



If Twitter Could Vote

Joseph Brown,
Mikaela
Jordan, Adam
Swayze

Polling and
Predictions

Results

Democrats
Republicans

Future Work

References

If Twitter Could Vote

Joseph Brown, Mikaela Jordan, Adam Swayze

Tarleton State University

January 7, 2017



Predicting Primary Results

- In Primaries, polls change fast and are inaccurate

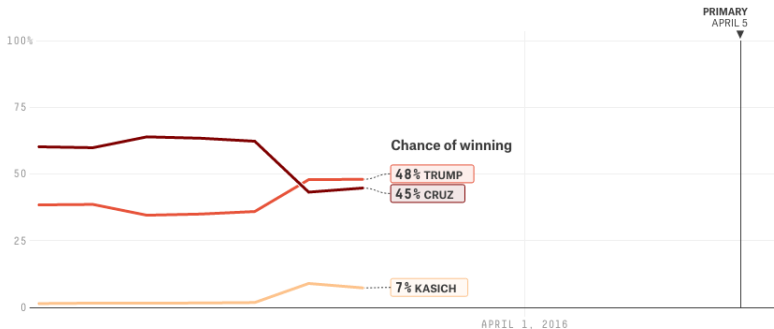


Figure: Late March/Early April Polls for the Wisconsin Republican Primary from 538



Predicting Primary Results

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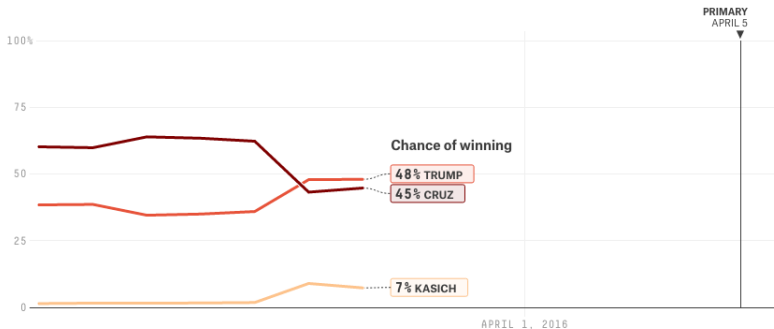


Figure: Late March/Early April Polls for the Wisconsin Republican Primary from 538



Alternative Primary Predictions



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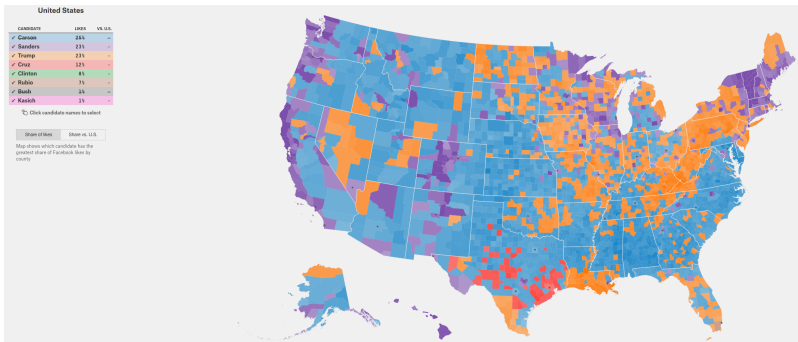
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- Counties colored by Candidate with most Facebook likes





Candidates and Social Media



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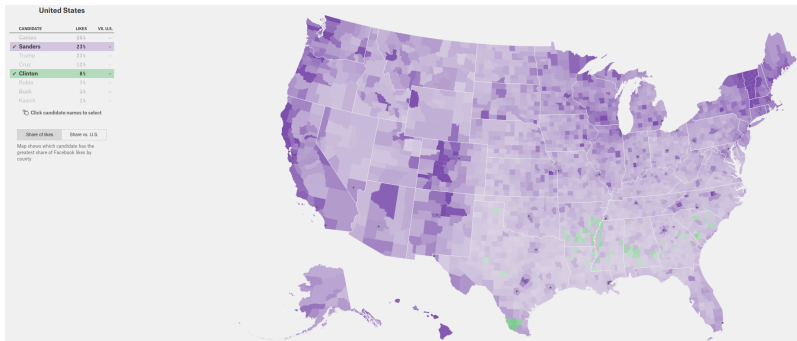
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• Democratic Candidates





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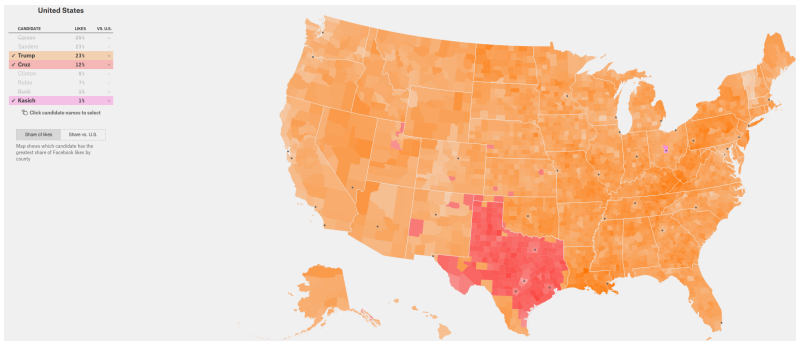
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Natural Language Processing

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- Basic Idea
 - Computers understanding language



Natural Language Processing

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- Basic Idea
 - Computers understanding language
- Several Tasks in Natural Language Processing
 - Question Answering
 - Automatic Summarization
 - Sentiment Analysis



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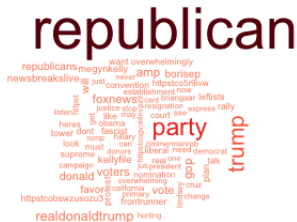
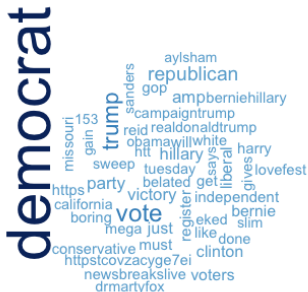


Figure: Word Clouds for Twitter Searches with Keywords “Democrat” and “Republican”



Design of the Primary Prediction

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- Created a dataset with the names of all counties in US, their respective FIPS codes, and the recorded majority winners for each county
 - Unique identification number for each county in US



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 - Unique identification number for each county in US
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- Search for tweets with specified keywords in every county of US

Candidates	Bernie Sanders	Hillary Clinton	Donald Trump	John Kasich	Ted Cruz
Keywords	"Bernie" "Sanders" "Feel The Bern" "Bernie2016"	"I'm with Her" "HillaryClinton" "Hillary2016" "Clinton"	"Trump" "Donald" "Make America Great Again" "Trump2016" "DonaldTrump"	"Kasich" "JohnKasich" "Kasich2016"	"Cruz" "TedCruz" "Trust Ted" "TrustTed" "Cruz2016"



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- Merge results data frame with tweets data frame by FIPS code



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An Example

An original tweet from our collection:

†TrusTED #cruz2016 🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸 @ Palmbay FL
<https://t.co/SNEIizEZY0L>



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- Cleaning Tweets
 - Remove punctuation



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- Cleaning Tweets
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 - Remove emojis



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- Cleaning Tweets
 - Remove punctuation
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- Cleaning Tweets

- Remove punctuation
- Remove emojis
- Remove Stopwords
- Make everything lower case



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An Example

An original tweet from our collection:

†Trusted #cruz2016 🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸🇺🇸 @ Palmbay FL
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"trusted cruz2016 palmbay fl httpstcosneliezy0l"



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- Create a Document-Term Matrix

Doc Name	Term 1	Term 2	...	Term n
Doc 1	$\text{Freq}(\text{T1 in D1})$	$\text{Freq}(\text{T2 in D1})$...	$\text{Freq}(\text{Tn in D1})$
\vdots				
Doc m	$\text{Freq}(\text{T1 in Dm})$	$\text{Freq}(\text{T2 in Dm})$...	$\text{Freq}(\text{Tn in Dm})$



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Doc Name	Term 1 (Trump)	Term 2	...	Term n
My Tweet	5	0	...	0

- Attach labels to each tweet based on location of tweet



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Doc Name	Term 1 (Trump)	Term 2	...	Term n
My Tweet	5	0	...	0

- Attach labels to each tweet based on location of tweet
- Use machine learning algorithms to predict majority winners of each tweet's county



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		Predicted	
		Bernie	Hillary
Actual	Bernie	431	3332
	Hillary	148	10212

Table: Support Vector Machine Confusion Matrix

		Predicted	
		Bernie	Hillary
Actual	Bernie	434	3329
	Hillary	132	10228

Table: Neural Network Size 6 Confusion Matrix

	Accuracy Rate
Support Vector Machine	75.36%
Neural Network	75.50%

Table: Accuracy Rates of Both Models



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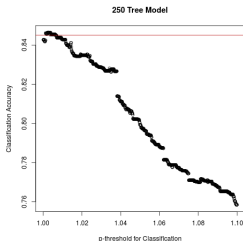


Figure: A plot of classification accuracy versus probability threshold for Random Forest Model

		Predicted	
		Trump	Not Trump
Actual	Trump	9517	42
	Not Trump	1695	58

Table: Random Forest with 250 Trees Confusion Matrix. Has an accuracy of 84.64%



Limitations with Social Media



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- According to the Pew Research Center, only 23% of Americans use Twitter



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- Less than 5% of all tweets are georeferenced



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References

- Continue to try to improve our models
- Compare to traditional polling results
- Does Twitter have an advantage over traditional polling?



References

We'd like to thank the Office of Student Research and Creative Activity at Tarleton State University



- Benjamin, Dan. "A Gentle Introduction to Random Forests, Ensembles, and Performance Metrics in a Commercial System - Blog & Press" *Citizen and Net*. N.p., 09 Nov. 2012. Web. 28 Mar. 2016.
- Phillips, Winfred. "Introduction to Natural Language Processing." *Consortium on Cognitive Science Instruction*. The MIND Project, 2006. Web. 16 Mar 2016.
- Raine, Lee. "Social Media and Voting." *Pew Research Center Internet Science Tech RSS*. Pew Charitable Trusts, 05 Nov. 2012. Web. 28 Mar. 2016.
- Weston, Jason. "Support Vector Machines (and Statistical Learning Theory)." *ComputerScience4701*. Columbia University, New York. *Columbia University*. Web. 28 Mar. 2016.
- "FiveThirtyEight." *FiveThirtyEight*. Nate Silver, n.d. Web. 28 Mar 2016.
- "2016 Primary Election Results: President Live Map by State, Real-Time Voting Updates" *Election Hub*. Politico LLC, 27 Mar. 2016. Web. 28 Mar. 2016.