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CarTopicVis: GeoVisual Text Analytics for Exploring Public Discourse on Twitter

Caglar Koylu*, Ryan Larson, Bryce J. Dietrich & Kang-Pyo Lee

* Caglar Koylu,

Assistant Professor

Geographical and Sustainability Sciences

Iowa Informatics Initiative

@caglarkoylu

Motivation I

On January 27, 2017, President Donald Trump signed Executive Order 13769 which prevented people from. . .

- Iran
- Iraq
- Libya
- Somalia
- Sudan
- Syria
- Yemen



from entering the United States.

Motivation I

Similar outrage was expressed on Twitter, with many tweeting about immigration for the first time.

In contrast to previous studies that analyzed tweets after an event (Bruns et al., 2013), we started collecting tweets using immigration-related keywords:

immigration, immigrant, muslim, Islam, refugee

a month before the first travel ban took effect in January 2017.

Motivation I: Questions

- What were the common topics about immigration and Muslim refugees?
- How did the intensity of conversations vary by states and time?
- Which states were similar in terms of the common topics discussed?
- How did the content of tweets vary before and after the ban and across different states?
- How did the sentiment of tweets vary before and after the ban, and across states?

Motivation I

ian bremmer @ianbremmer Follow

Immigration ban not sitting well with America.

Retweets 12,592 Likes 17,472

Alyssa Milano @Alyssa_Milano · Jan 28

My best friend, Alaa Mohammad Khaled, is Muslim. His parents were Palestinian refugees. His brother is DJ Khaled. #RefugeesWelcome

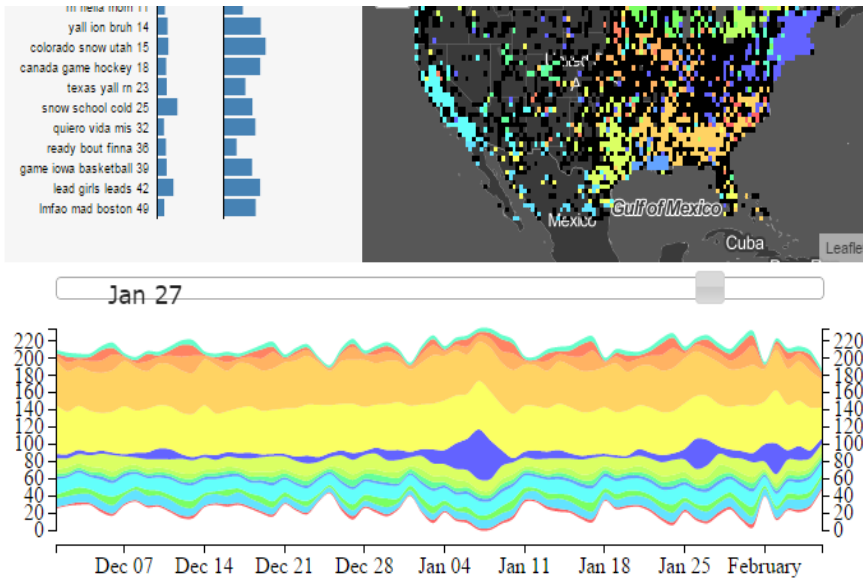
227 776 3.1K

Maya Sen @maya_sen Following

Crowd of around 300 has gathered at Massachusetts state capitol in Boston to protest #MuslimBan

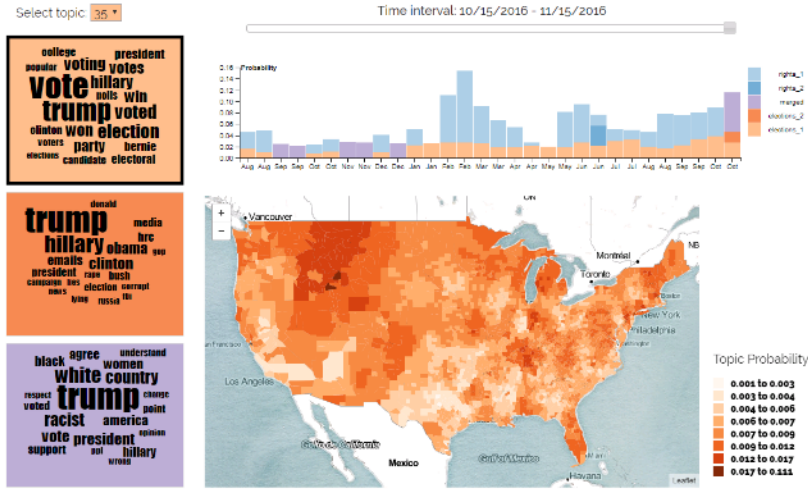
Retweets 62 Likes 87

Motivation II: Topic Modeling and GeoVisual Analytics



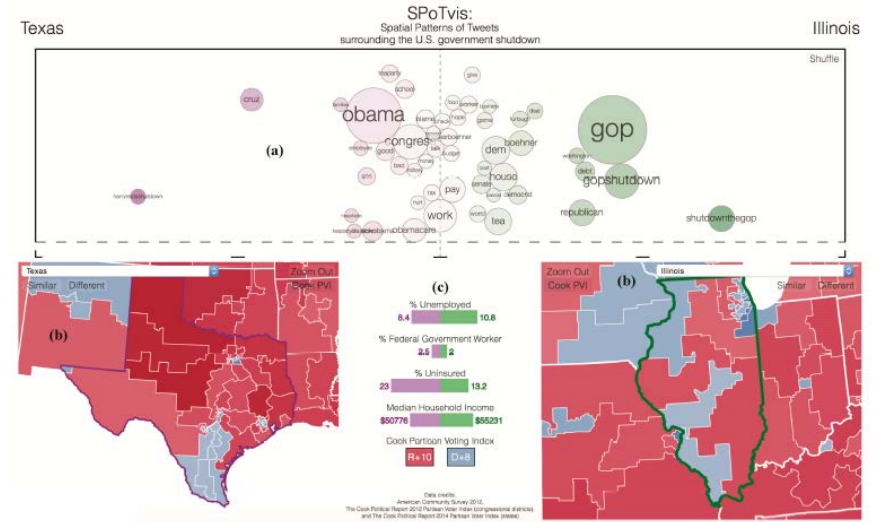
Motivation II: Topic Modeling and GeoVisual Analytics

Election topics of reciprocal communication on Twitter



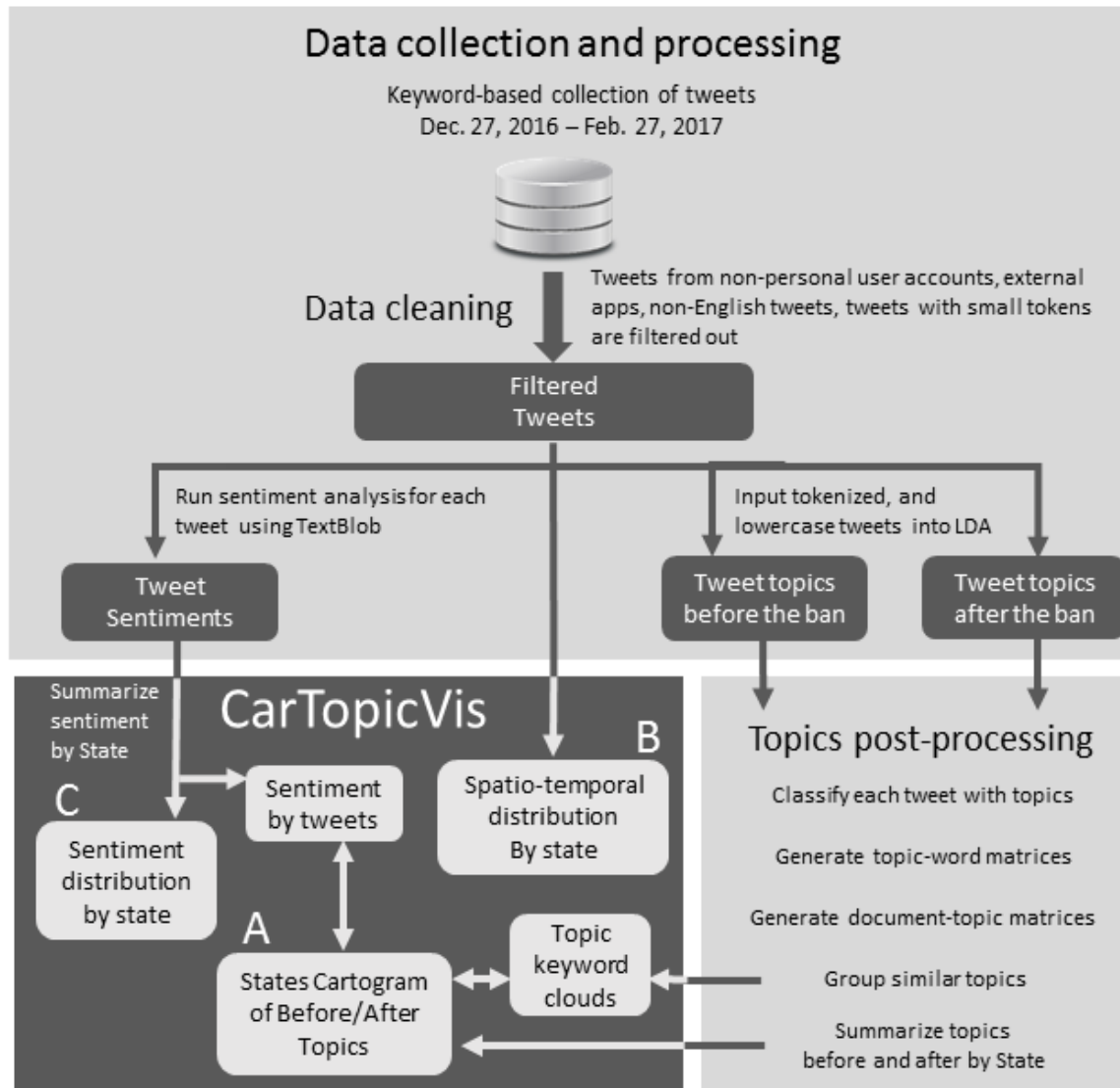
<http://geo-social.com/topicviz/mentiontopics.html>

Koylu, 2018



Nelson et al, 2015

Methodology

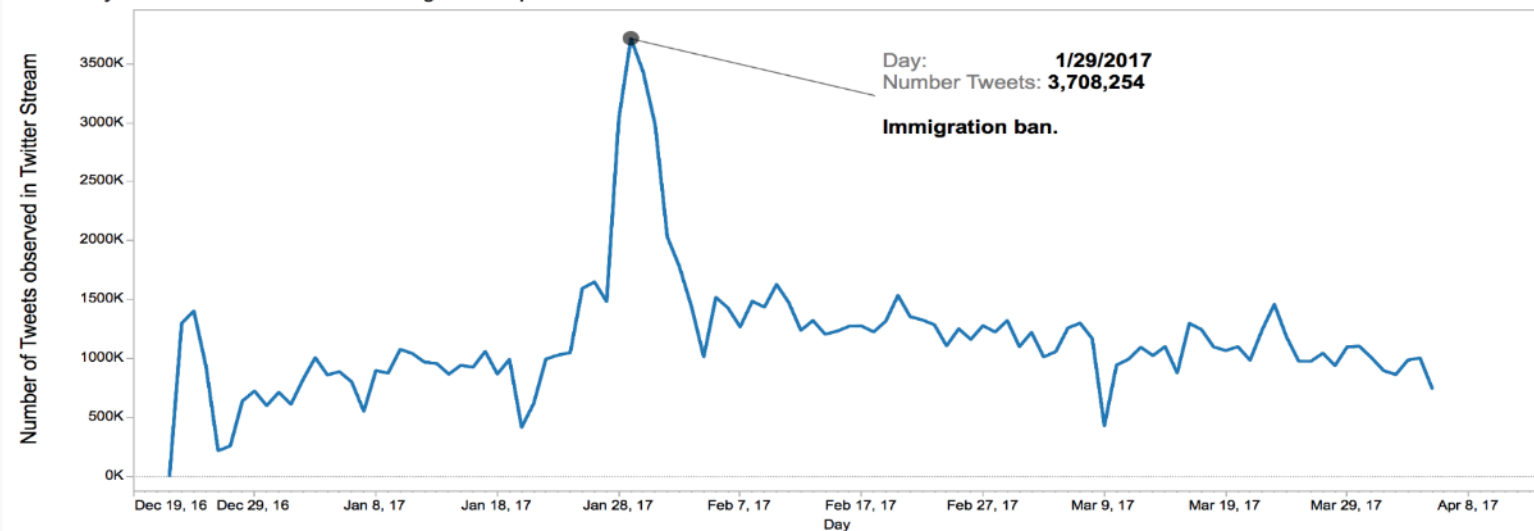


Filtering & Statistics

Tweets	No Retweets	English Geo-located Tweets	Geo-located tweets in the US	Users
72,397,072	43,438,243	17,501,502	3,803,544	6,350,263
Filtering short tweets, language classification			Final Tweets	Final Users
			1,953,094	759,171

Twitter Stream Count

How many tweets have we observed during our scrape?



Topics before the Travel Ban

Topic	Words	P
0	muslim, trump, immigration, like, ban, islam, immigrant, refugee, wall, obama, brotherhood, america, president, orders, know, news, white, executive, women, donald	0.11
1	muslim, islam, people, immigration, muslims, trump, immigrant, girls, wall, sex, border, anti, yes, isis, policy, says, white, order, know, saying	0.09
2	immigrant, muslim, trump, refugee, immigration, women, rights, american, islam, orders, syrian, woman, free, wall, anti, immigrants, support, like, want, children	0.10
3	immigration, islam, trump, muslim, refugee, executive, orders, order, sign, read, need, obama, new, president, illegal, stop, ban, policy, country, white	0.11
4	muslim, islam, people, immigration, trump, religion, countries, america, ban, obama, immigrant, register, refugee, says, good, albright, need, order, muslims, video	0.11
5	muslim, islam, country, like, refugee, trump, immigrant, hate, world, california, sharia, day, know, law, terrorist, immigration, women, arabic, saudi, tourism	0.09
6	muslim, trump, immigration, islam, countries, immigrant, wall, refugee, muslims, ban, orders, new, border, executive, sex, illegal, girls, anti, know, fuck	0.08
7	immigration, muslim, trump, illegal, islam, wall, anti, law, border, executive, policy, president, american, security, world, immigrant, video, new, obama, actions	0.12
8	islam, muslim, immigration, immigrant, illegal, trump, refugee, god, world, isis, hate, immigrants, west, human, women, life, ban, want, said, usa	0.09
9	muslim, women, islam, refugee, trump, immigrant, new, law, woman, think, immigration, illegal, time, rights, need, march, america, want, obama, sharia	0.10

Topics after the Travel Ban

10	muslim, like, immigration, islam, refugees, immigrant, ban, refugee, countries, want, great, trump, country, need, muslims, people, american, stop, know, americans,	0.12
11	muslim, trump, ban, immigration, order, refugee, president, people, judge, travel, white, country, executive, anti, court, donald, know, federal, says, immigrant	0.12
12	trump, muslim, ban, immigration, refugee, islam, people, court, immigrant, countries, love, president, travel, america, protest, sex, majority, order, muslims, true	0.08
13	muslim, trump, ban, immigration, islam, refugees, order, countries, like, obama, religion, terrorist, immigrant, refugee, watch, legal, muslims, new, free, country	0.08
14	immigration, trump, ban, muslim, immigrant, anti, order, right, refugee, countries, new, illegal, islam, america, world, like, executive, travel, post, policy	0.12
15	immigration, muslim, ban, trump, refugee, islam, order, immigrant, new, white, let, country, people, woman, video, good, help, president, know, says	0.08
16	islam, muslim, immigrant, immigration, america, know, ban, illegal, think, trump, time, immigrants, muslims, media, refugee, going, legal, country, law, religion	0.13
17	immigration, trump, refugee, islam, muslim, ban, order, obama, news, executive, people, radical, america, women, donald, american, president, policy, illegal, today	0.08
18	muslim, ban, trump, immigration, countries, obama, immigrant, islam, people, muslims, like, order, way, refugee, want, world, country, president, donald, says	0.10
19	refugee, trump, ban, muslim, immigration, people, islam, donald, support, muslims, like, stop, news, order, right, need, tell, new, immigrant, come	0.09

Topic Similarity

Document topic probabilities

↓ *Average by space-time partition*

Average document topic probabilities by each State and Time

↓

$$\begin{bmatrix} x_{11} & x_{12} & \cdots & x_{1q} \\ \vdots & & \ddots & \\ x_{n1} & x_{n2} & \cdots & x_{nq} \end{bmatrix}$$

→

Topic Similarity between State Partitions

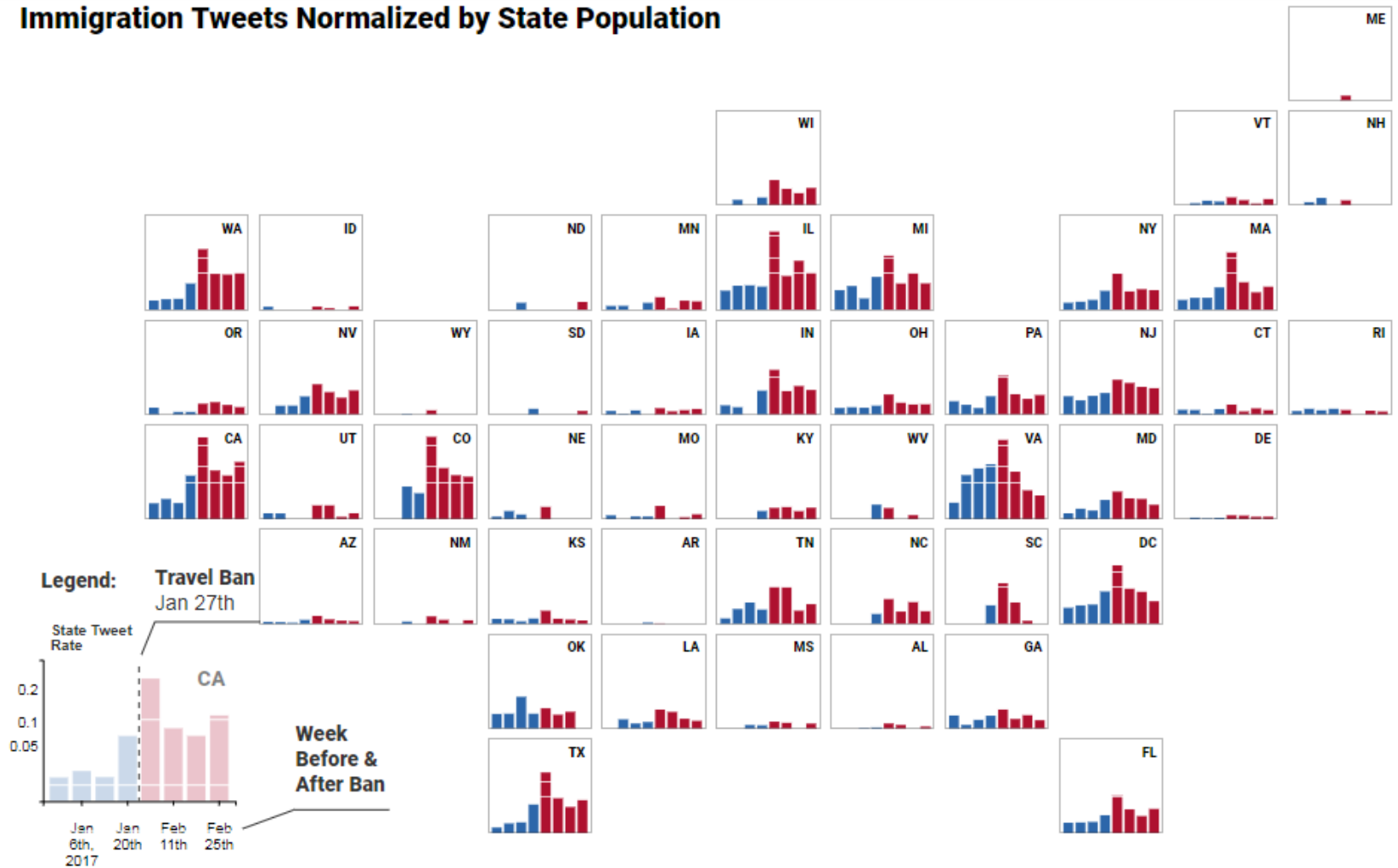
$$d_{ij} = \left[\sum_{k=0}^n a(x_{ik} - x_{jk})^2 \right]^{1/2}$$

↑ *K-means clustering*

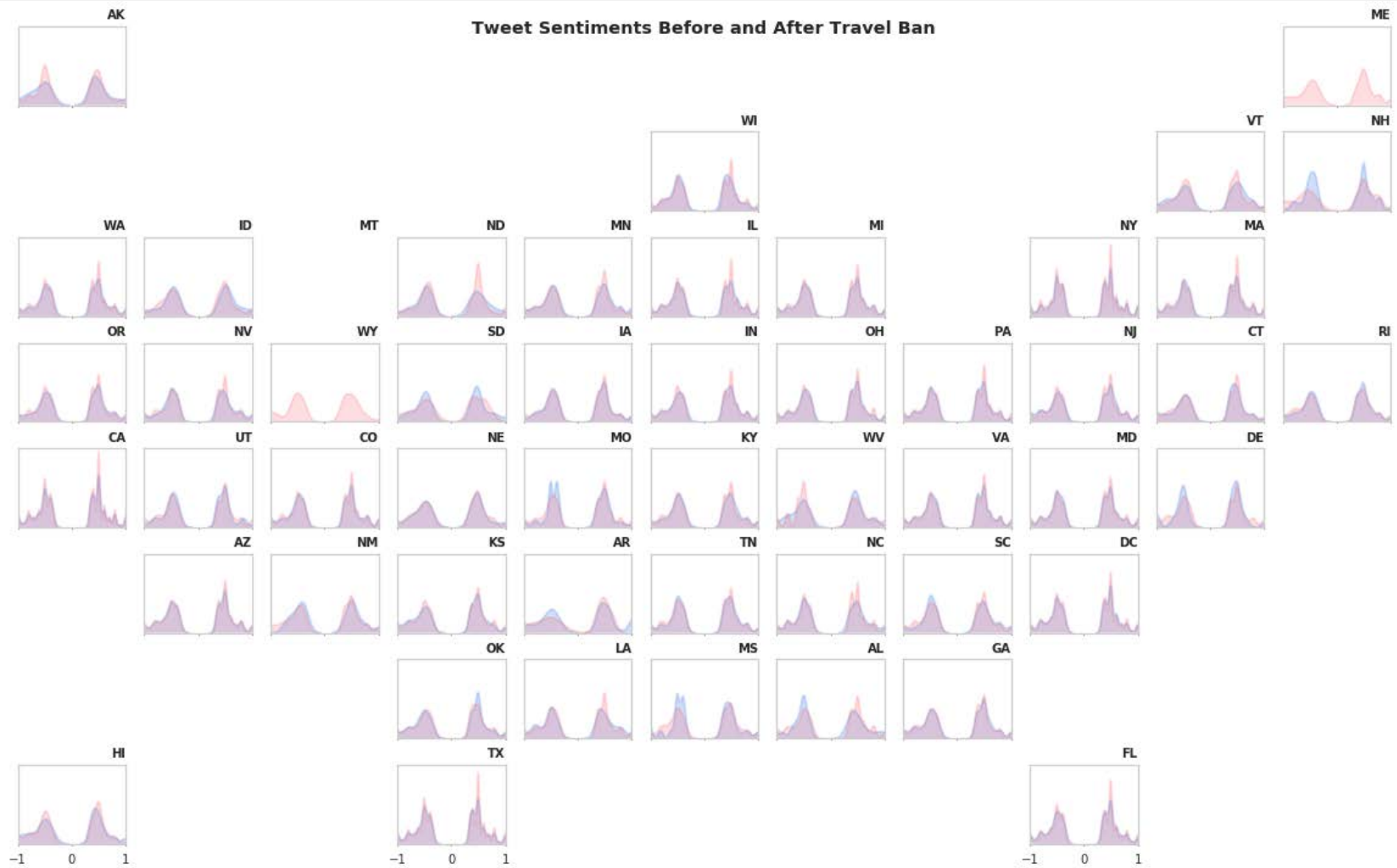
State Clusters

Weekly reaction cartogram

Immigration Tweets Normalized by State Population



Sentiment Cartogram



The GeoSocial Lab

www.geo-social.com



Ryan Larson
Undergraduate Alumni
Computer Science



Bryce Dietrich
Assistant Professor
Political Science



Kang-Pyo Lee
Research Scientist
Informatics Initiative

