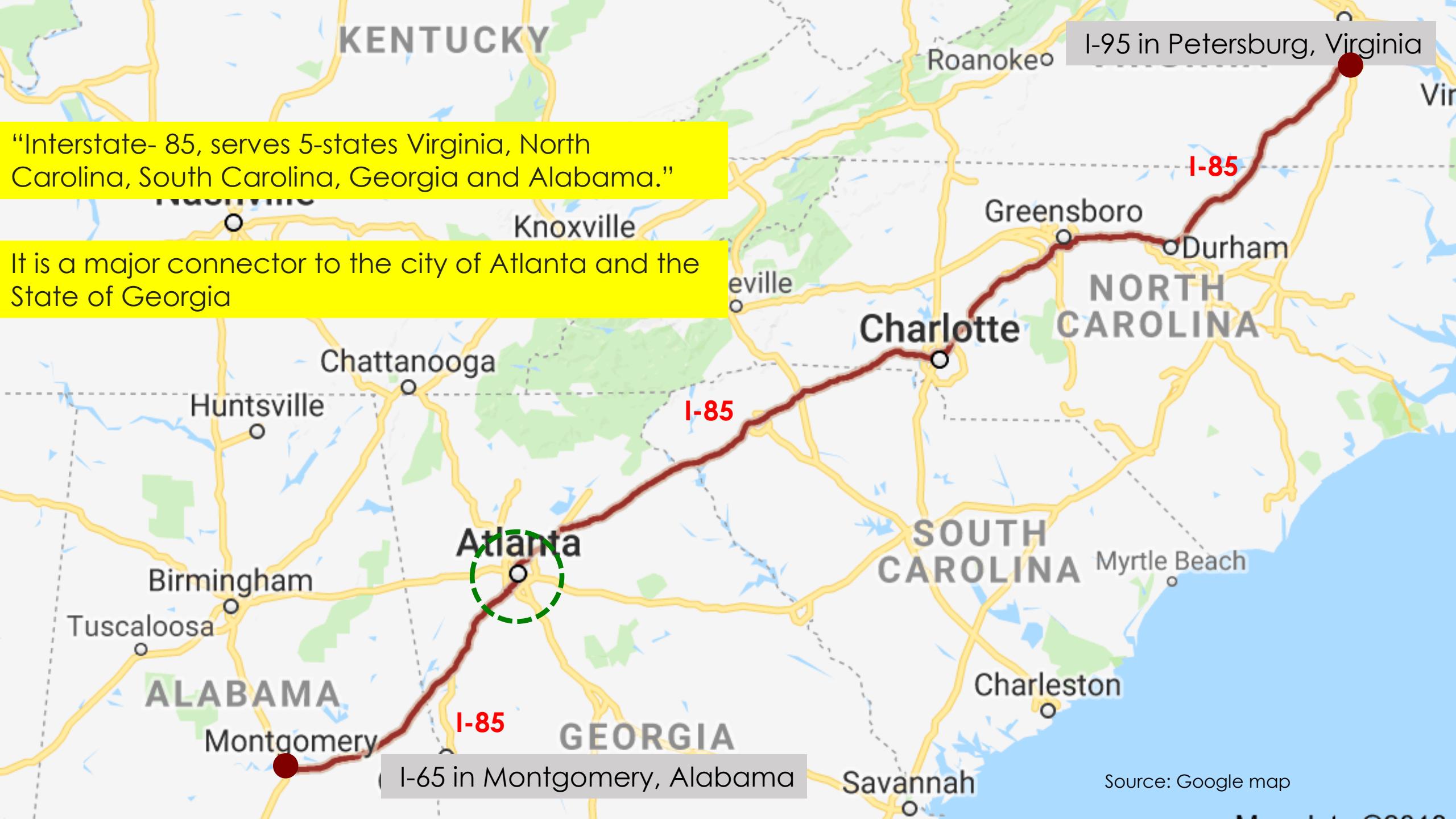


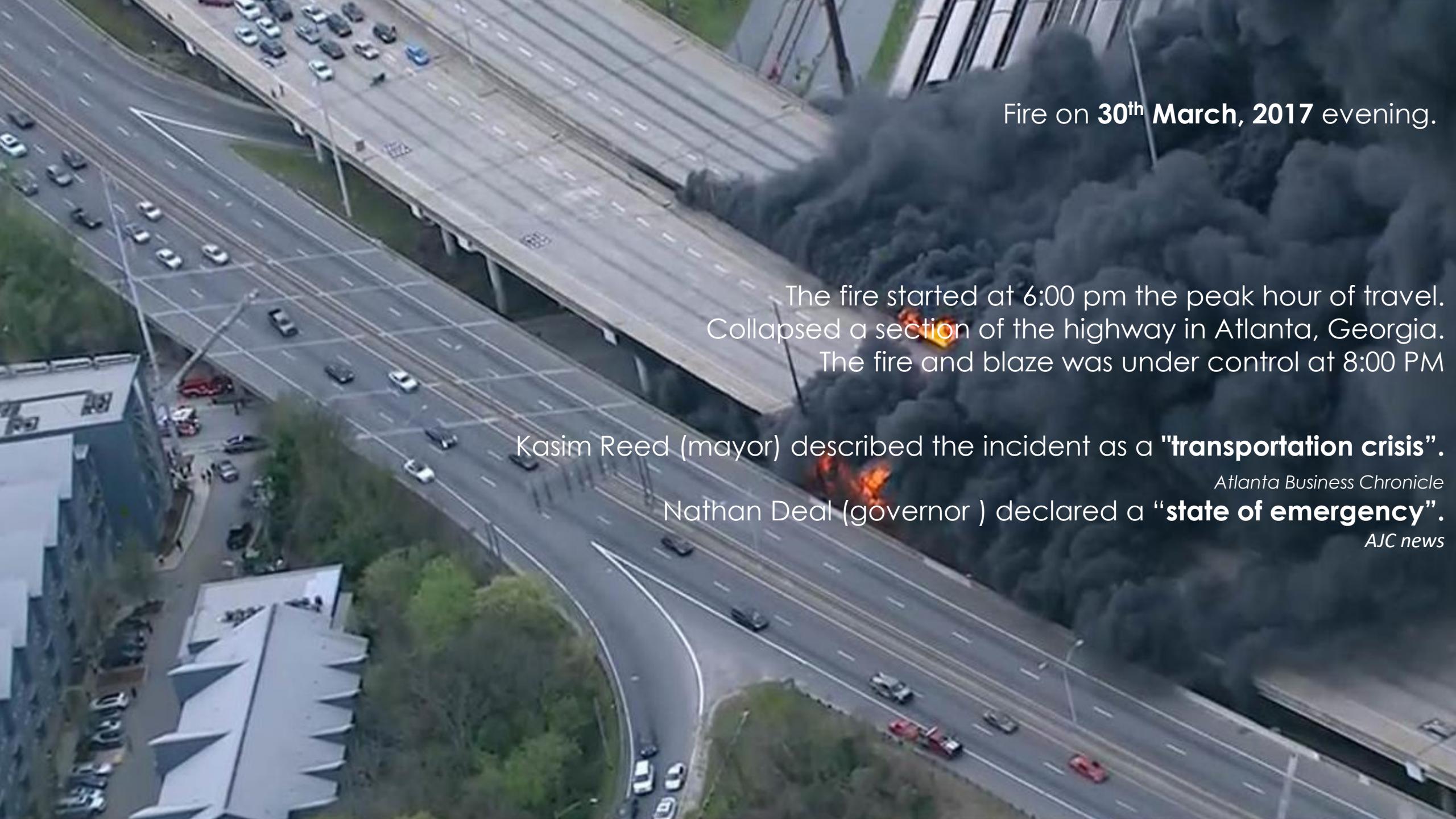
ACSP 2018

An aerial photograph of a multi-lane highway bridge that has collapsed. A massive plume of dark, billowing smoke rises from the collapsed structure. Several cars are visible on the highway below and on the collapsed section. The surrounding area appears to be a mix of urban and green space.

Assessing "Citizen's Affect" during I-85 bridge collapse incident through social media mining

Florina Dutt | Subhrajit Guhathakurta





Fire on 30th March, 2017 evening.

The fire started at 6:00 pm the peak hour of travel.
Collapsed a section of the highway in Atlanta, Georgia.
The fire and blaze was under control at 8:00 PM

Kasim Reed (mayor) described the incident as a "**transportation crisis**".

Atlanta Business Chronicle

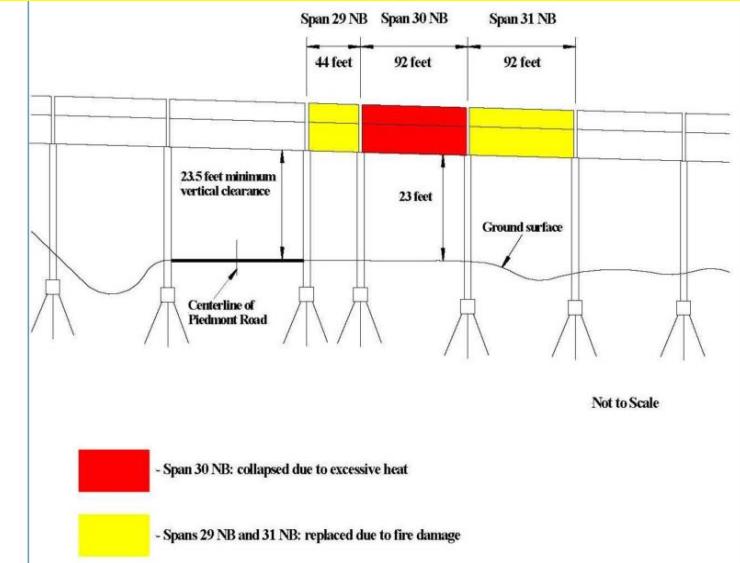
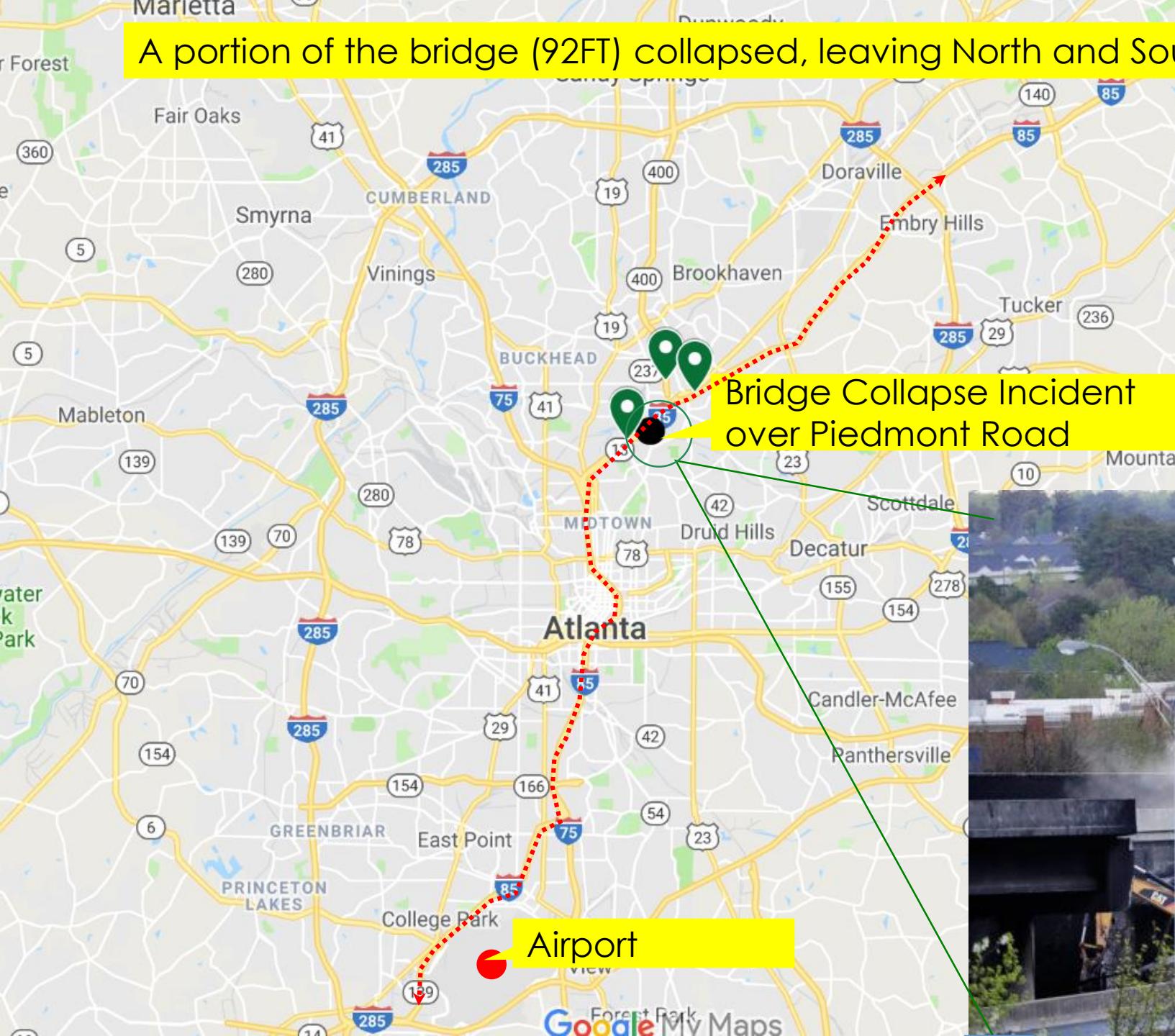
Nathan Deal (governor) declared a "**state of emergency**".

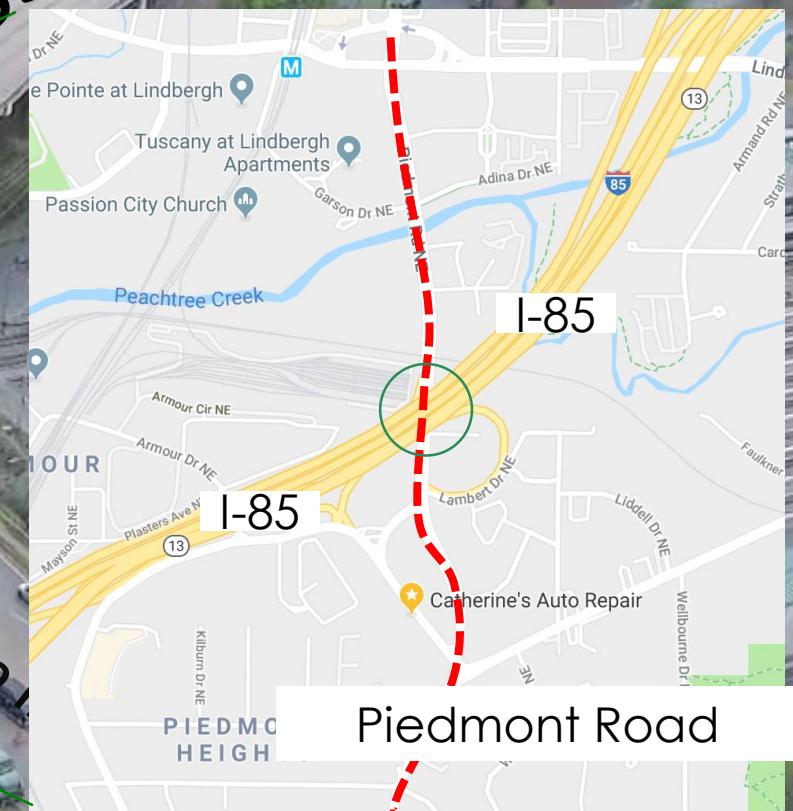
AJC news

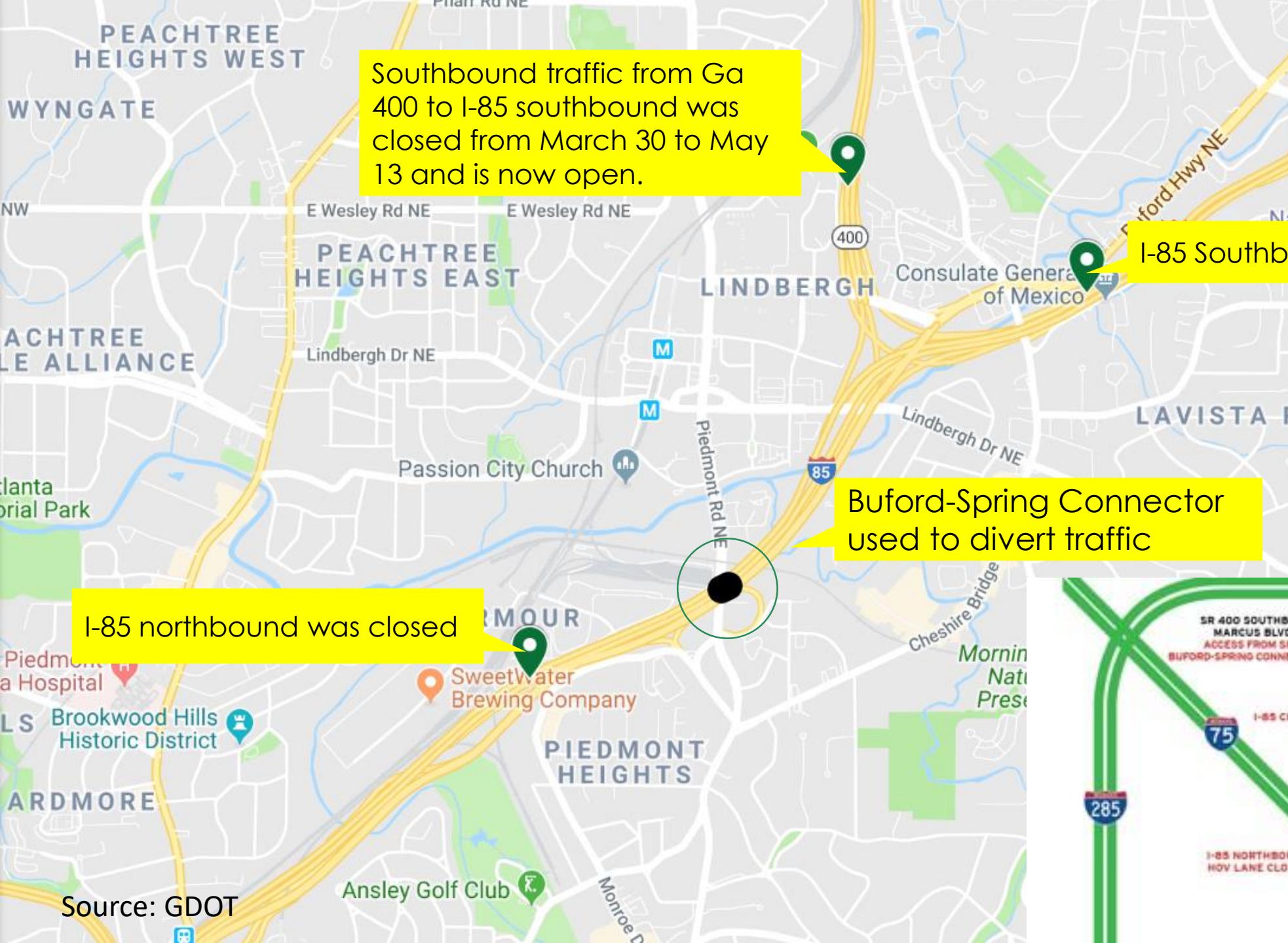
Marietta

Dunwoody

A portion of the bridge (92FT) collapsed, leaving North and South bound traffic through GA disrupted







Buford-Spring Connector used to divert traffic

Atlanta bridge collapse: Officials expect traffic nightmare while repairs take place

foxnews.com 3/31/2017 Ryan Gaydos

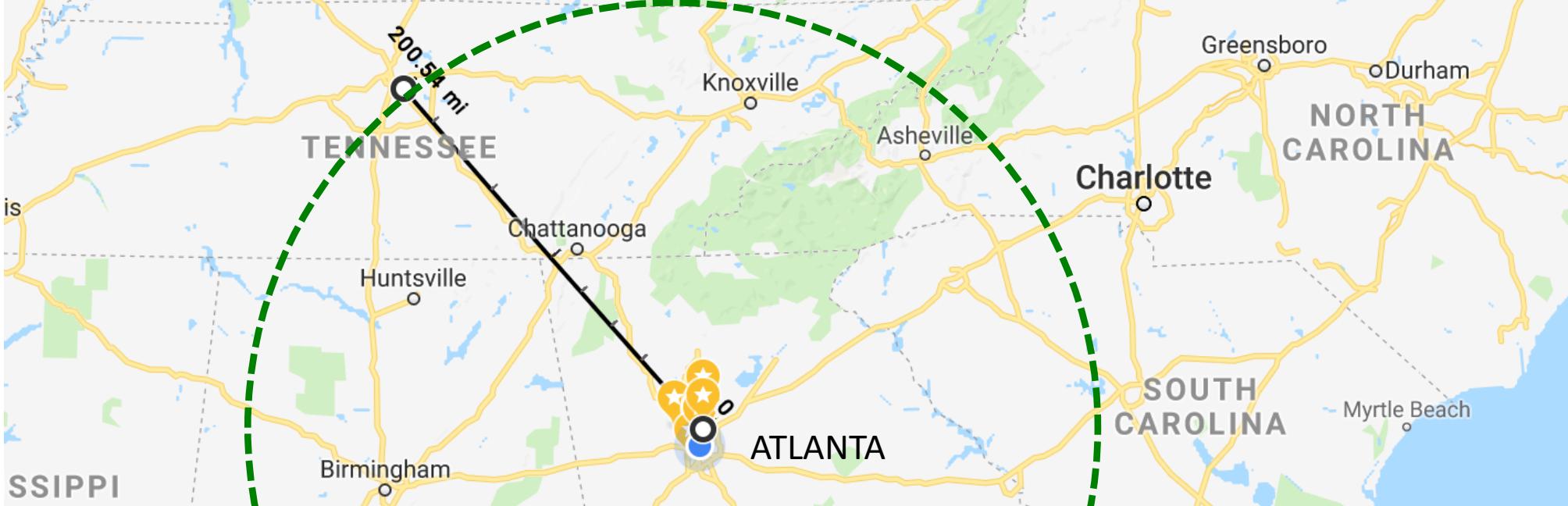


*How did the collapse affect people?
Were they more stressed than usual
during that period?
What were their coping mechanisms?
Were there differences in the
sentiments expressed by locals vs.
those from other areas?*

"Interstate 85, which carries **250,000 cars per day**, is a major artery for the U.S. South and a thoroughfare for traffic heading north and south through Atlanta." - Ryan Gaydos F3News



Image source: ajc.com



Were people outside of Georgia
also affected ?





Did people think about alternative modes of transportation ?



Anything more cost
effective ?

TRAFFIC DATA ?

How do we know what people felt
during the I-85 collapse?

Tweets

SURVEY ?

DATA COLLECTION

Twitter Data is collected using Python's *Tweepy* module.



The Tweets were between the time frame from **Feb 28, 2017, to Jun 15, 2017**, within a **200-mile radius** of Atlanta, USA.

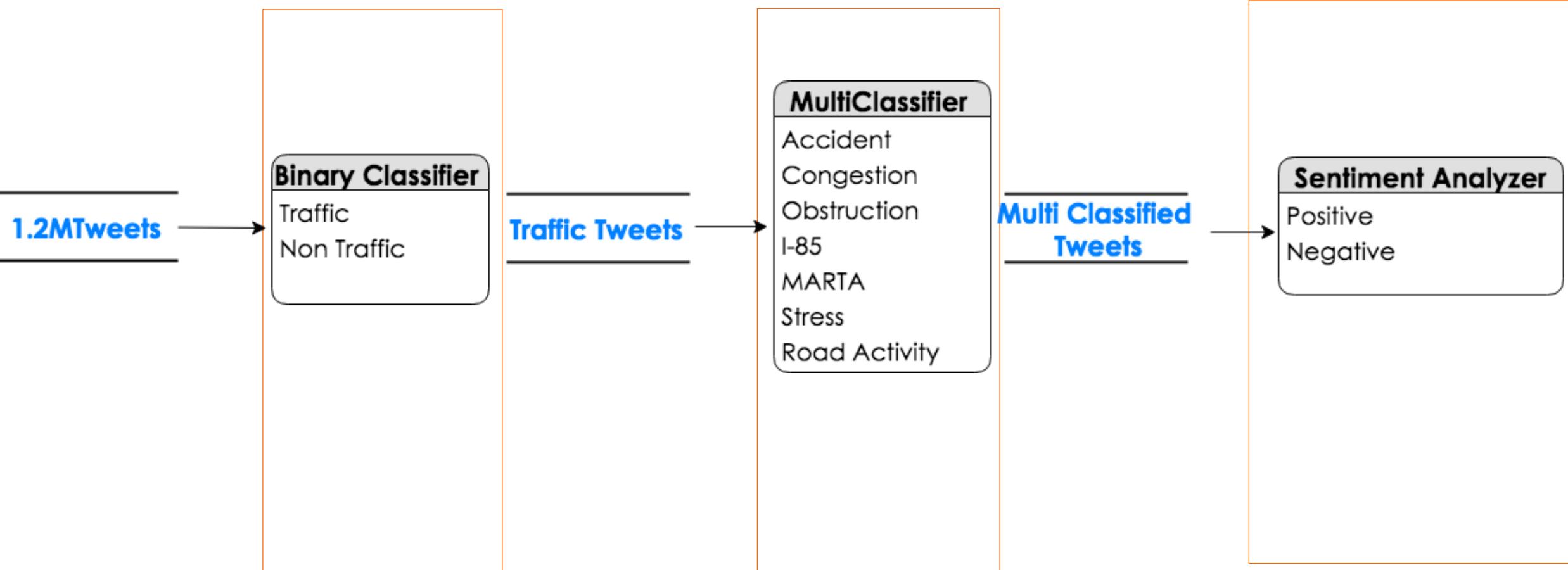
Over 1.2 million tweets used.

date	retweets	favorites	text	geo	mentions	hashtags	id	permalink	label
4/4/17 13:57	0	0	Slow traffic in #Hoover on Hwy 280 EB between Cahaba River Rd and Hwy 119 - Cahaba Valley Rd, c #Hoover #traffic				8.49E+17	https://twi.i/traffic	
4/4/17 11:14	0	0	Stopped traffic in #Irondale on I-459 SB between I-20 and Grants Mill Rd, delay of 8 mins #traffic ht! #Irondale #traffic				8.49E+17	https://twi.i/traffic	
4/11/17 16:04	0	0	Stop and go traffic in #Jefferson on Pkwy E SB between Huffman Rd and Springville Rd, delay of 1 m #Jefferson #traffic				8.52E+17	https://twi.i/traffic	
3/31/17 11:11	0	0	#Repost @Siriusknows ä»ä»ä» #Repost @freedomsfaction ä»ä»ä» A human traffici @Siriuskno #Repost #Repost				8.48E+17	https://twi.i/traffic	
4/3/17 8:02	0	0	Disabled vehicle, caution in #Summerville on I 26 WB at US-17-Alt #traffic http:// bit.ly/10EZuoi #Summerville #tra				8.49E+17	https://twi.i/traffic	
4/11/17 16:40	0	0	Snacks and all!!! @Atlanta Traffic https://www.instagram.com/p/BSwq_vnDUWht8pS_ @Atlanta				8.52E+17	https://twi.i/traffic	

KEY CONTRIBUTIONS

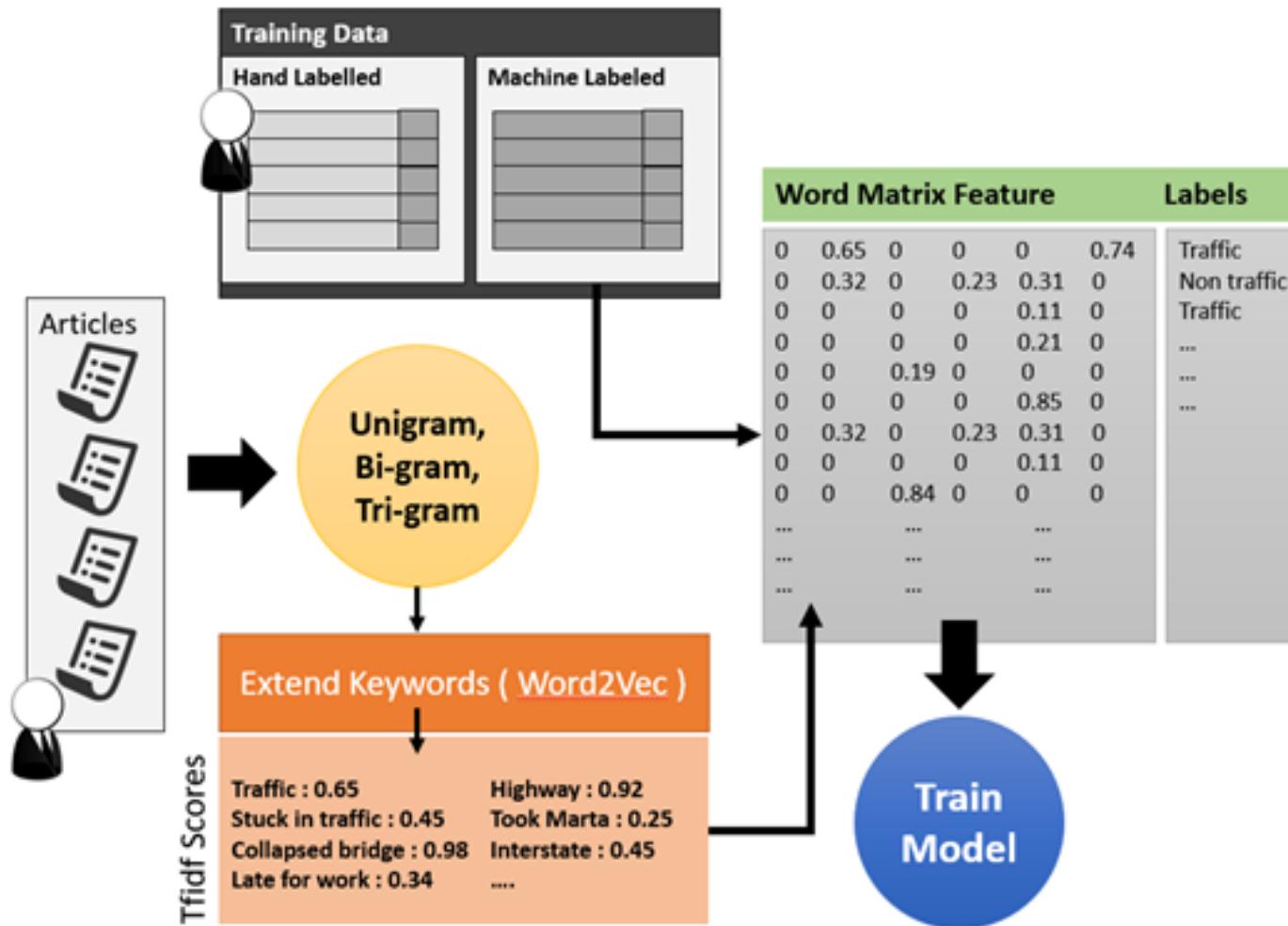
- Historic Event Analysis
- Use non-Geo tagged Tweets
- Feature Engineering specific to Tweet Topic Assessment
- Predictive modeling of Sentiments (“affect”)

Classify Tweets



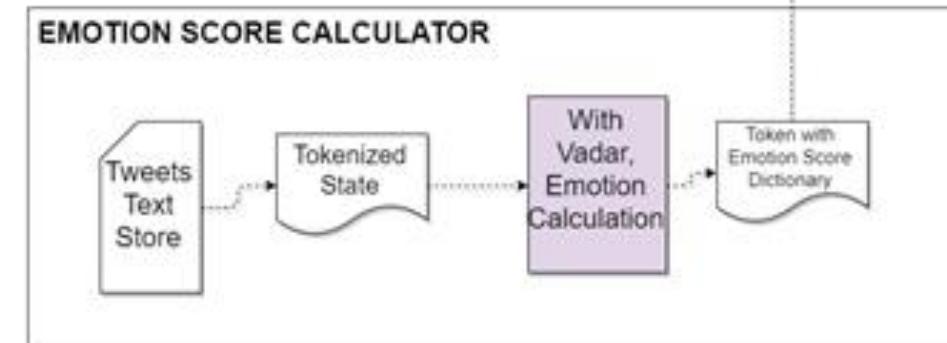
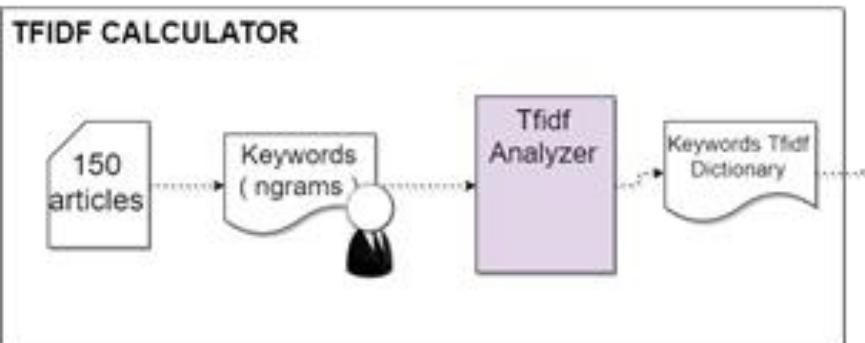
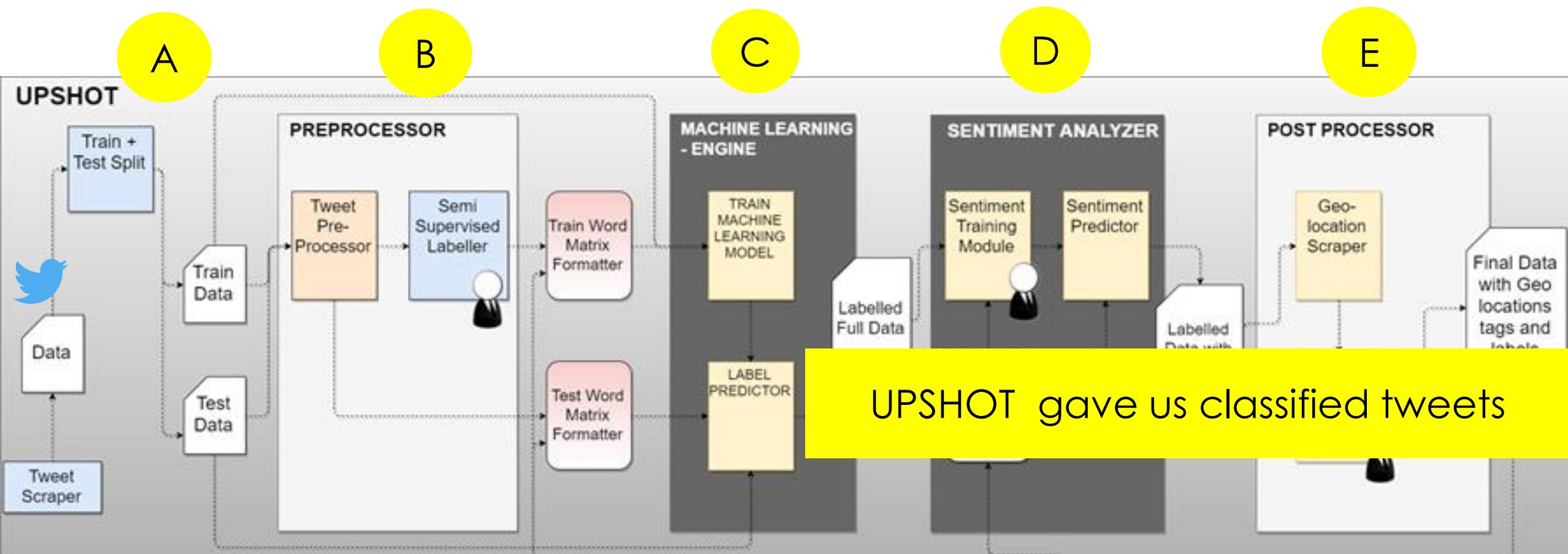
My heart goes out to the folks living up North. It's gonna be a mess to commute. Thank goodness I live down South!

heart, folks, living ,north, Mess, commute, Thank, goodness, live, down, South



heart goes out - trigram - 0 .65
mess to commute – trigram – 0.98
Thank goodness – bigram -0.35

UPSHOT



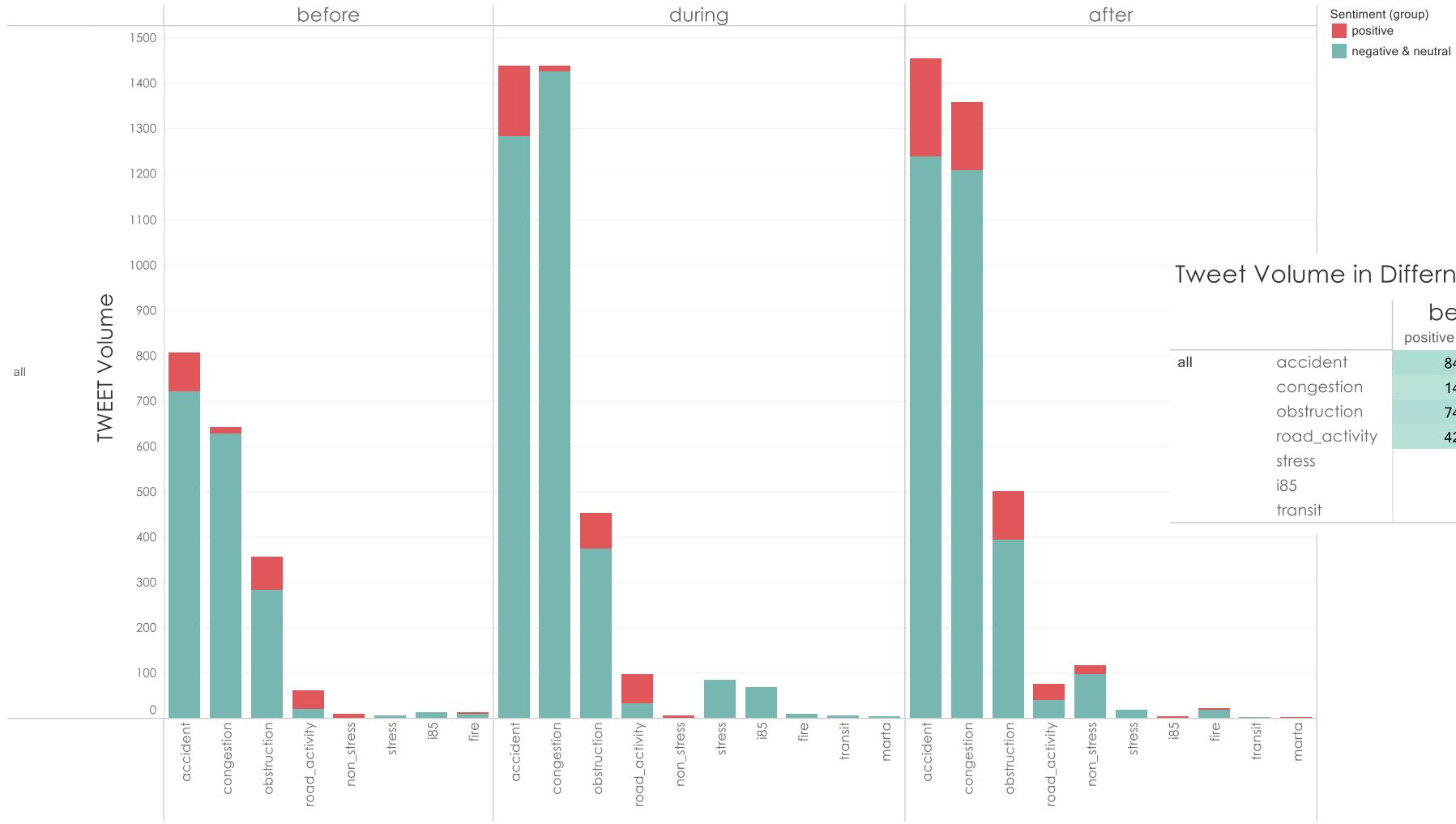
Classified Tweets

Multi-Class	SVM	Decision Tree	Naive Bayes	Random Forest	XGBoost
Accident	0.852	0.781	0.821	0.832	0.882
Congestion	0.831	0.843	0.732	0.833	0.912
Obstruction	0.745	0.754	0.773	0.782	0.812
Fire	0.870	0.875	0.824	0.792	0.854
i85	0.864	0.876	0.852	0.811	0.923
Marta	0.754	0.872	0.765	0.711	0.874
Stress	0.730	0.786	0.721	0.710	0.810
Non Stress	0.680	0.719	0.711	0.729	0.801
Road Activity	0.871	0.812	0.811	0.822	0.891

Precision score of the different model output tested

time	#tags	Tweet Text		location	Binary	Muticlass	Sentiment
	#AtlantaTraffic #MartalsSmarter						
11:04 PM	#TimeToBuyABike	Today will go down in #AtlantaTraffic history! #MartalsSmarter #TimeToBuyABike	Atlanta,GA	traffic	marta	negative	
	#rideMARTA	I hope a lot of these get purchased today!! #rideMARTA #martaviews #MARTA					
6:01 AM	#martaviews #MARTA	@Marta Mansell Park	Atlanta,GA	traffic	marta	positive	
	#atlantai85collapse	I-85 Fire Collapsed Bridge. Morning commute will be like.... #atlantai85collapse					
1:41AM	#I85 #atlanta	#I85 #atlanta	Atlanta,GA	traffic	stress_i85	negative	
		i-85 morning commute alternate route suggestion... I'm not saying this wouldn't work, after all	Sugar Hill, GA	traffic	i85	positive	
3:43 AM							
10:31 AM	#Atlanta #stilts	85 Bridge collapse got you down #Atlanta ? Don't worry, MARTA is here to get you around! #stilts '	Atlanta,GA	traffic	marta	positive	
5:31AM	#marta #i85	tell me more about how everyone is using #marta as a result of #i85 's collapse.	Atlanta,GA	traffic	marta	positive	
		My heart goes out to the folks living up North. It's gonna be a mess to commute.					
7:29PM		Thank goodness I live down South!	Atlanta,GA	traffic	stress	negetive	
	#hotpot #crispypork #chongqinghotpot						
3:48PM	#chinatown	Hoping your commute isn't a hot mess	Chamblee, GA	traffic	stress	negative	
	#ATL #publictransportation #commuter #options						
8:28 PM	#i85	This is why #ATL needs #publictransportation #commuter #options #i85	Atlanta,GA	traffic	stress	negative	
	#wine #atlanta	Here's #wine to that horrible #atlanta commute (especially now)! #untiljune	Brookhaven, GA	traffic	stress	negative	
8:55 PM	#untiljune #cheers	#cheers					
10:36PM		It's going to be a slightly longer commute to visit Carleen next	Athens, GA	traffic	stress	negative	
		The Atlanta Commute this morning @toddwalkernews ewscrippsco @I-85 and Ga					
8:01AM		400 @Buckhead (Atlanta)	Atlanta,GA	traffic	i85	negetive	
		Another day, another MARTA station. Sandy Springs is closer to home	Sandy Springs, GA	traffic	marta	positive	
11:56 AM	#commutewin	#commutewin @Sandy Springs'					
		COMMUTERS: Expect traffic going into Concord via I-85 & Poplar Tent Rd from 9a-					
9:31 AM		4p this month. Delays due to adding	CharlotteCP	traffic	congestion	negetive	

Tweet Volume in Different Category In Georgia

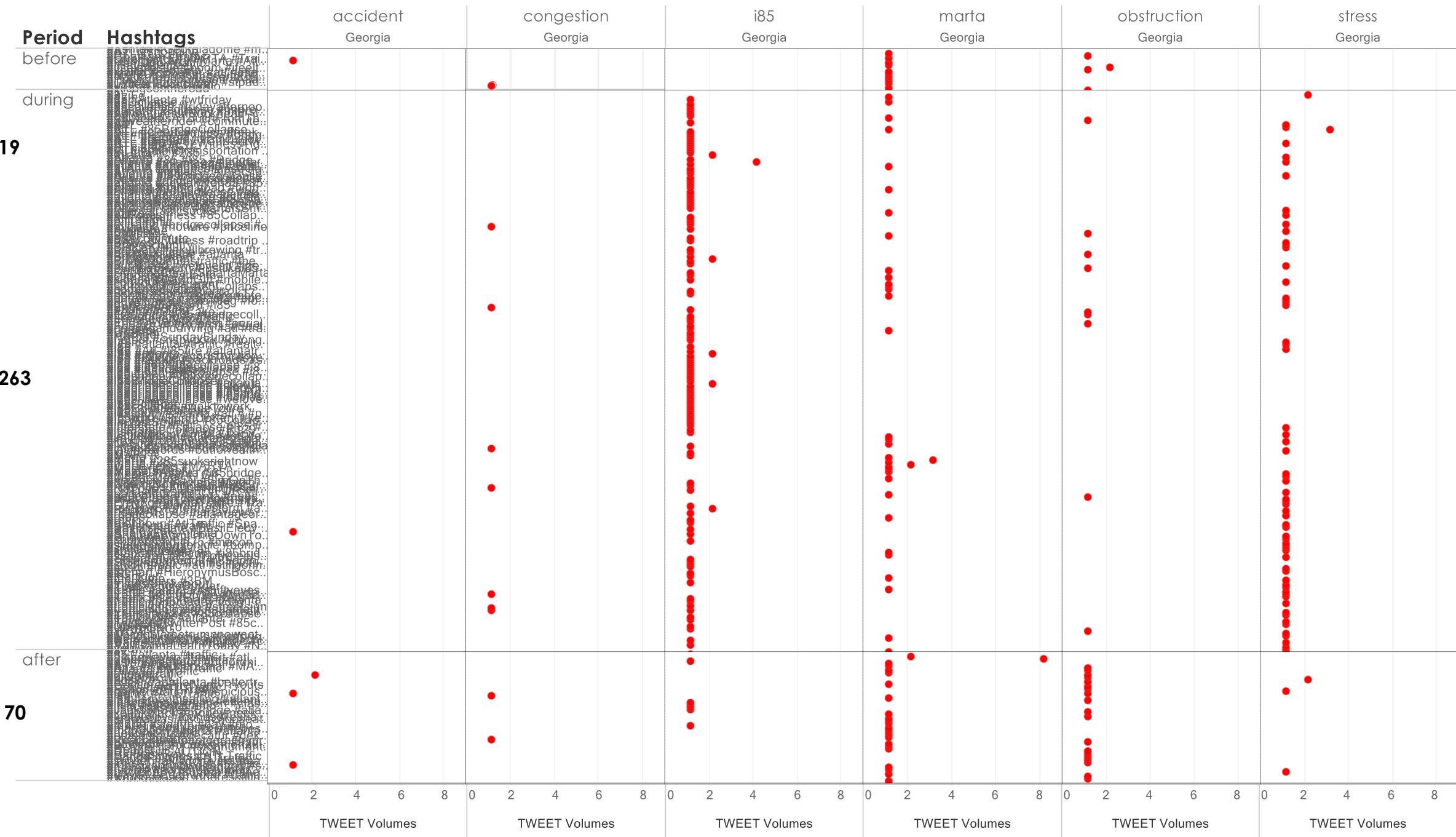


Tweet Volume in Different Category In Outside Georgia

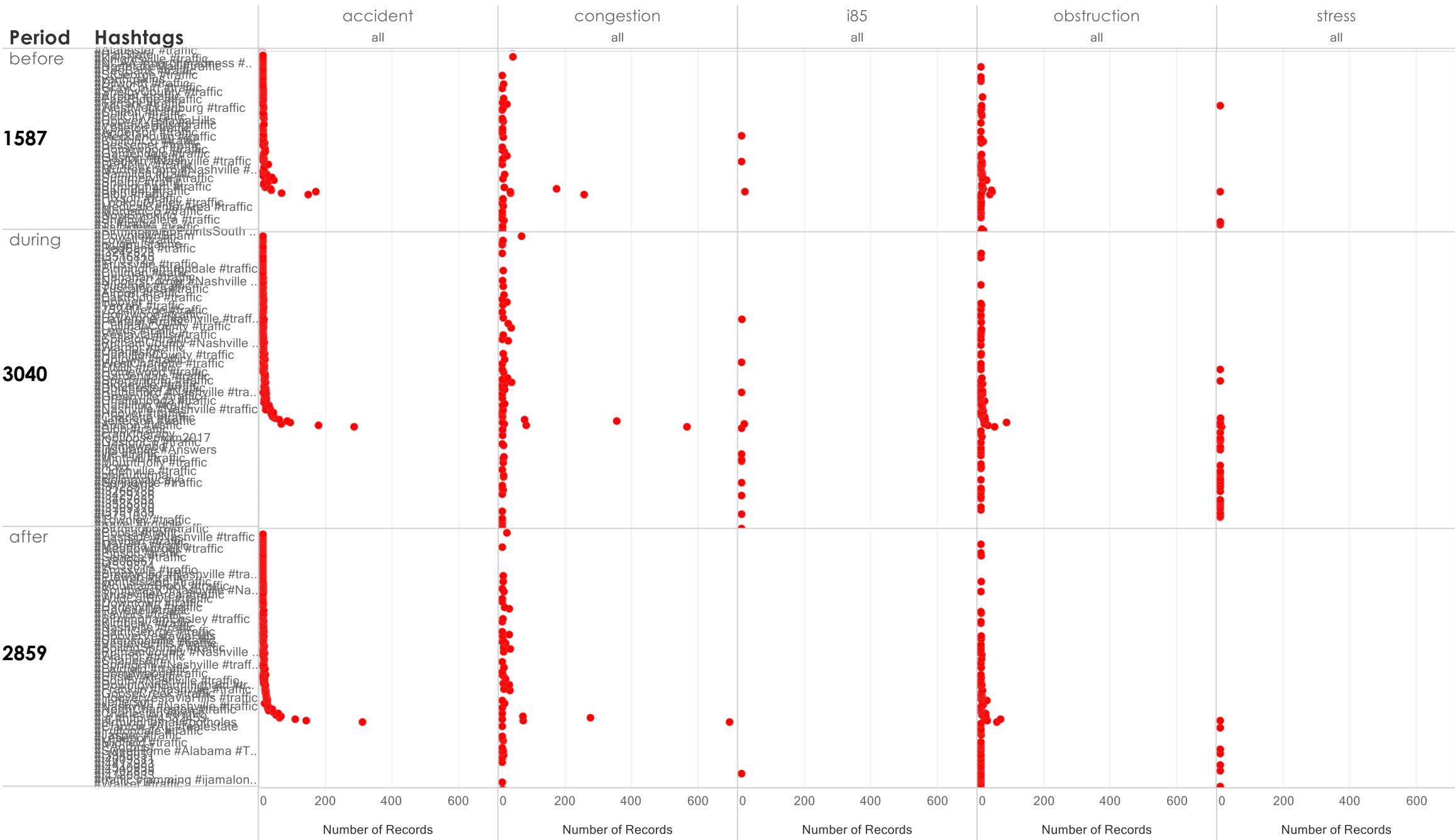
	before		during		after	
	positive	negative	positive	negative	positive	negative
all						
accident	84	722	153	1,286	215	1,240
congestion	14	628	12	1,428	150	1,211
obstruction	74	283	78	374	106	396
road_activity	42	20	62	35	36	40
stress	6	85	85	19		
i85		14	69	1		
transit			6	2		
marta						

Number of Records
1 1,428

HashTag Analysis



HashTag Analysis

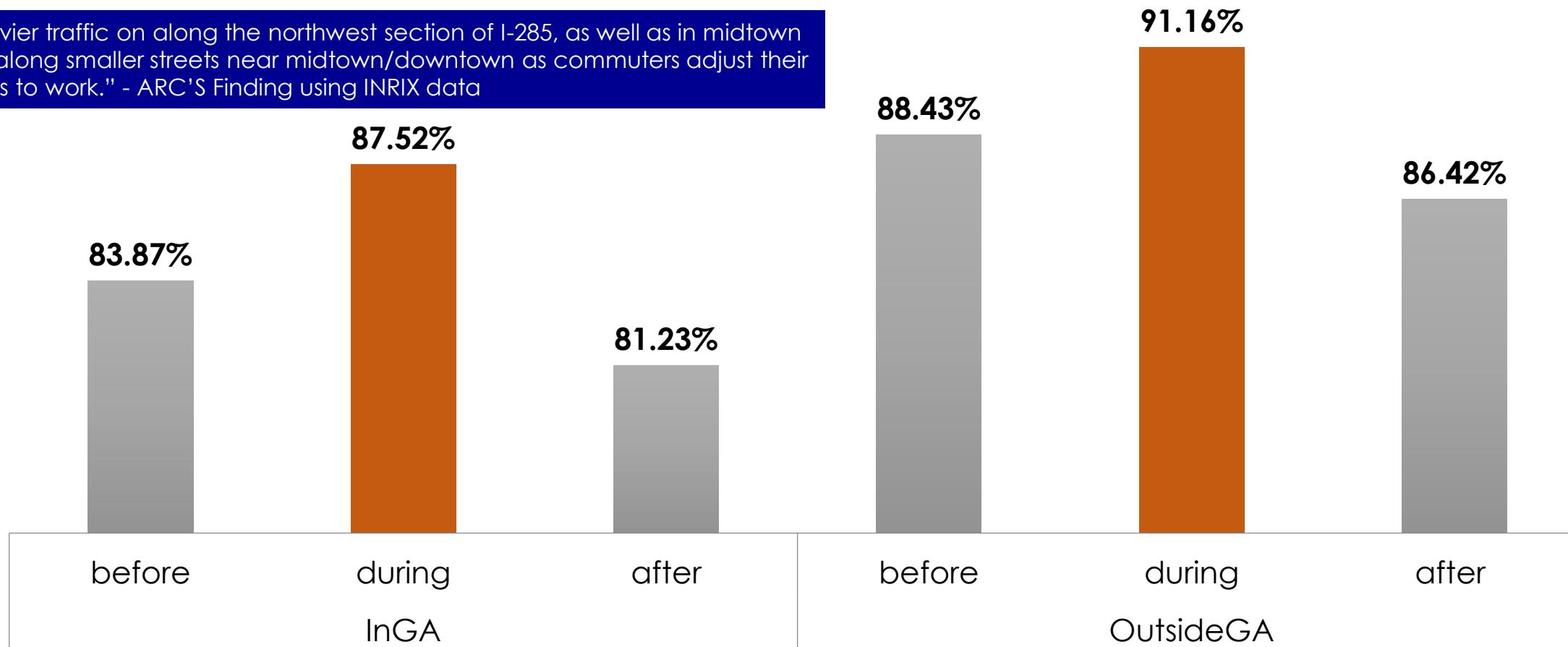


Understanding sentiment occurrence

	Negative Sentiments						Positive Sentiments					
N=10305	All Traffic Tweets			Traffic Stress			Congestion			Marta		
	Coeff	(OR)	Sig	Coeff	(OR)	Sig	Coeff	(OR)	Sig	Coeff	(OR)	Sig
(Intercept)	1.85	6.365	***	-5.34	0.004	***	-2.19	0.111	***	-3.3	0	***
Region												
isGeorgia	-0.39	0.67	***	2.454	11.6	***	-0.72	0.48	***	-	-	-
isOutsideGA(ref)		1			1			1				
Period of occurrence												
isDuring	0.482	1.6	***	1.695	5.44	***	-0.15	0.86	**	0.748	2.11	**
isBefore	0.183	1.2	**	-0.48	0.6		0.311	1.36	***	-0.4	0.67	
isAfter (ref)		1			1			1			1	
Time of the day												
isPeak	-0.06	0.94		-0.07	0.92		0.217	1.2	**	-0.4	0.67	
isNonPeak(ref)		1			1			1			1	

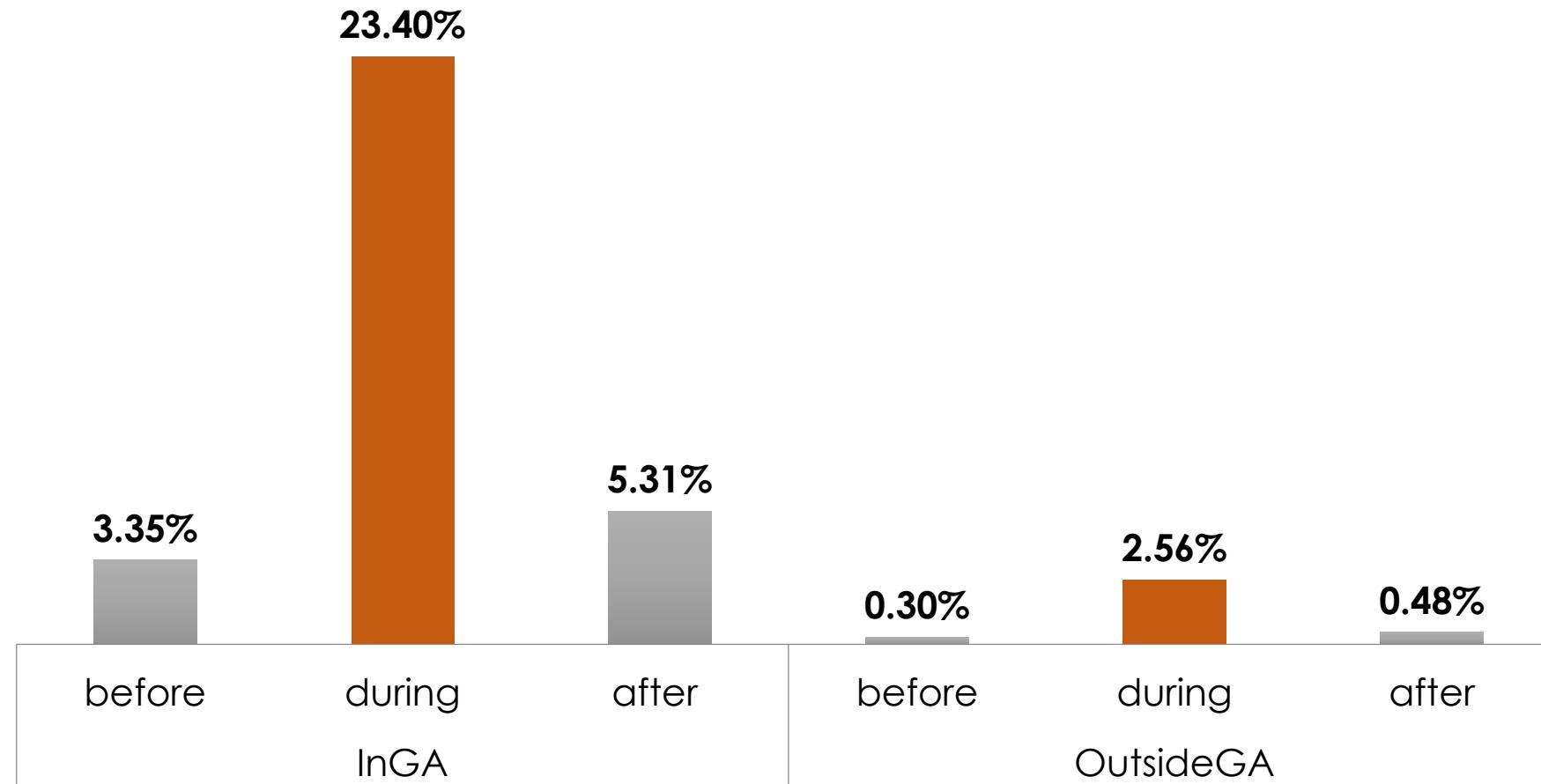
Probability of Negative sentiments in Traffic Tweets

"Heavier traffic on along the northwest section of I-285, as well as in midtown and along smaller streets near midtown/downtown as commuters adjust their routes to work." - ARC'S Finding using INRIX data



While people in Atlanta and Georgia show increased levels of stress due to traffic during I-85 collapse, people **outside of Georgia** in the adjacent states also experience **increased level of stress** due to traffic.

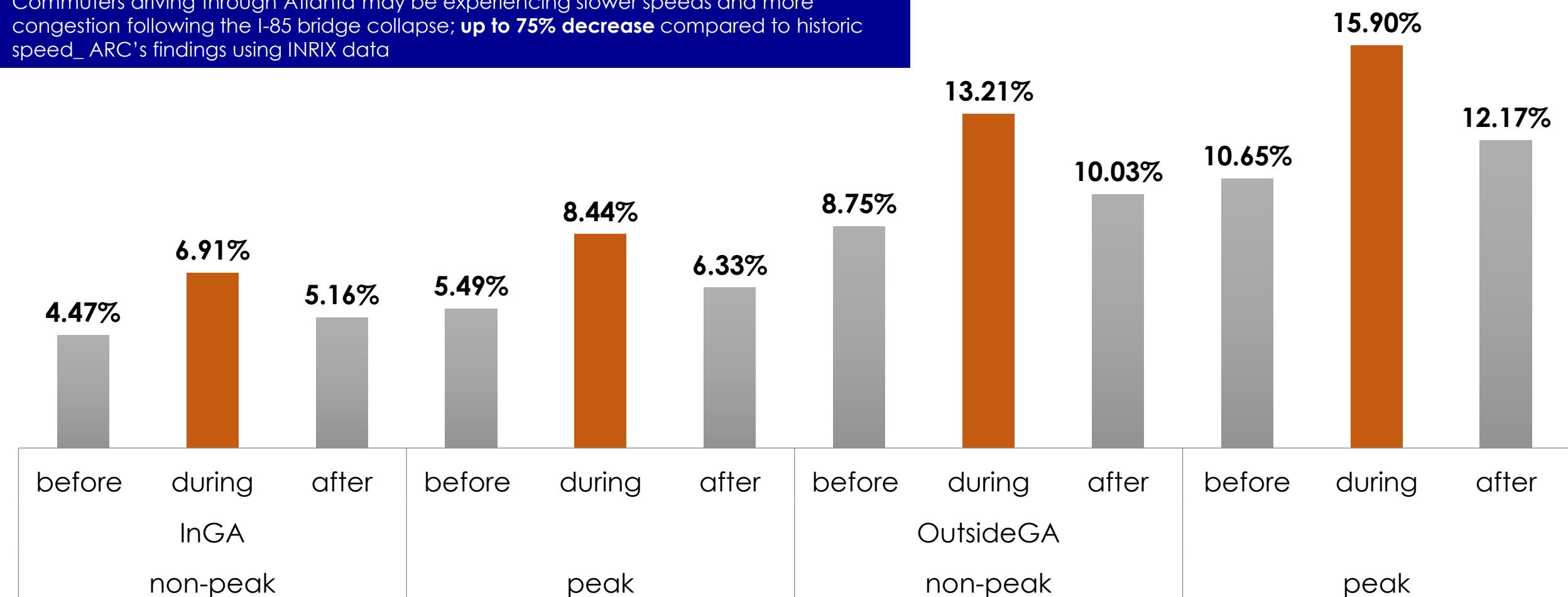
Probability of Traffic Stress expressed in Tweets



Overall Stress experienced by people due to traffic related issues during the I-85 collapse is independent of the peak hours of travel (i.e. 6-9am, and 4-8pm)

Probability of Congestion Reported in Tweets

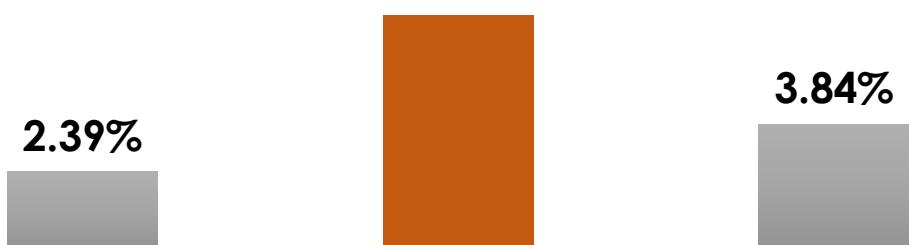
Commuters driving through Atlanta may be experiencing slower speeds and more congestion following the I-85 bridge collapse; **up to 75% decrease** compared to historic speed_ ARC's findings using INRIX data



Stress experienced by people due to **congestion** (reported road blockage , obstacles , accidents , traffic slowing down) is **higher during peak hours** of travel both in and out of Georgia.

Probability of Marta use reported in Tweets

7.18%



before

during
InGA

after

People **appreciated the importance of public transportation** in Atlanta and several tweets indicate that people used Marta for commuting. More use was reported by riders from North (Sandy Spring, Brookhaven).

Marta ridership that increased during the I-85 collapse period **did not last**.

Bike ridership increased during the I-85 collapse period although results are not statistically significant

Change in the average number of riders boarding stations on weekdays during March 31 – April 29 (after the collapse) is compared to the average number of riders during weekdays March 24-31 (before the collapse). Ridership for the stations in the North of Atlanta **increased up to 67%** – ARC's finding

Policy Implications

The findings emphasize the **necessity of alternative transportation infrastructure** to efficiently reroute traffic both local and from other areas going through Atlanta when a major interstate is dysfunctional.

The conversation about use of MARTA and biking is limited to the central areas in Atlanta. **Increasing MARTA's reach** is the key.

Bike paths and street design conducive to safe biking is a necessity to deal with travel disruptions

Benefits of using Social media

Social media analysis allows planners and policy makers to gauge people's experience during crisis. **Reduce cost and time for analysis**

The analysis captures specific nuances such as **people's perception** and **preference** during a crisis incident. This is often overlooked when dealing with only traffic data.

Most findings matched with the results available from traffic data . As such social media can be considered a reliable source of data when used as an alternative to enrich the finding of a crisis event.