

# Leveraging social media to map disasters

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Photo by:  
Andrew Burton for The New York Times



# AGENDA

1. Problem statement
2. Gathering the data
3. Modeling (Word2vec)
4. Results and next steps

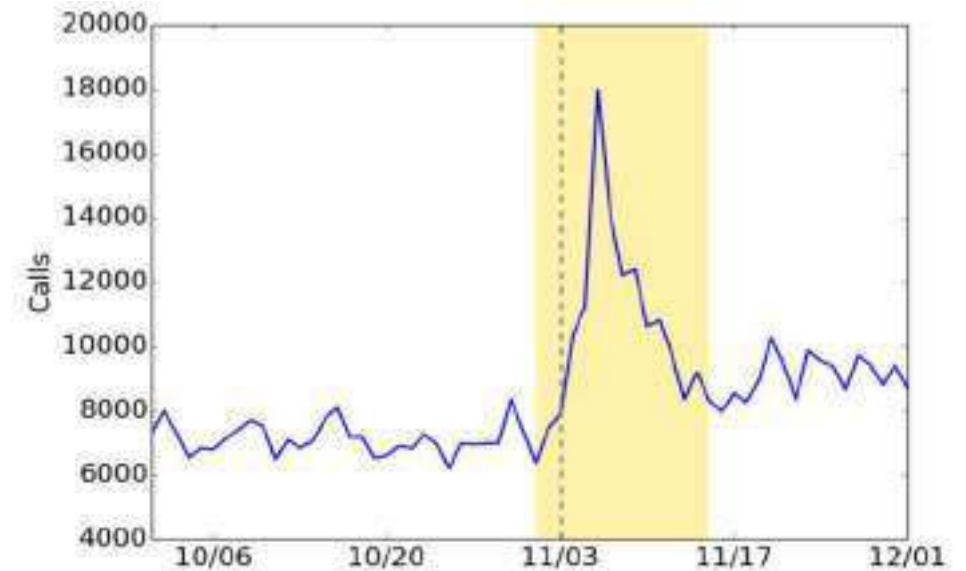


# 1. Problem statement

# Problem

When responding to disasters, it is critical to map and identify locations of survivors needing assistance.

Graph 1. Using Mobile Phone Activity For Disaster Management During Floods



Source: UN Global Pulse, 2014



## 2. Gathering data

# Twitter API

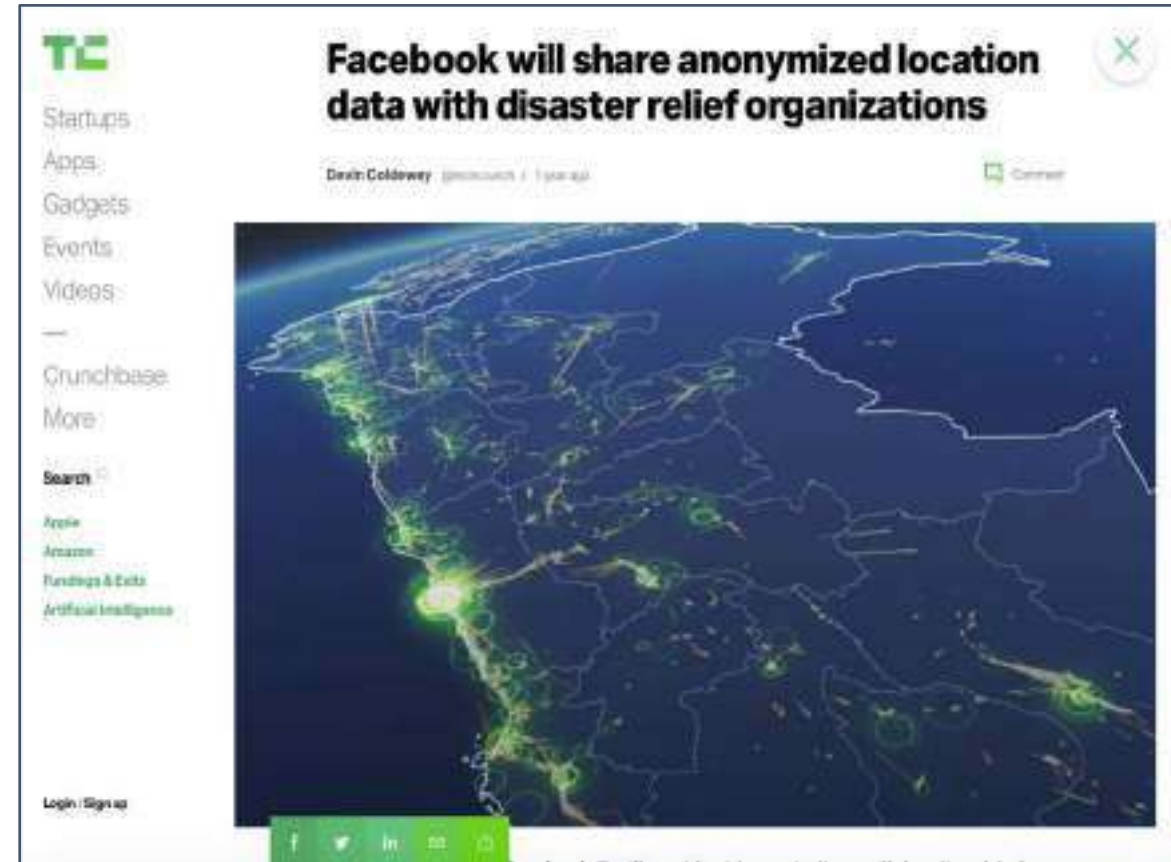


# Project limitations

Standard API access

Limited geo location data

Account location based on the  
'home' location



Source: Techcrunch, 2017

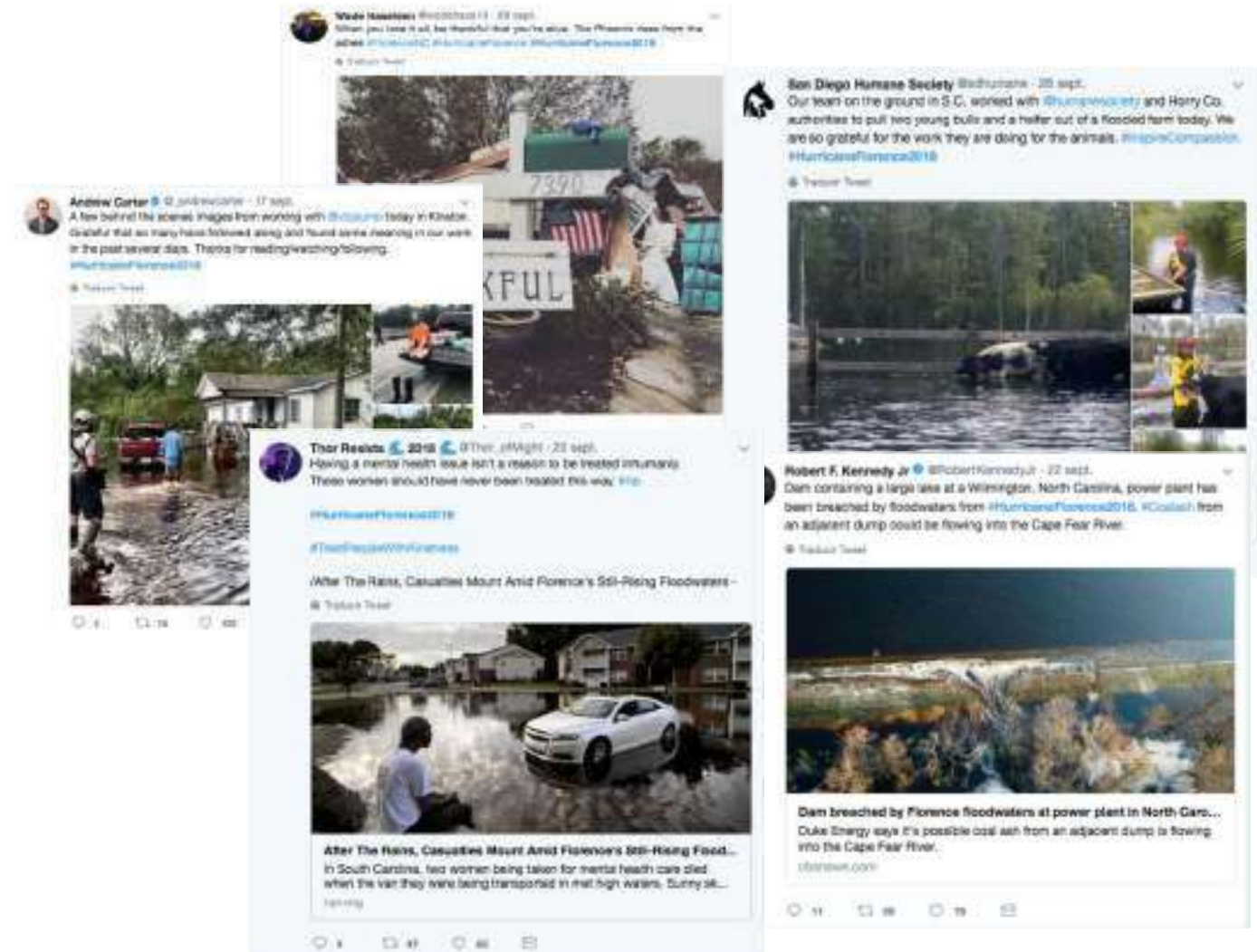


# Data

## 9,759 Tweets

### #HurricaneFlorence2018

Source: <https://tags.hawksey.info/>



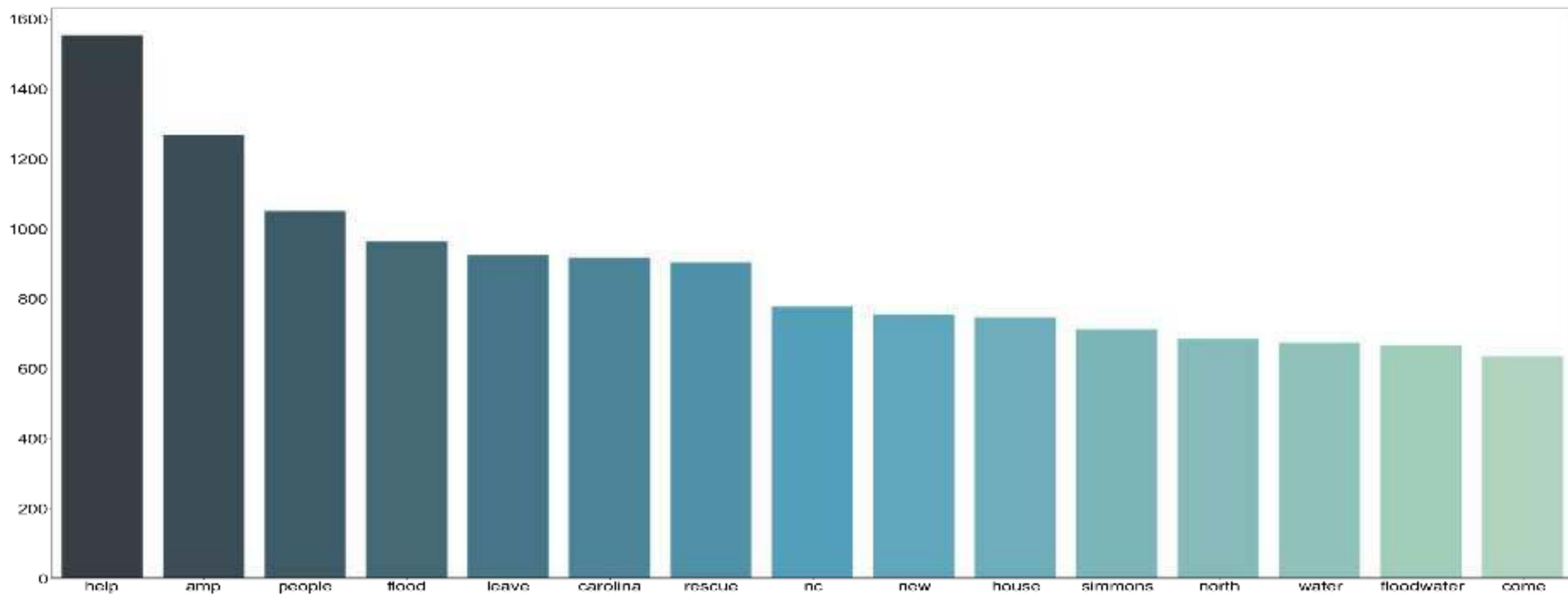
# Mapping Tweets with GeoPandas





## 3. Modeling

# NLP: Most Common Words in Tweets



# Assessing Damage and Impact

Type	Category Work	
Emergency Work	A	Debris Removal
	B	Emergency Protective Measures
Permanent Work	C	Roads and Bridges
	D	Water Control Facilities
	E	Buildings and Equipment
	F	Utilities
	G	Parks, Recreation and Others

Source: FEMA, 2016. "Damage Assessment Operations Manual"

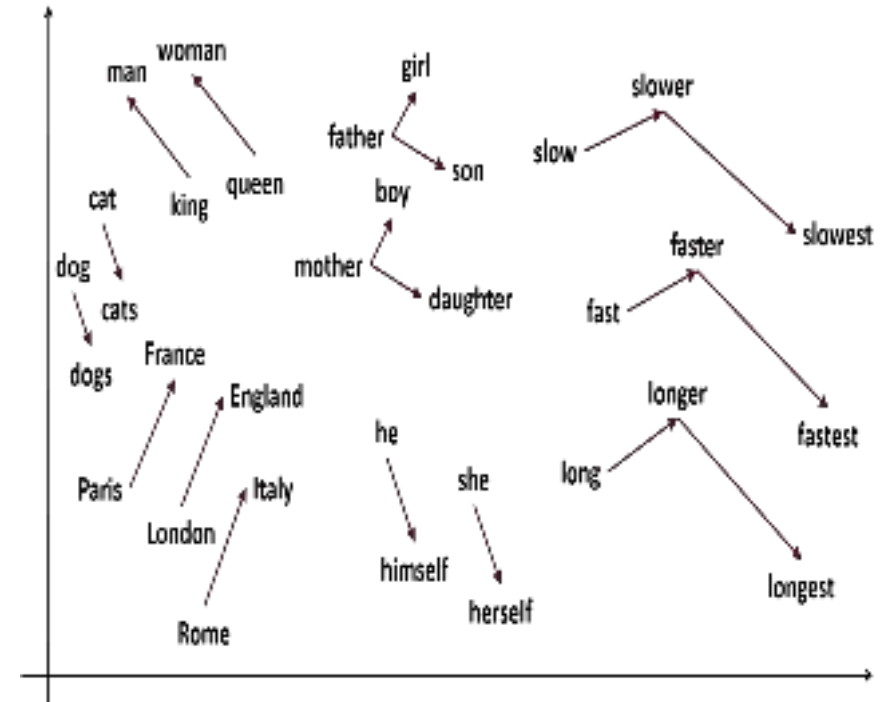
# Classifying a tweet with Word2Vec

Pre-Trained model – Google News

Turns each word into a 300 dimensional vector.

Highly accurate guesses based on past appearances.

Guesses can be used to establish association with other words. (Urgent vs. Non Urgent)

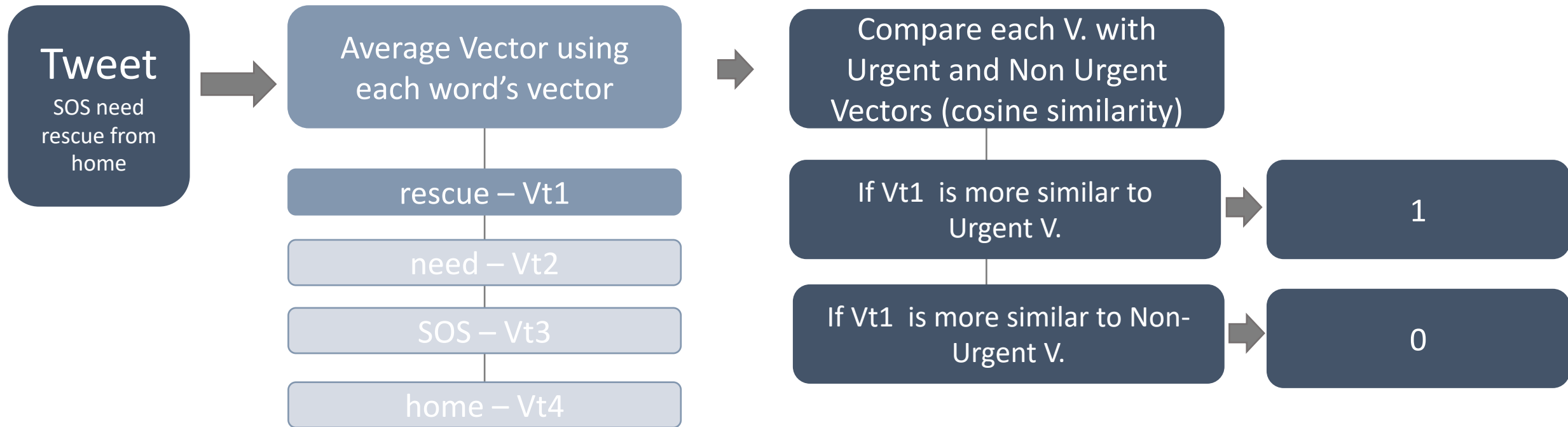


Source: <https://samyzaf.com/ML/nlp/nlp.html>

# Sentiment Analysis - Bags of Words

Type	Words in Bag Words	Vector
Urgent Response	rescue, sos, urgent ...	Urgent V.
Non Urgent Response	traffic, closure, prayer ...	Non Urgent V.

# How does our algorithm work?

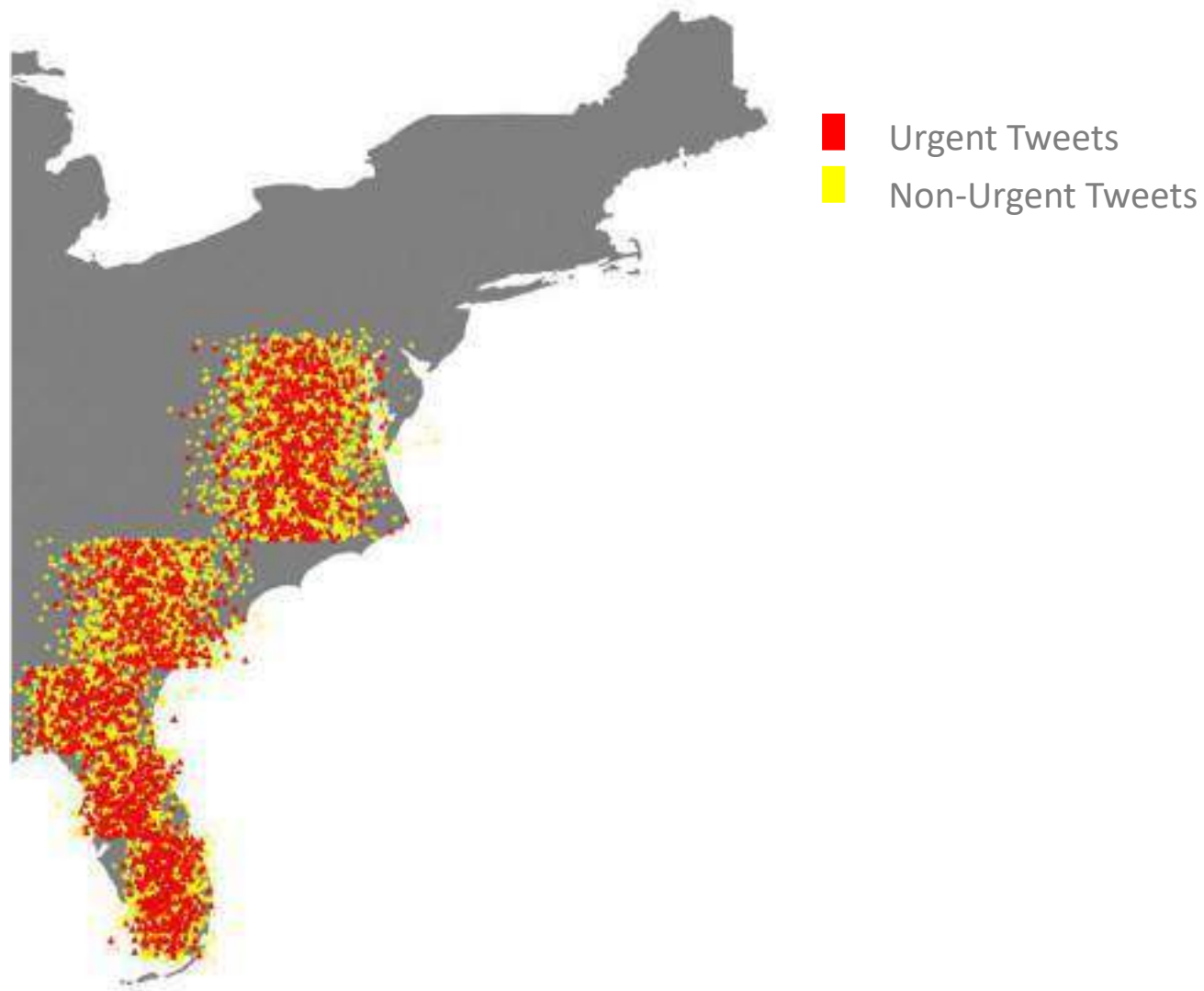






## 4. Results & Next Steps

# Mapping Urgent and Non-Urgent Tweets





# MAIN TAKEAWAYS

- Access to geo information in social media is difficult but not impossible!
- Word2vec can be used to classify tweets.



# Next steps

Improve the bag of words with experts knowledge.

Run the model with tweets with real Lat and Long.

Call us if you need to take this model to the next level!

# Data Science Team



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@\_SLAPPY\_



Annex

# Bags of Words

Type	Words in Bag Words
Urgent Response	help, people, flood, leave, rescue, sos, come, debris, removal, junk, waste, property, tree, private, cubic, yard, creek, removal, roads, levees, unsafe, structures, water, floodplains, critical, evacuation, shelter, emergency, transport, access, safe, rescue, barricades, fire, generator, safety, hazard, need, lost, seen, missing, flooding, reach, trying.
Non Urgent Response	help, vegetation, mud, silt, bridge, waterways, facility, utilities, park, traffic, replacement, control, repairs, stabilization, remediation, surfaces, bases, shoulders, ditches, drainage, sidewalk, guardrails, signs, decking, pavement, channel ,alignment, irrigation, erosion, prevention, dams, reservoirs, basins, canals, aqueducts, coastal, shoreline, pumping, building, mechanical, electrical, basement, painting, treatment, power, transmission, natural gas, sewage, permanent, restoration, communication, systems, inspection, assessment, beach, park, playground, pool, docks, golf, tennis, ball, port, harbor, fish, hatcheries, insurance, habitat, temporary