



Locate Disasters with Twitter

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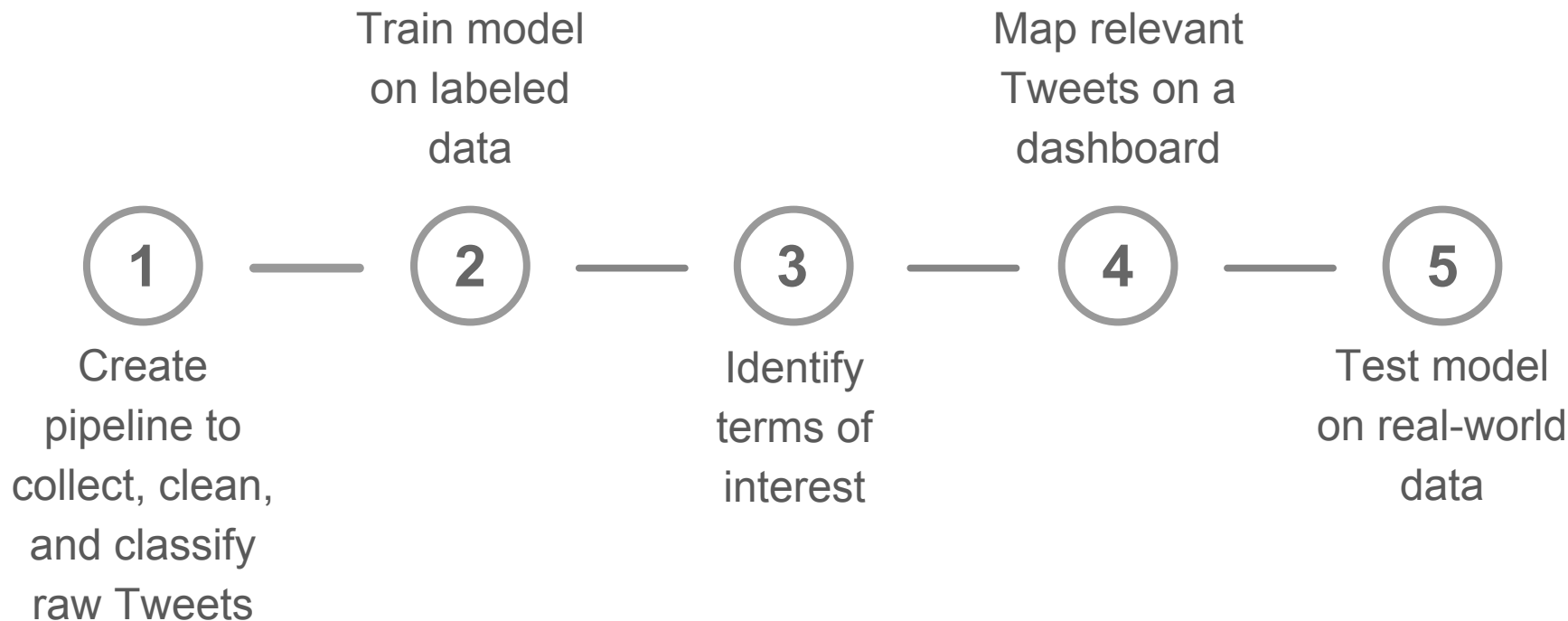
BACKGROUND



With the speed of information sharing enabled by **social media**, we investigate how platforms such as Twitter can be used by emergency response agencies to **identify a crisis and efficiently allocate resources.**



APPROACH



- **Source:** <http://crisislex.org/data-collections.html#CrisisLexT6>
- **Size:** ~ 40k labeled tweets from natural disasters
- **Disaster Types:** Flood (2), Hurricane (1), Tornado (1)
- **Collection Methods:** Keyword and Geo-fenced Twitter queries



MODELS



61.33%
ACCURACY



94.52%
ACCURACY



98.03%
ACCURACY

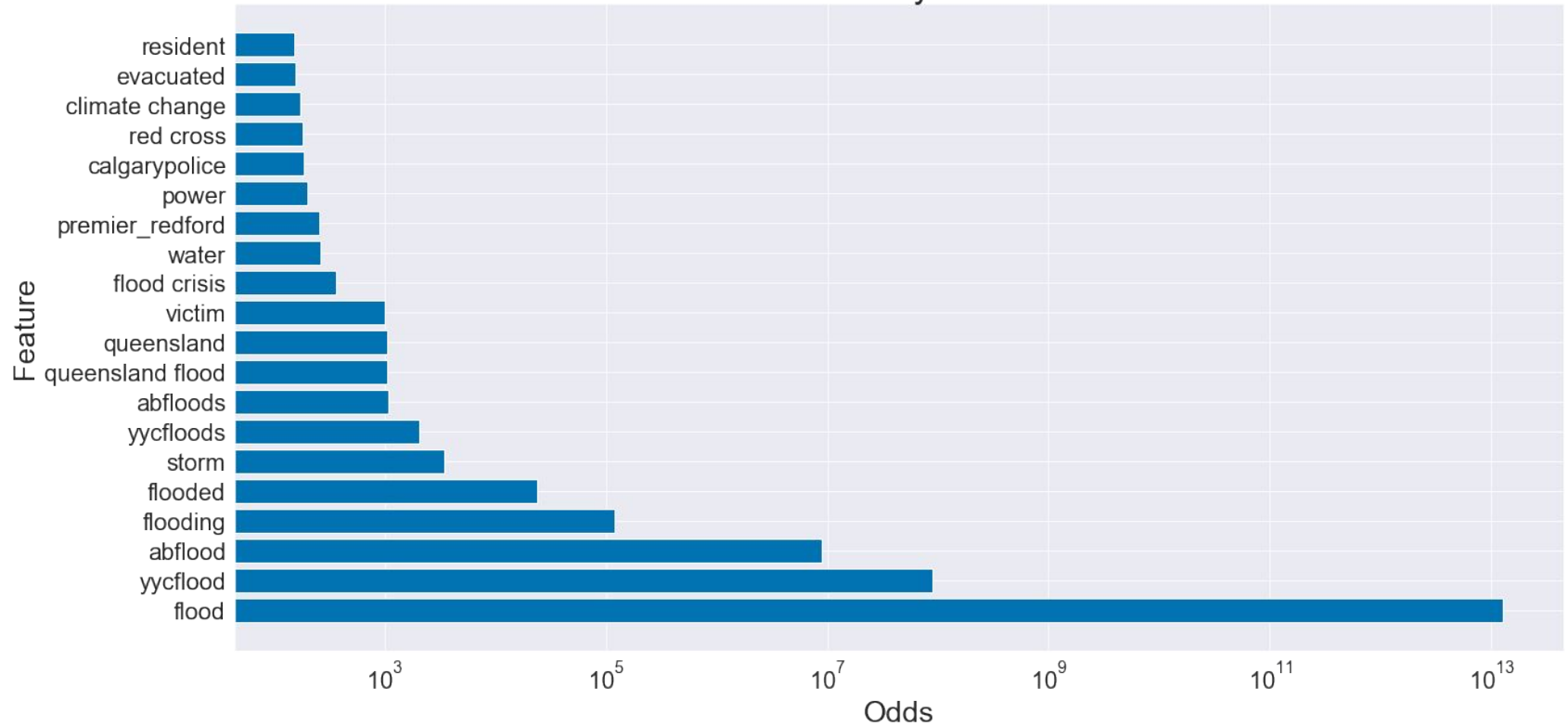


TERMS OF INTEREST



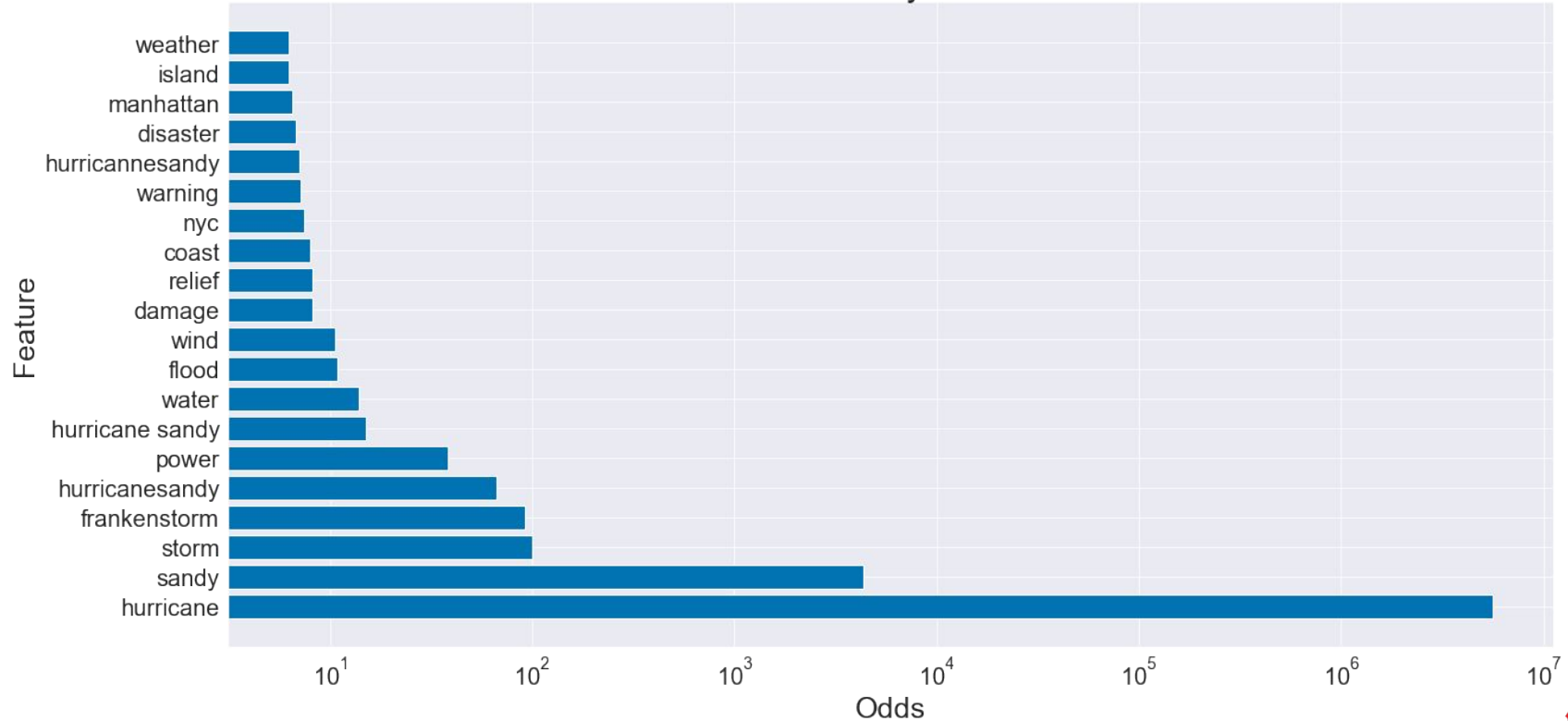
FLOOD

Top 20 words with Positive Impact on Odds
Accuracy: 97%



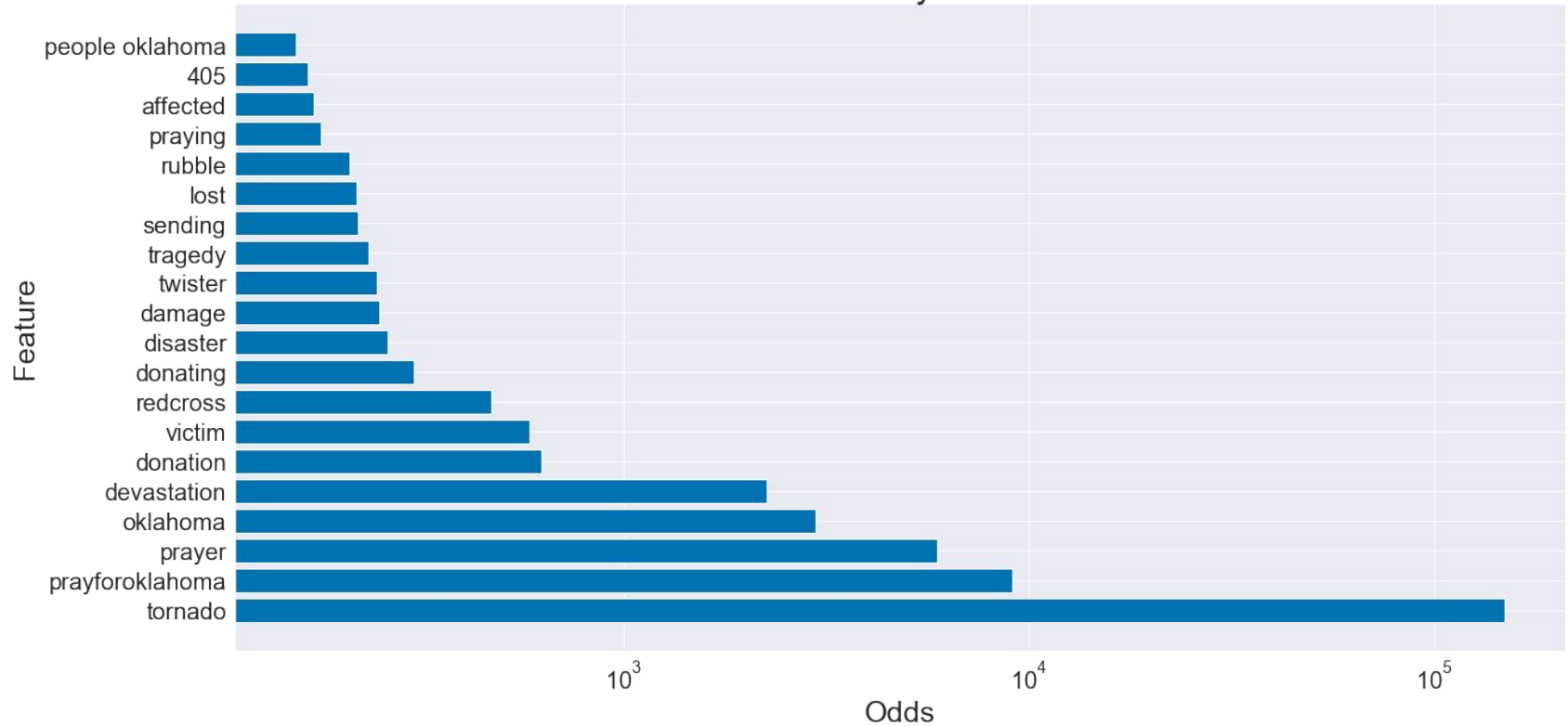
HURRICANE

Top 20 words with Positive Impact on Odds
Accuracy: 96%



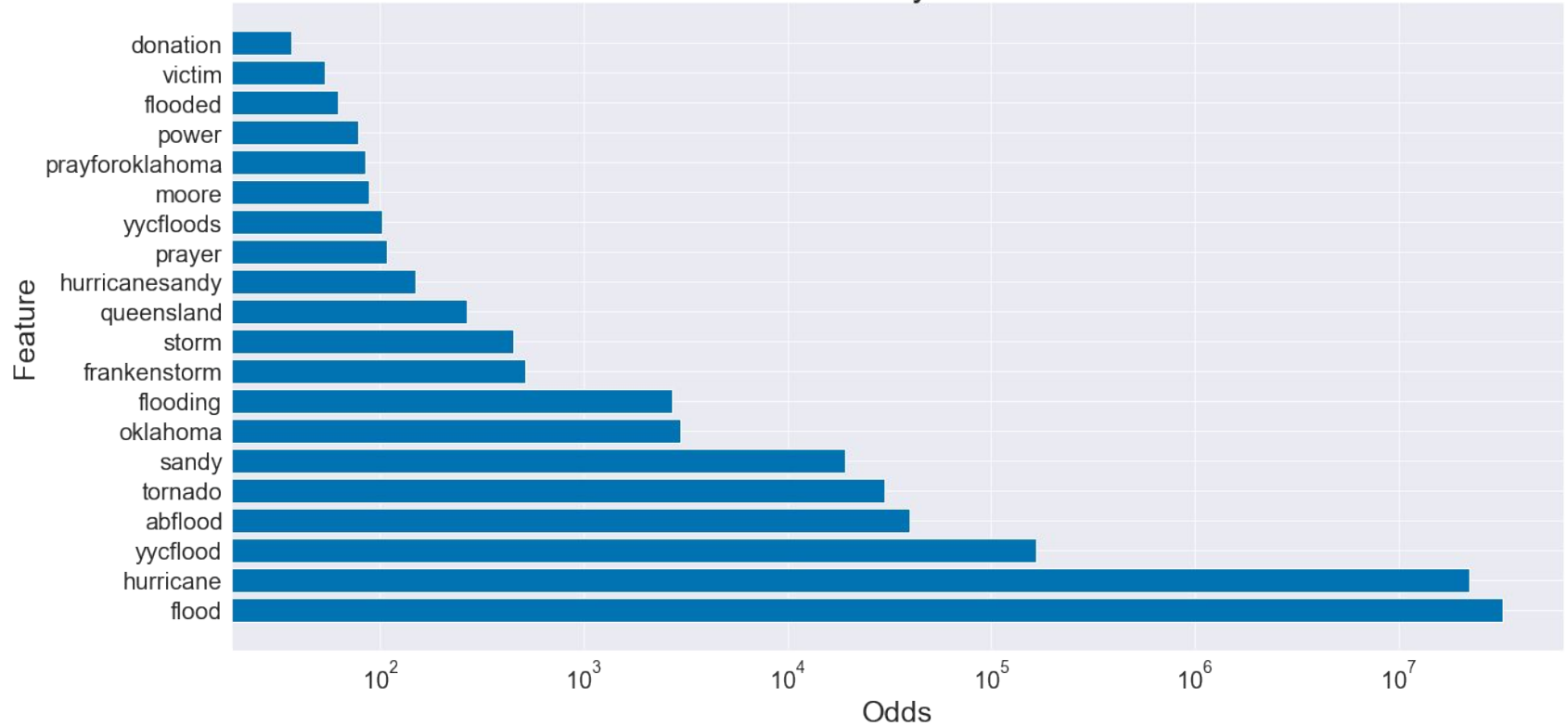
TORNADO

Top 20 words with Positive Impact on Odds
Accuracy: 97%



ALL DISASTERS

Top 20 words with Positive Impact on Odds
Accuracy: 98%



MAP SIMULATION



PROOF OF CONCEPT



PREPROCESSED TWEETS

	text	lat	long	processed	tokenized	lemmatized
89	ENCINO UPDATE: LAFD @PIOErikScott says evacuat...	-118.411907	34.020789	encino update: lafd pioerikscott says evacuati...	[encino, update, lafd, pioerikscott, says, eva...	encino update lafd pioerikscott say evacuation...
191	@twdandmetal @Axis7173 @nearly_departed @unkno...	-118.411907	34.020789	twdandmetal axis7173 nearly_depaed unknown_meu...	[twdandmetal, axis7173, nearly_depaed, unknown...	twdandmetal axis7173 nearly_depaed unknown_meu...
193	Fire crews keeping an eye on hillside that hav...	-118.411907	34.020789	fire crews keeping an eye on hillside that hav...	[fire, crews, keeping, an, eye, on, hillside, ...	fire crew keeping an eye on hillside that have...
194	@twdandmetal @Axis7173 @nearly_departed @unkno...	-118.411907	34.020789	twdandmetal axis7173 nearly_depaed unknown_meu...	[twdandmetal, axis7173, nearly_depaed, unknown...	twdandmetal axis7173 nearly_depaed unknown_meu...
579	@darreng60 🙌🙏☺	-118.411907	34.020789	darreng60 🙌🙏☺	[darreng60]	darreng60

	00	000	10	100	11	12	13	14	15	1800	...	yycflood	yycflood abflood	yycflood relief	yycflood yyc	yycflood yychelps	yycfloods	yychelps	yychelps yycflood	zone	zoo
0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.446169	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
3	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.000000	0.0	0.0	...	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

5 rows × 1060 columns



LABELLED WITH LR MODEL

OFF-TOPIC

	lemmatized	label_on-topic
64052	devondstewa don t sta with me logically it doe...	False
166766	honestly uber pool wouldnt be a thing if ther...	False
122410	we really got 7 sub at our school like what s ...	False
29834	the way these clipper fan is booing j30_randle...	False
19753	kaydontplay_ girl it s your year all about you...	False
50763	this is why the medium asks absurd question so...	False
86063	hey bed	False
57757	manilaluzon	False
16499	thatsocute we are aren t we beau	False
17221	they have slowly added in culture under the wh...	False

ON-TOPIC

	lemmatized	label_on-topic
155326	damien flood crest 2017 oil on canvas 30 x 24 ...	True
9187	heathdwilliams lol triple storm front rolling ...	True
145488	malibu storm prep video foxnews bethannstyne n...	True
27986	at citymalibu council meeting city manager rev...	True
7532	little man think it s going to flood whenever ...	True
9184	awoodruff the massive mannasas molasses flood	True
7301	am i crazy to drive into malibu during a rain ...	True
130927	los angeles ca tue jan 15th am forecast today ...	True
13826	a an adult driving through paially flooded str...	True
147075	nike adapt bb sneaker the first shoe of 2019 t...	True



LOW-CERTAINTY

	lemmatized	label_on-topic
193	fire crew keeping an eye on hillside that have...	False
7320	that s more like it theandykatz stjohnsbball t...	False
7322	good chance of some thunderstorm high wind and...	False
7532	little man think it s going to flood whenever ...	True
9187	heathdwilliams lol triple storm front rolling ...	True
25462	area of malibu will be under mandatory evacuat...	False
28258	mandatory evacuation b c of mudslide debris fl...	False
35108	2011 2019	False
119932	help u fight eating disorder here by donating ...	False

- Labeled with
40%< certainty <60%
- Feature weightings are highly specific:
 - Evacuated ≠ Evacuation
 - Storm ≠ Thunderstorm
- Can expand terms used to train model

CLOSING



TAKEAWAYS

- Model accurately classifies on-topic / off-topic samples
- Provides key terms that can be used for future disaster queries
- Tweets map to dashboard, giving fast and intuitive situation overview



NEXT STEPS

- Generalize to other disaster types
- Real-time mapping with Twitter streaming API
- More robust NLP - classify by type of need



<https://github.com/csinatra/Twitter-Disaster-Repo>



TEAM



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THANK YOU

