

Leveraging social media to map disasters

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AGENDA

1. Problem statement

- 2. Gathering the data
- 3. Modeling (Word2vec)
- 4. Results and next steps



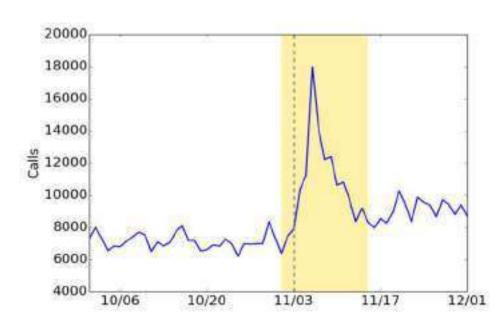
1. Problem statement



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



tion you late it all, be thereful that you're alive. The Pileanie free hope the

Son Diego Humane Society Wildhamana - Jill sept.

& Twent Yest

Our team on the ground in S.C. worked with Church who et and Horry Co. authorities to pull two young bulls and a helfer out of a Roscled form today. We

are so grateful for the work they are doing for the animals. Proposition and the second secon

Data

#HurricaneFlorence2018

9,759 Tweets That Resids & 2018 & O'Ther, off-light / 21 cept. faving a mental health leade list it a reason to be treated inhumania. Hobert F. Kennedy Jr O Wildsert Kennedyult - 22 sept. These women should have never been treated this way. His Dem containing a large lake at a Wilmington, North Carolina, power plant has been breached by floodwaters from Hituarisany/Florecost2016, #Ciculath from PERSONAL PROPERTY. an adjacent dump could be flowing into the Cape Fear River. #TracePropagation/Publishers @ Tables Total When The Raine, Canualties Mount Amid Porence's SSI-Rising Floodwaters-Dam breached by Florence floodwaters at power plant in North-Caro... Duke Energy eays it's possible ossi asn from an adjacent dump is flowing. into the Cape Fear River. After The Reins, Casuaties Mount Amid Florence's Still-Rising Food... ubinness.com in South Carstine, two women being taken for mental health care died Source: https://tags.hawksey.info/ when the van they were being transported in met high waters. Surny of ... OH UM DH S

A few behind the source images from working with the source fodgy in Kineton. Gradular that are many have followed arring and found some meaning in our west in the past several date. There a for reading weathing following.



Mapping Tweets with GeoPandas



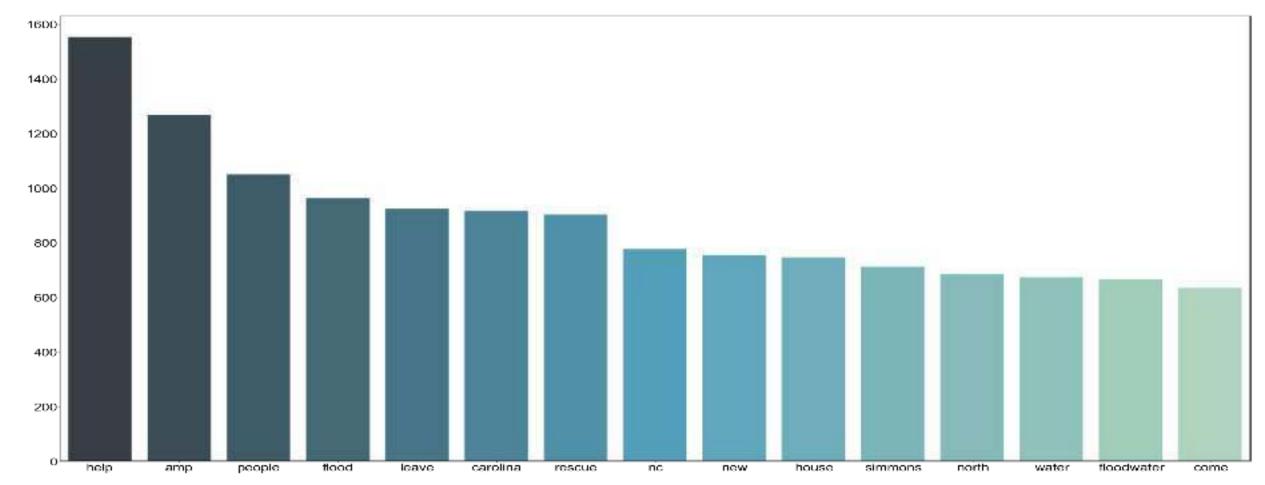




3. Modeling



NLP: Most Common Words in Tweets





Assessing Damage and Impact

Туре		Category Work
Emergency Work	Α	Debris Removal
	В	Emergency Protective Measures
Permanent Work	С	Roads and Bridges
	D	Water Control Facilities
	Е	Buildings and Equipment
	F	Utilities
	G	Parks, Recreation and Others

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



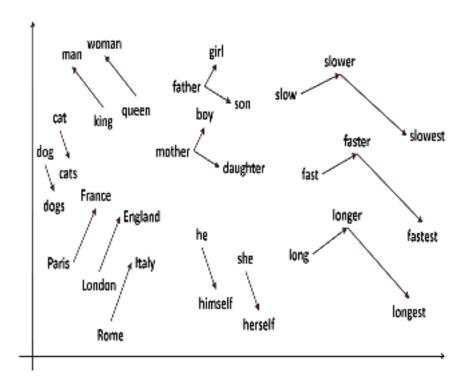
Classifying a tweet with Word2Vec

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)



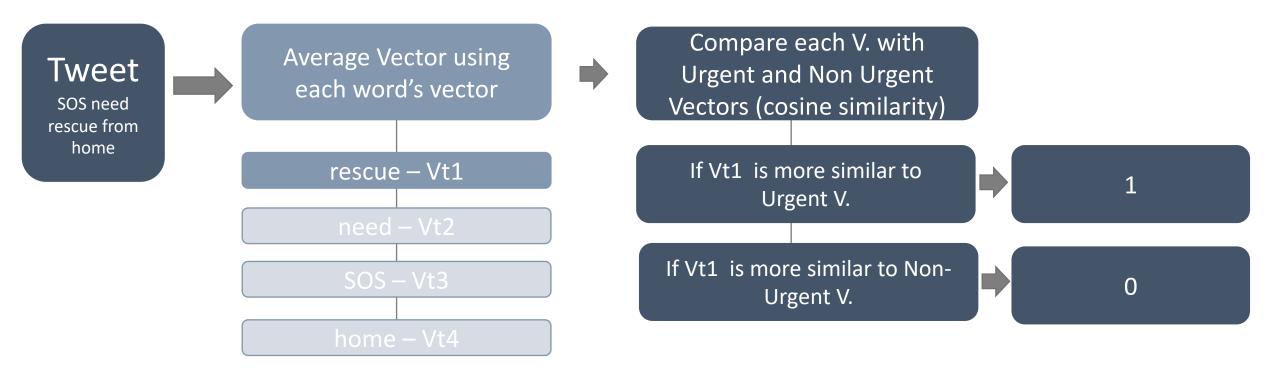
Source: https://samyzaf.com/ML/nlp/nlp.html

Sentiment Analysis - Bags of Words

Туре	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?

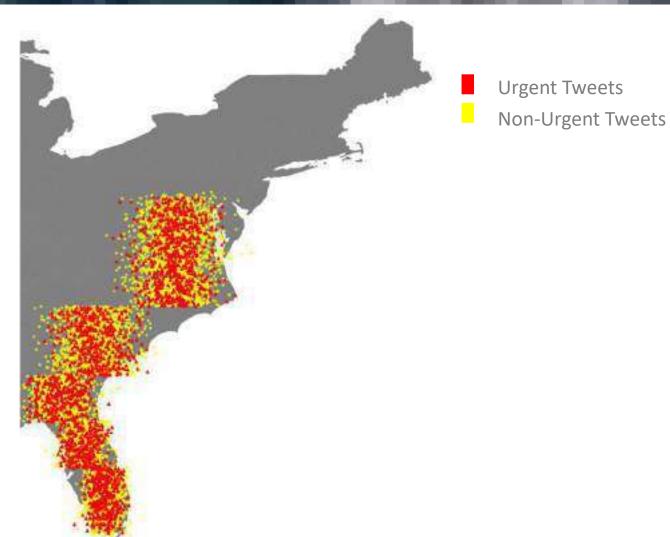




4. Results & Next Steps



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



















Annex

Bags of Words

Туре	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