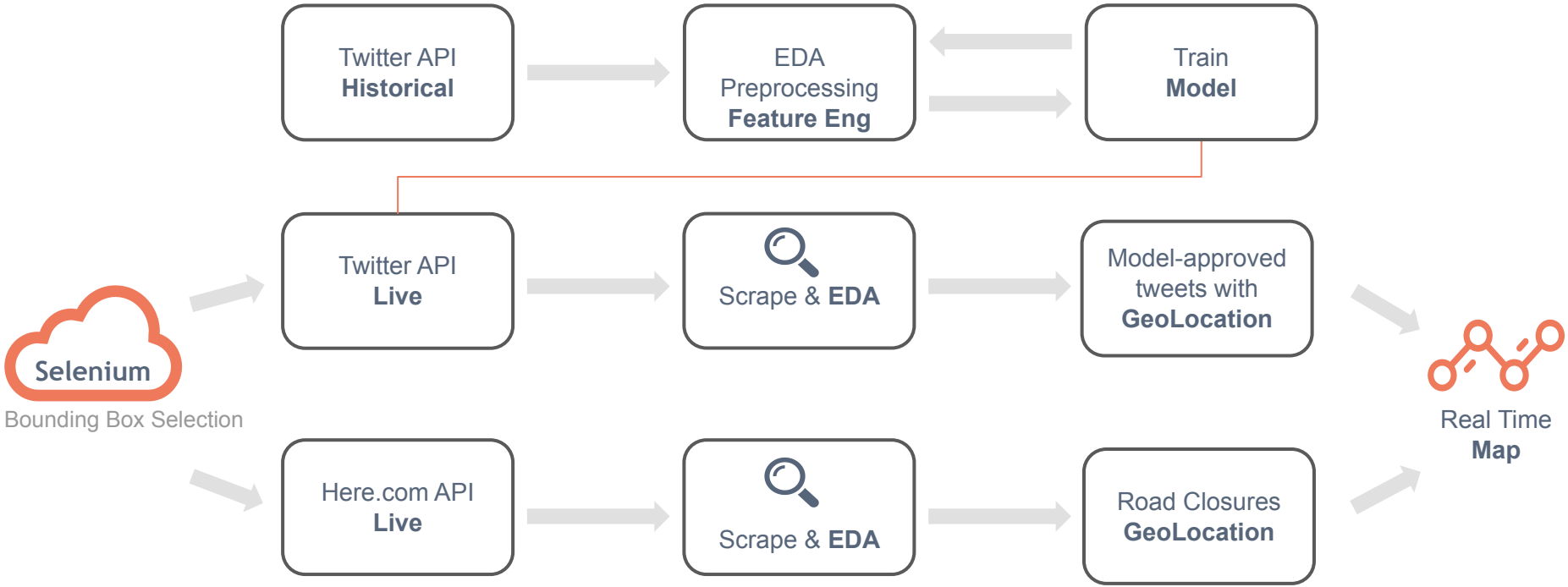

Here.com

## Live Map



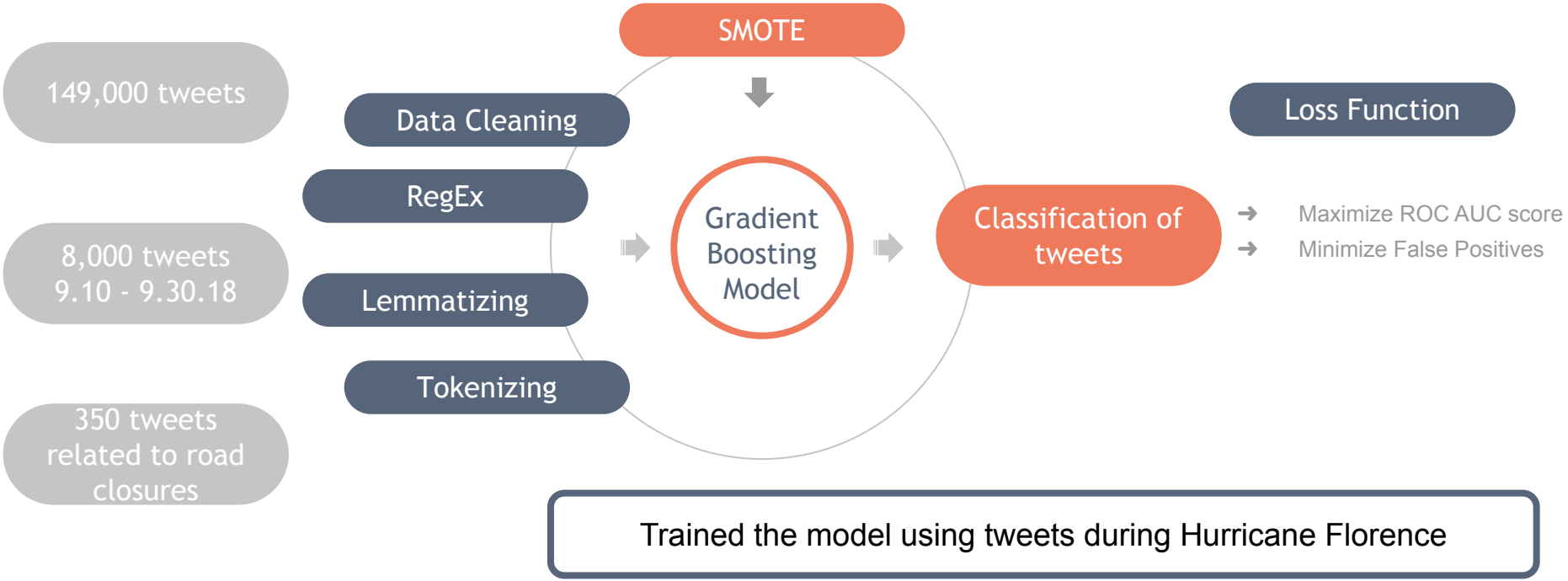
Mapbox /Tableau / Bokeh

# Our Approach



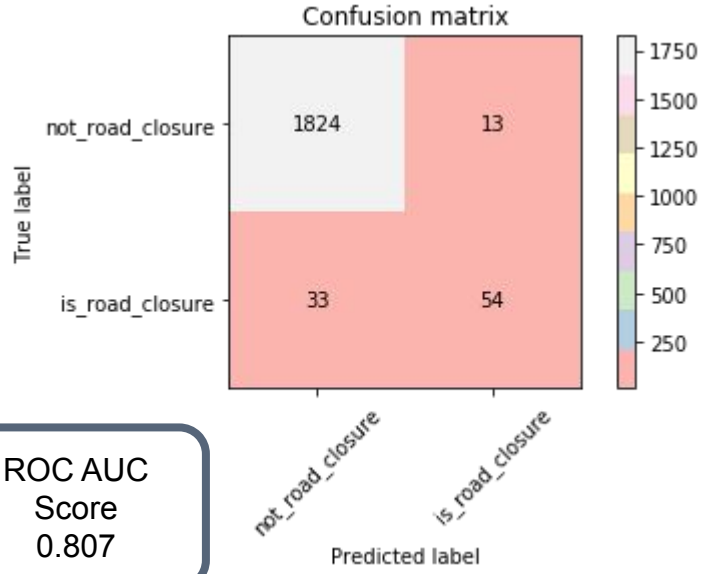
# Modeling Strategy

Multiple techniques for handling severely imbalanced classes



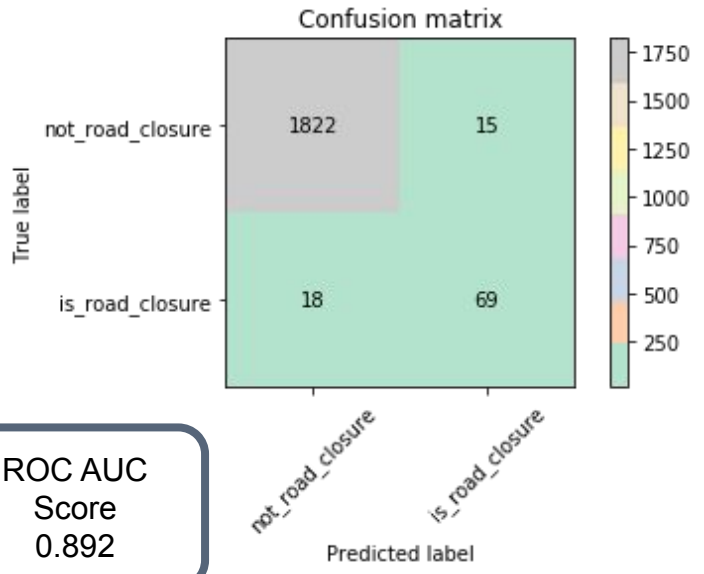
# Modeling Steps

## Logistic Regression




ROC AUC Score 0.807

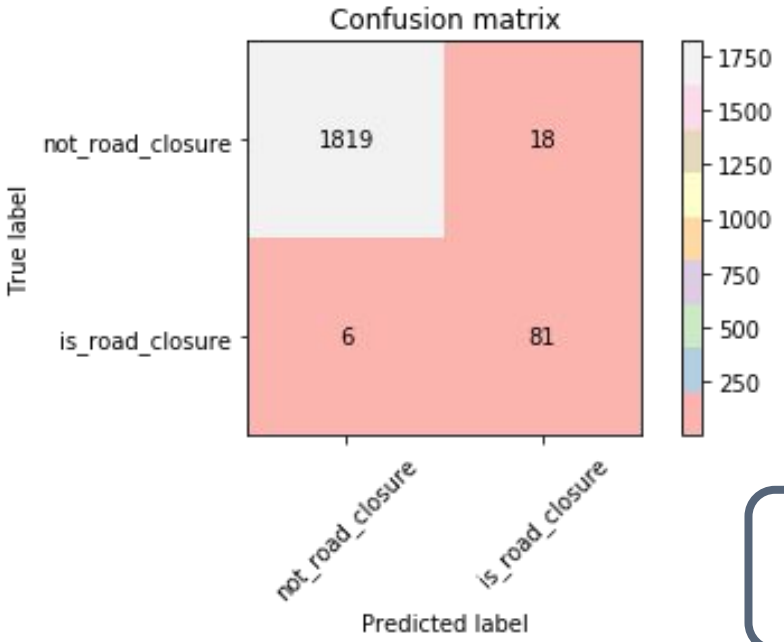
## Gradient Boosting

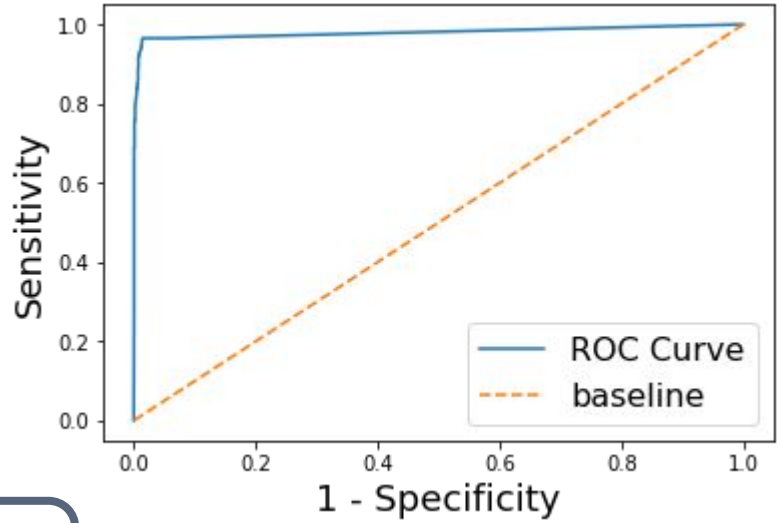



ROC AUC Score 0.892

# Final Model

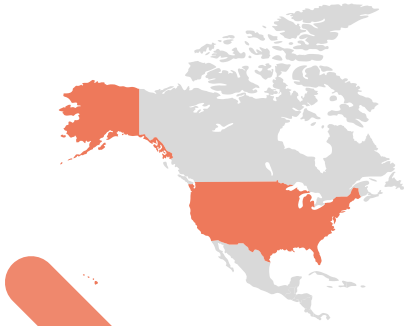
TFIDF Vectorizer, SMOTE, Gradient Boosting




ROC AUC Score 0.960

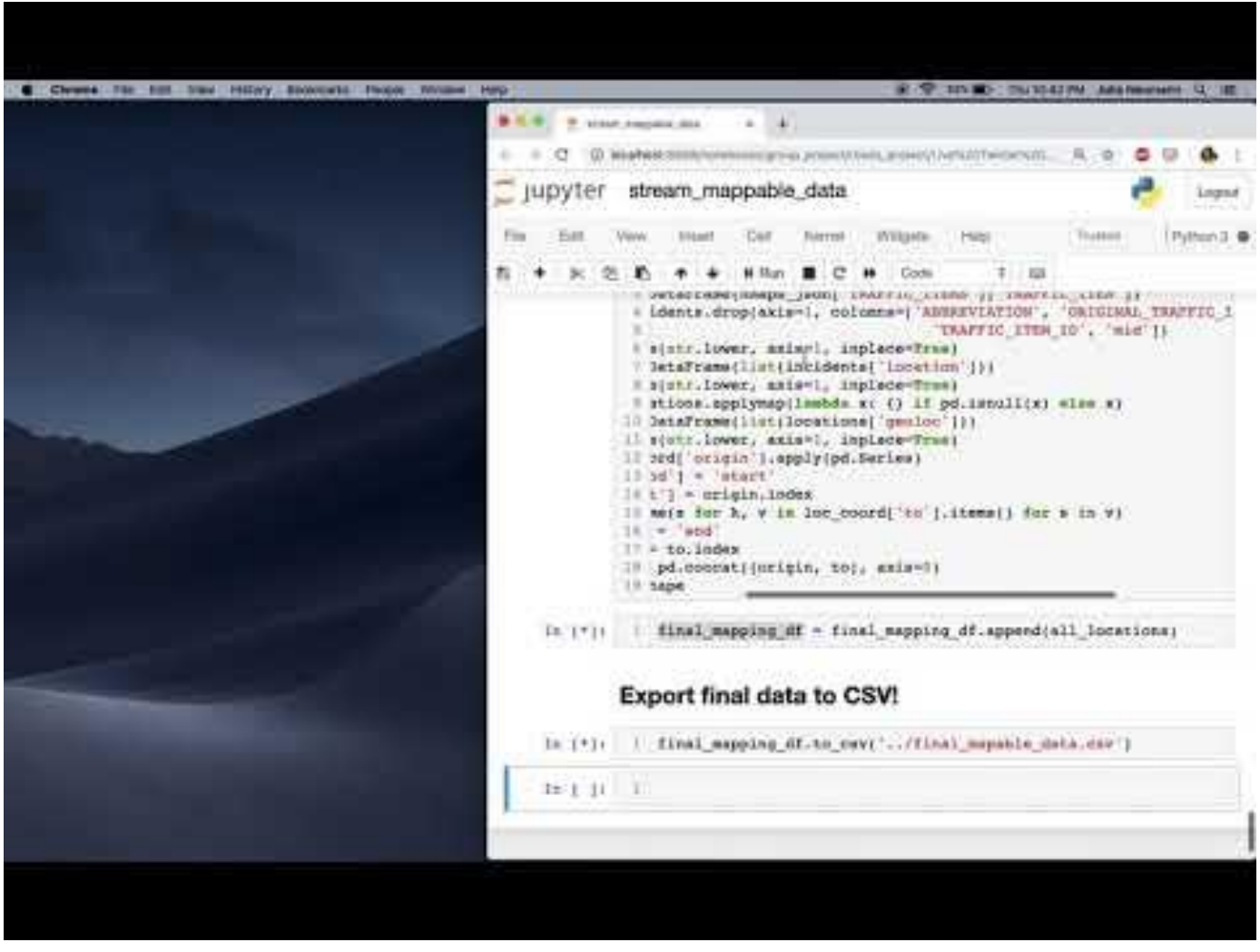
# Map anywhere, not everything



Insert your address

Selenium searches for its exact coordinates

Return data only within 25 miles of your destination


jupyter
stream_mappable_data
Logout
File
Edit
View
Insert
Cell
Kernel
Widgets
Help
Trusted
Python 3
Run
Code
TRAFFIC_ITEM_ID', 'mid']]
final_mapping_df = final_mapping_df.append(all_locations)
Export final data to CSV!
final_mapping_df.to_csv('../final_mappable_data.csv')

# Streaming Tweets

- Pull tweets within a 25 mile radius of address from the last 12 hours via keyword search
- Record all tweets with location data (either exact coordinates or city-wide coordinates)
- Run all tweets through classification model
- Map all tweets with exact location data
- Parse remaining tweets for mappable locations


# Streaming Traffic

- Connected to the here.com API to stream traffic live data
- Pulled only “critical” level incidents that would represent stoppages and not just congestion
- Added that data to list with twitter closures.

# Mapping Process

Selenium

Bounding Box Selection

Here.com

Start & End geolocation points for road closures based on the bounding box area

Example Data

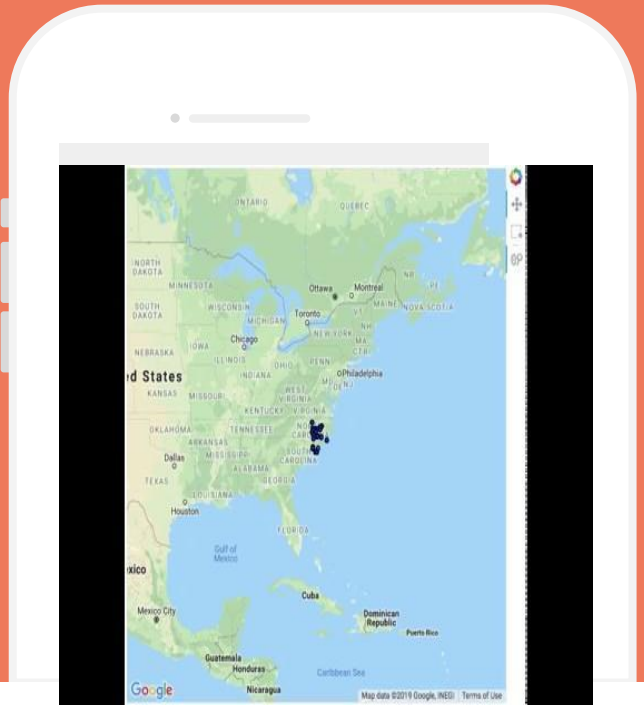
| | LATITUDE | LONGITUDE | start_end | incident |
|---|---|---|---|---|
| 0 | 35.180930 | -77.942290 | start | 0 |
| 1 | 34.219480 | -78.618100 | start | 1 |
| 2 | 35.727026 | -77.636233 | start | 2 |

tableau

mapbox

Live map Prototype

Google Maps & Bokeh




# Demo

Google Maps API & Bokeh

The points shown here are start and end points of road closures based on the original bounding box.

## Tableau Live Map

Tableau Dashboard Example

## Open Source **Data**

The model pulls live information from social media and open source traffic applications about road closures, road conditions, damaged roads which may affect travel and accessibility.

## Efficient **Code**

The model is live, but doesn't require users to load information about the entire disaster or the entire - important in disaster situations where

## Robust **Model**

A trained model that can be applied to any location and any emergency.

# Next Steps

## Flask

To integrate API connections, modeling, and mapping code from Python into one product

## Google Maps

Explore paid opportunities with Google Maps for true optimization of routes that include our mapped road closure & search capabilities

## Twitter

Work with Twitter to build a stronger crowdsourced dataset during emergencies

## A more robust dataset

More data collected from natural disasters on traffic to help our model successfully read tweets

# Questions?

Optimizing Evacuation Routes for First Responders