Project-Dealing with data

May 16, 2016

1 Executive Summary:

The 2016 GOP race has garnered the public's attention especially the debates. Fox News' debate in Detroit is the highest viewed debate of the year at 16.9 million viewers. This is no surprise with the interest Donald Trump has gathered from the general public. Trump's brash manner and lack of civility has ran counter to traditional political campaigns. Our project tries to see if there is a correlation between how negative Trump is being compared to his rivals and public sentiment towards him. The workflow process was as follows:

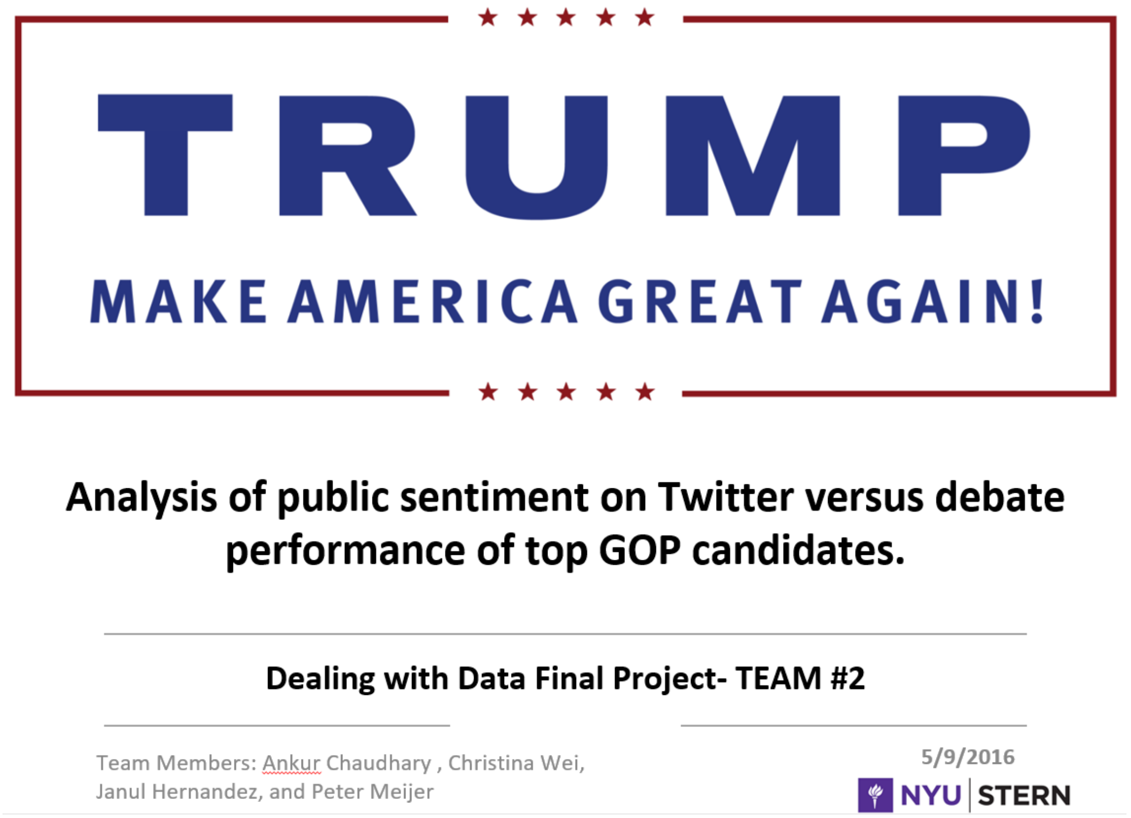
1) We used transcripts from the Washington Post of three previous Republican Debates (Houston, Detroit, and Miami). With the help of Beautiful Soup (an HTML parser) we scraped these sites to build dictionaries of all words said by specific candidates during each debate.
2) The dictionaries were placed in a relational database to find keywords and then sent through Alchemy Sentiment API to get a confidence and sentiment score.
3) Due to Twitter locking down their publicly available data we were only able to analyze the last 10 days of data from Tweepy.
4) After both data sets were collected we assigned a weighting factor and then combined using SQL. From the sets we performed data visualization using pandas (MATPLOTLIB) and Tableau to showcase the trends and our findings.

To our surprise we found that Trump's debate performances were not as negative as his running mates. Additionally, our expectation for positive public sentiment on Twitter was wrong as well. What we did find was that Trump dominated the digital space in sheer volume of tweets and re-tweets.

TOOLS USED:

Technologies/Tools used: Python, Beautiful Soup, Sentiment, TwitterAPI, Tweepy, MySQL, and Pandas/Tableau

```
In [3]: from IPython.display import Image

        Image(filename='ProjectHeading.PNG')

Out[3]:
```



TRUMP

MAKE AMERICA GREAT AGAIN!

Analysis of public sentiment on Twitter versus debate performance of top GOP candidates.

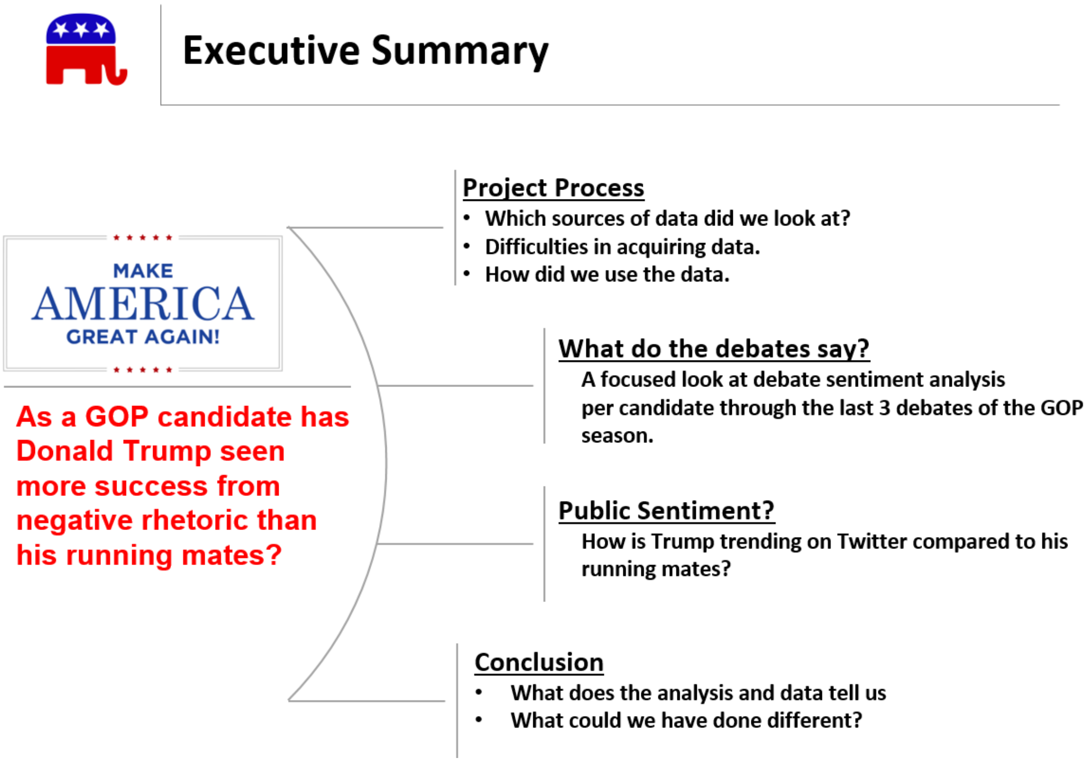
Dealing with Data Final Project- TEAM #2

Team Members: Ankur Chaudhary , Christina Wei,
Janul Hernandez, and Peter Meijer

5/9/2016

NYU | STERN

```
In [2]: from IPython.display import Image

        Image(filename='ExecutiveSummary.PNG')

Out[2]:
```



Executive Summary

MAKE AMERICA GREAT AGAIN!

As a GOP candidate has Donald Trump seen more success from negative rhetoric than his running mates?

Project Process

- Which sources of data did we look at?
- Difficulties in acquiring data.
- How did we use the data.

What do the debates say?

A focused look at debate sentiment analysis per candidate through the last 3 debates of the GOP season.

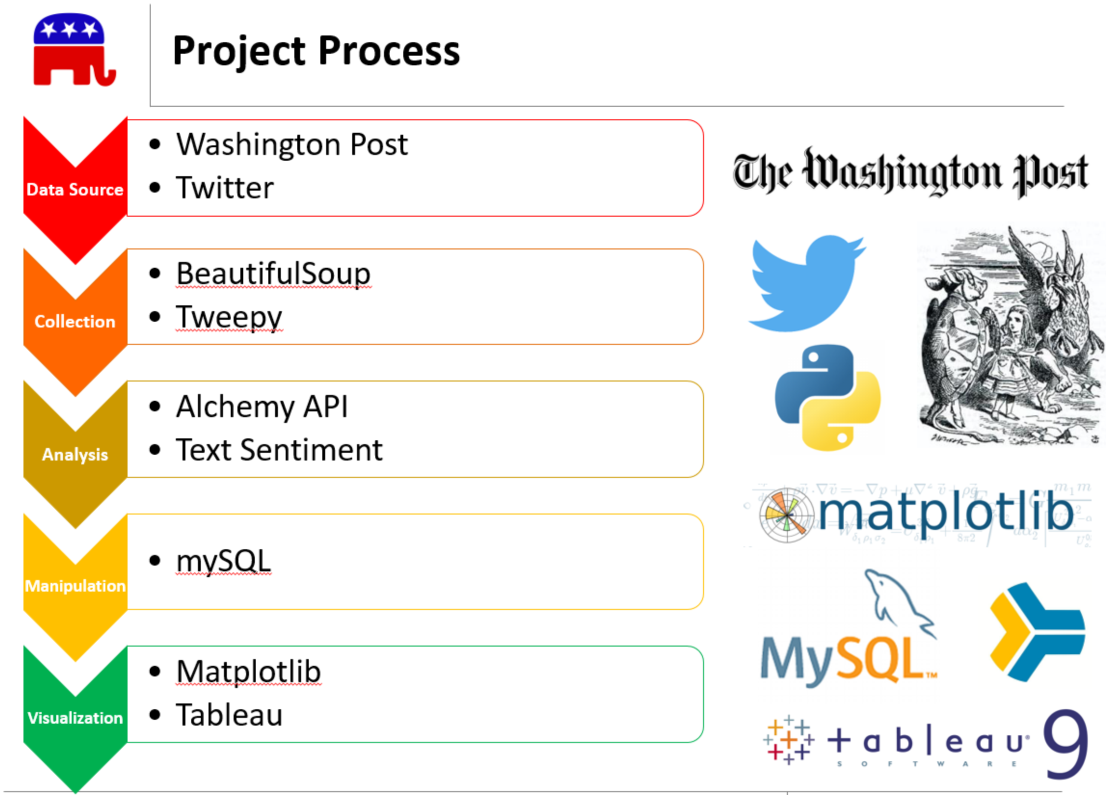
Public Sentiment?

How is Trump trending on Twitter compared to his running mates?

Conclusion

- What does the analysis and data tell us
- What could we have done different?

```
In [4]: from IPython.display import Image

        Image(filename='ProjectProcess.PNG')

Out[4]:
```



Project Process

Data Source
- Washington Post
- Twitter

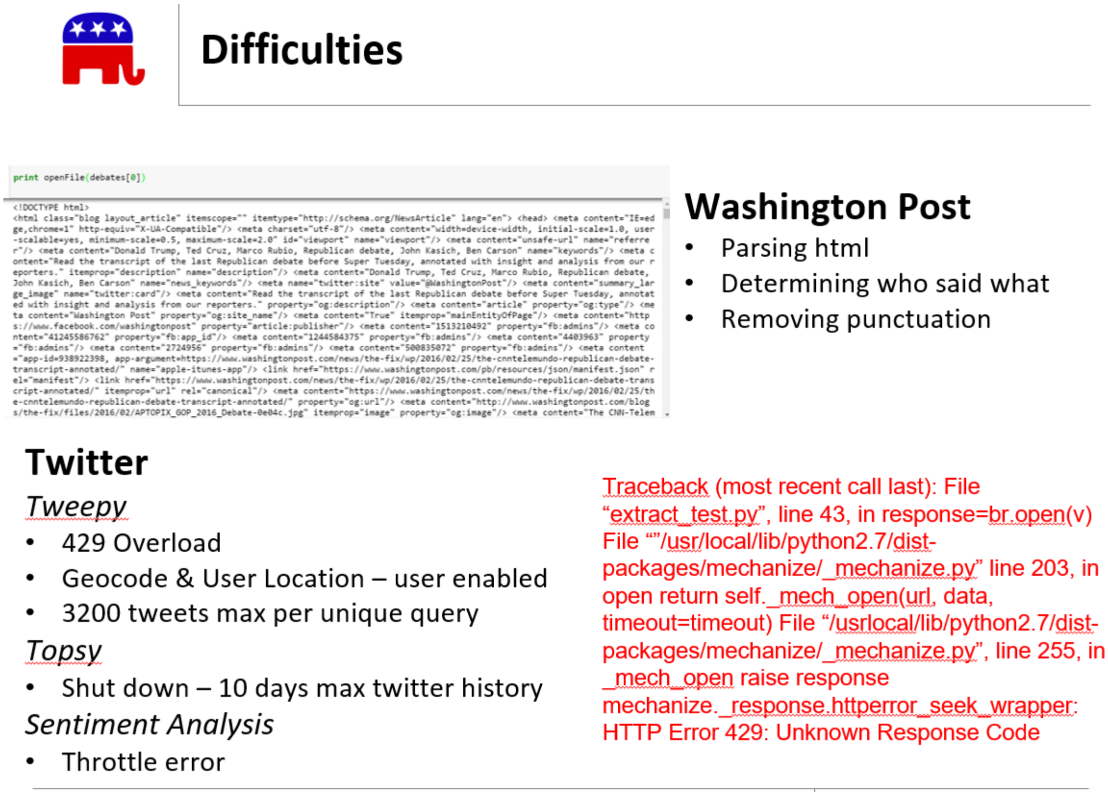
Collection
- BeautifulSoup
- Tweepy

Analysis
- Alchemy API
- Text Sentiment

Manipulation
- mySQL

Visualization
- Matplotlib
- Tableau

```
In [6]: from IPython.display import Image

        Image(filename='Difficulties_Project.PNG')

Out[6]:
```



Difficulties

```
print openFile(debates[0])
```

```
<!DOCTYPE html>
<html class="blog layout_article" itemscope="" itemtype="http://schema.org/NewsArticle" lang="en"> <head> <meta content="IE=ed
ge,chrome=1" http-equiv="X-UA-Compatible"/> <meta charset="utf-8"/> <meta content="width=device-width, initial-scale=1.0, user
-scalable=yes, minimum-scale=0.5, maximum-scale=2.0" id="viewport" name="viewport"/> <meta content="unsafe-url" name="referre
r"/> <meta content="Donald Trump, Ted Cruz, Marco Rubio, Republican debate, John Kasich, Ben Carson" name="keywords"/> <meta c
ontent="Read the transcript of the last Republican debate before Super Tuesday, annotated with insight and analysis from our r
eporters." itemprop="description" name="description"/> <meta content="Donald Trump, Ted Cruz, Marco Rubio, Republican debate,
John Kasich, Ben Carson" name="news_keywords"/> <meta name="twitter:site" value="@WashingtonPost"/> <meta content="summary_lar
ge_image" name="twitter:card"/> <meta content="Read the transcript of the last Republican debate before Super Tuesday, annotat
ed with insight and analysis from our reporters." property="og:description"/> <meta content="article" property="og:type"/> <me
ta content="Washington Post" property="og:site_name"/> <meta content="True" itemprop="mainEntityOfPage"/> <meta content="http
s://www.facebook.com/washingtonpost" property="article:publisher"/> <meta content="1513210492" property="fb:admins"/> <meta co
ntent="41245586762" property="fb:app_id"/> <meta content="1244584375" property="fb:admins"/> <meta content="4403963" property
="fb:admins"/> <meta content="2724956" property="fb:admins"/> <meta content="500835072" property="fb:admins"/> <meta content
="app-id=938922398, app-argument=https://www.washingtonpost.com/news/the-fix/wp/2016/02/25/the-cnntelemundo-republican-debate-
transcript-annotated/" name="apple-itunes-app"/> <link href="https://www.washingtonpost.com/pb/resources/json/manifest.json" r
el="manifest"/> <link href="https://www.washingtonpost.com/news/the-fix/wp/2016/02/25/the-cnntelemundo-republican-debate-trans
cript-annotated/" itemprop="url" rel="canonical"/> <meta content="https://www.washingtonpost.com/news/the-fix/wp/2016/02/25/th
e-cnntelemundo-republican-debate-transcript-annotated/" property="og:url"/> <meta content="http://www.washingtonpost.com/blog
s/the-fix/files/2016/02/APTOPIX_GOP_2016_Debate-0e04c.jpg" itemprop="image" property="og:image"/> <meta content="The CNN-Telem
```

Washington Post

- Parsing html
- Determining who said what
- Removing punctuation

Twitter

Tweepy

- 429 Overload
- Geocode & User Location – user enabled
- 3200 tweets max per unique query

Topsy

- Shut down – 10 days max twitter history

Sentiment Analysis

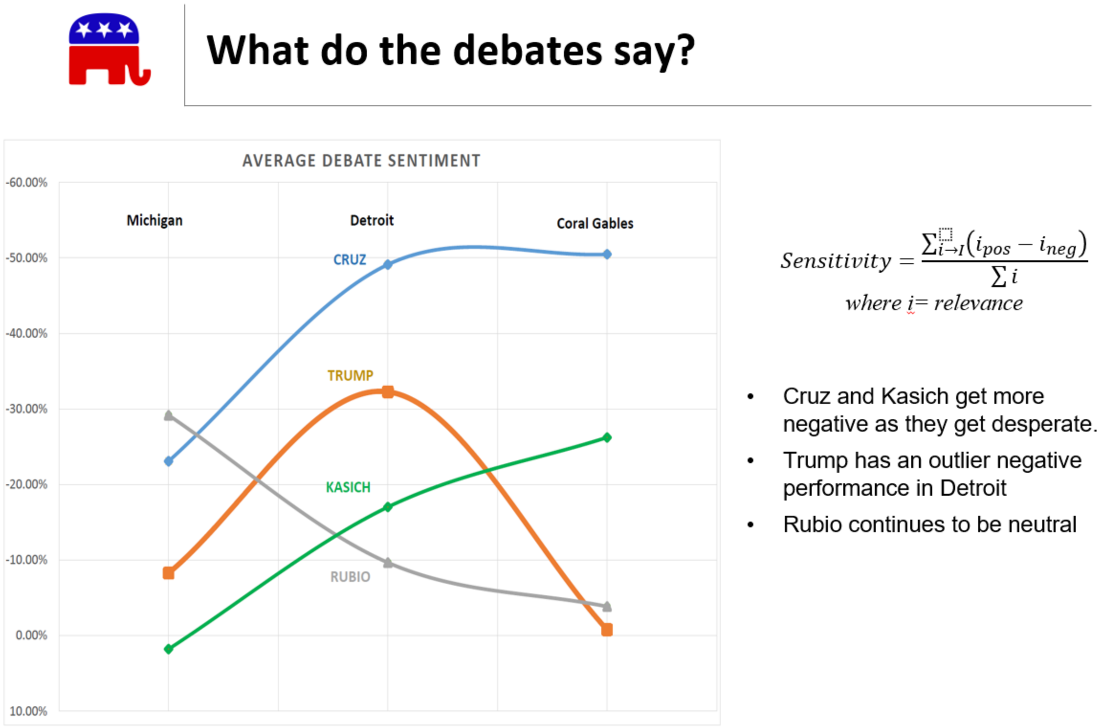
- Throttle error

```
Traceback (most recent call last): File
“extract_test.py”, line 43, in response=br.open(v)
File “”/usr/local/lib/python2.7/dist-
packages/mechanize/_mechanize.py” line 203, in
open return self._mech_open(url, data,
timeout=timeout) File “/usrlocal/lib/python2.7/dist-
packages/mechanize/_mechanize.py”, line 255, in
_mech_open raise response
mechanize._response.httperror_seek_wrapper:
HTTP Error 429: Unknown Response Code
```

Our main difficulties as stated above were acquiring the data and then being able to actually clean it. Sticking to one source of transcripts was key in parsing the html. We wrote code that searched for specific candidate call outs and then grabbed the text after the candidate name and placed it in a string list. Afterwards we did a lot of code cleaning for punctuation with SQL.

```
In [7]: from IPython.display import Image

        Image(filename='WhatDoDebatesSay.PNG')
```

Out[7]:



What do the debates say?

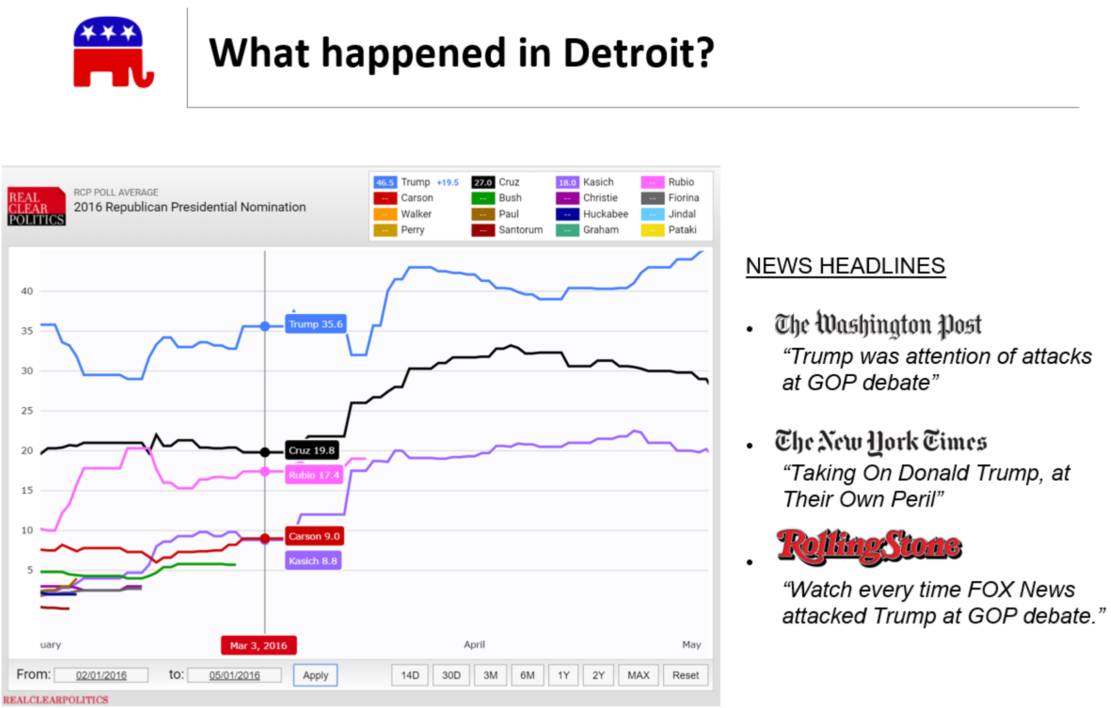
$$Sensitivity = \frac{\sum_{i \to I}^{\square}(i_{pos} - i_{neg})}{\sum i}$$

$where\ i = relevance$

- Cruz and Kasich get more negative as they get desperate.
- Trump has an outlier negative performance in Detroit
- Rubio continues to be neutral

Here we can see that Trump was not more negative in his debate performance than Rubio or Cruz. In Detroit he did spike up on negative retoric but this was because he was being attacked as we see below.

```
In [8]: from IPython.display import Image

        Image(filename='WhatDoDebatesSay-2.PNG')

Out[8]:
```



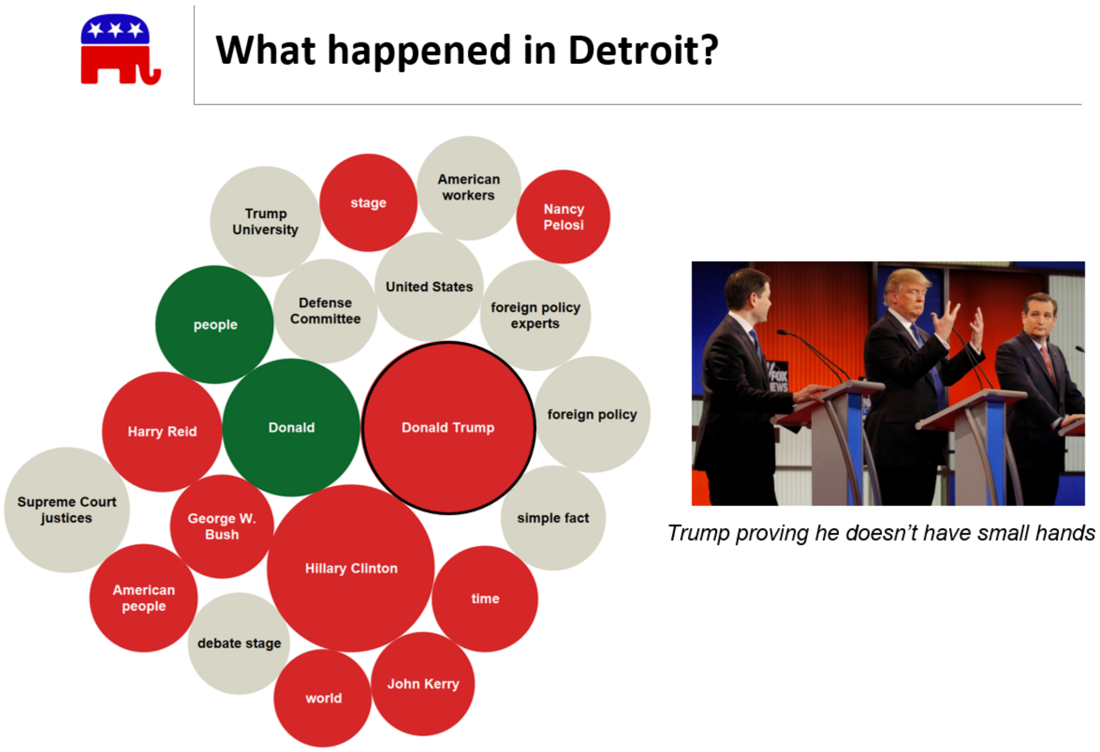
What happened in Detroit?

NEWS HEADLINES

- The Washington Post
  "Trump was attention of attacks at GOP debate"
- The New York Times
  "Taking On Donald Trump, at Their Own Peril"
- Rolling Stone
  "Watch every time FOX News attacked Trump at GOP debate."

The line graph is from Real Clear Politics, which takes an aggregate of all polls available and displays how each candidate is fairing in the public's eye. What we can see is that Trump before the debate in Detroit was crushing his competetion by at least 15 percentage points. Rubio, Cruz, and Kasich decided to gather their attacks at Trump in order to take away some of his poling power. The attacks were so constant and decisive that they dominating the news headlines the next day.

```
In [9]: from IPython.display import Image

        Image(filename='WhatHappenedInDetroit.PNG')

Out[9]:
```



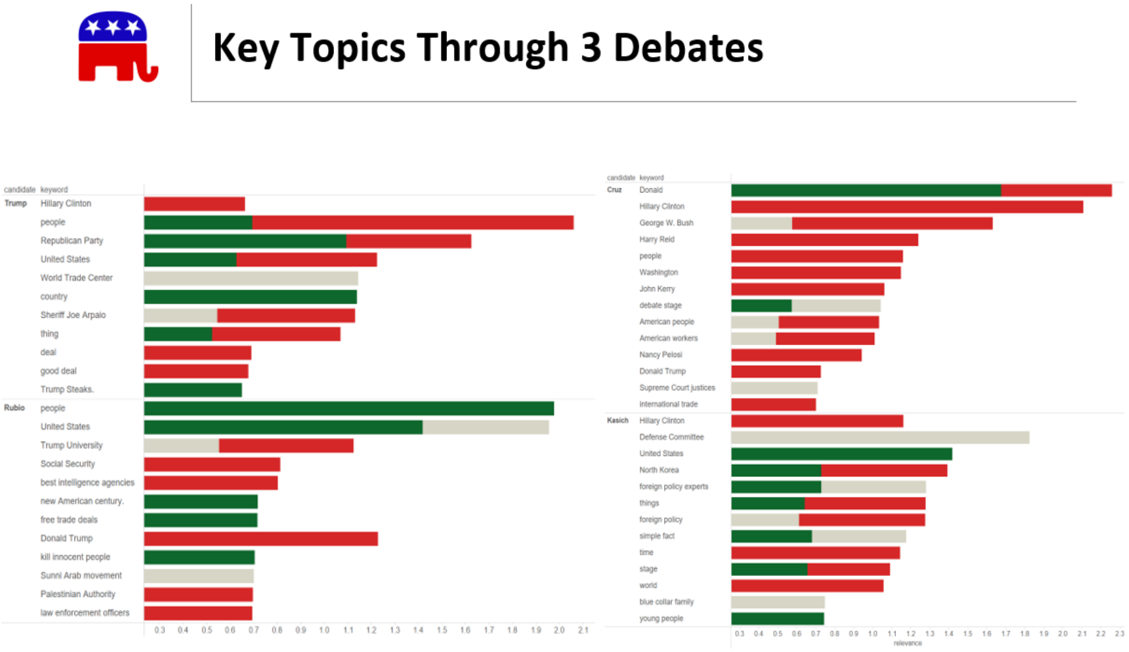
What happened in Detroit?

Trump proving he doesn't have small hands

This bubble chart displays the top key words from Kasich, Cruz, and Rubio during the debate in Detroit. Green represents positive sentiment, red represents negative, and grey neutral. We can see that Donald Trump was a main keyword with negative sentiment throughout the debate.

```
In [11]: from IPython.display import Image

         Image(filename='KeyTopicsDebates.PNG')
```

```
Out[11]:
```

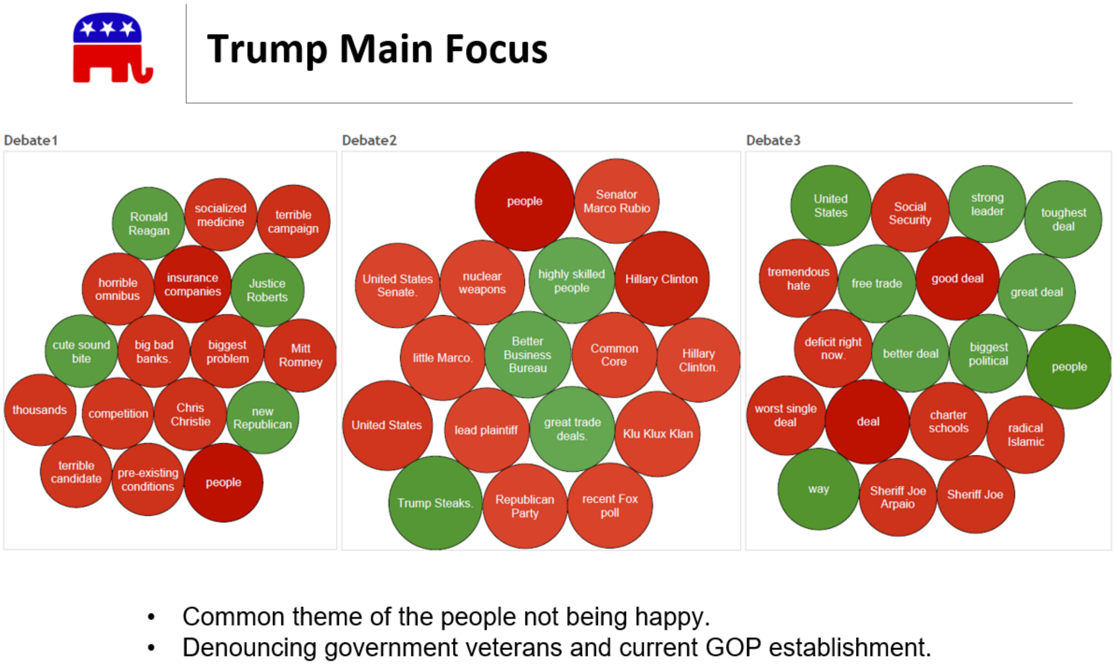


Key Topics Through 3 Debates

Trump was a key topic throughout the 3 debates, but this shows that he wasn't the main focus of his competition like he was in Detroit.

```
In [12]: from IPython.display import Image

         Image(filename='TrumpMainFocus.PNG')
```

Out[12]:



Trump Main Focus

- Common theme of the people not being happy.
- Denouncing government veterans and current GOP establishment.

Debate Data Analysis (What do the debates Say?)

May 16, 2016

1 Setting up global variables

```
In [7]: !pip install beautifulsoup4
        from bs4 import BeautifulSoup
        import urllib
        import string
        import collections
        import requests
        import json

        debates= ['https://www.washingtonpost.com/news/the-fix/wp/2016/02/25/the-cnntelemundo-republican
                  'https://www.washingtonpost.com/news/the-fix/wp/2016/03/03/the-fox-news-gop-debate-tra
                  'https://www.washingtonpost.com/news/the-fix/wp/2016/03/10/the-cnn-miami-republican-de
```

```
Requirement already satisfied (use --upgrade to upgrade): beautifulsoup4 in /usr/local/lib/python2.7/di
```

2 Defining global functions.

```
In [8]: def openFile(url):
            #opening files
            file0 = BeautifulSoup(urllib.urlopen(url).read(),"lxml")
            return file0

        def cleanFile(file1):
            #function extracts text lines from html
            textLines = []

            paragraph = file1.find_all("p")
            for lines in paragraph:
                textLines.append(lines.get_text())

            return textLines

        def lines2words(file1):
            #function takes a list of strings and returns it as a string of words
            return_string = ''

            for line in file1:
                return_string += line

            words = return_string.split()

            return words
```

```
def getCandidate(candidate,file2):
    #function gets cadidate lines
    i = 0
    candidateLines = []

    for line in file2:
        if candidate in line:
            candidateLines.append(line)
            i += 1
        elif candidate in file2[i] :
            candidateLines.append(line)
            i += 1
        else:
            i += 1

    return candidateLines
```

3 Function to compile all keywords due to API 50 word limit

```
In [3]: def keywordAnalysis (textFile):
        #Calculating how many passes to send the API through according to dictionaryt length.
            multiple= 0
            multiple= len(textFile)/50
            remainder= len(textFile)%50
            if remainder > 0:
                multiple += 1

            temp=[]


            url = "http://access.alchemyapi.com/calls/text/TextGetRankedKeywords"
            api_key = '1f62c149d1b092011db73353df8215f6a5d3eb9e'
            headers = {"Accept": "application/json"}

            i=0
            while i != multiple:
                text = textFile[i*50:i*50+50]

                parameters = {
                    'outputMode': 'json',
                    'apikey' : api_key,
                    'maxRetrieve' : 200,
                    'sentiment': 1,
                    'text': text}

                resp = requests.post(url, params=parameters, headers=headers)
                temp.append(json.loads(resp.text))
                i += 1

                #printing out relevenaces
                #j=0
                #while j != len(data['keywords']):
                    #print "Keyword: ", data['keywords'][j]['text'], ", Relevance: ", data['keywords'][
                    #j+=1

            return temp
```

4 Final Function.

You choose a candidate name and provide a source of text. The function parses the data and returns back keywords according to relevace.

```
In [ ]: def getCandidateKeywords(candidateName,URL):

            File1 = openFile(URL)
            textFile = cleanFile(File1)

            candidateLines= getCandidate(candidateName, textFile)

            word_counts = collections.Counter(lines2words(candidateLines))

            return keywordAnalysis(candidateLines)

            #for word, count in word_counts.most_common():
                #print word, count


        debate1={}
        debate1['Trump']= getCandidateKeywords('TRUMP', debates[0])
        debate1['Cruz']= getCandidateKeywords('CRUZ', debates[0])
        debate1['Rubio']= getCandidateKeywords('RUBIO', debates[0])

        debate2={}
        debate2['Trump']= getCandidateKeywords('TRUMP', debates[1])
        debate2['Cruz']= getCandidateKeywords('CRUZ', debates[1])
        debate2['Rubio']= getCandidateKeywords('RUBIO', debates[1])

        debate3={}
        debate3['Trump']= getCandidateKeywords('TRUMP', debates[2])
        debate3['Cruz']= getCandidateKeywords('CRUZ:', debates[2])
        debate3['Rubio']= getCandidateKeywords('RUBIO', debates[2])

        #for line in debate1['Cruz']:
        #    i = 0
        #    while i != len(line['keywords']):
        #        print '\n' , "Keyword: ", line['keywords'][i]['text'], ", Relevance: ", line['keywords
        #        print "Sentiment: ", line['keywords'][i]['sentiment']
        #        i+=1

        #i=0
        #for line in info:
        #    print info[i], '\n'
        #    i += 1
```

5 Creating SQL Tables

```
In [11]: import MySQLdb as mdb
         import sys

         con = mdb.connect(host = 'localhost', user = 'root', passwd = 'dwdstudent2015', charset='utf8'

         # Query to create a database
         db_name = 'Final_Project'
         create_db_query = "CREATE DATABASE IF NOT EXISTS {0} DEFAULT CHARACTER SET 'utf8'".format(db_na

         # Create a database
         cursor = con.cursor()
         cursor.execute(create_db_query)
         cursor.close()
```

```
/usr/local/lib/python2.7/dist-packages/ipykernel/__main__.py:12: Warning: Can't create database 'Final_Pr
```

6 Debate1

```
In [ ]: cursor = con.cursor()
        table_name = 'Debate1'
        # Create a table
        # The {0} and {1} are placeholders for the parameters in the format(....) statement
        create_table_query = '''CREATE TABLE IF NOT EXISTS {0}.{1}
                                    (candidate varchar(250),
                                    keyword varchar(250),
                                    relevance varchar(250),
                                    sentiment varchar(250)
                                    )'''.format(db_name, table_name)

        cursor.execute(create_table_query)
        cursor.close()
```

7 Sending information to TABLES

```
In [ ]: def send2SQL (candidateName, DebateSent, DebateDic):
            cursor = con.cursor()

            query_template = 'INSERT INTO Final_Project.'+ DebateSent + '(candidate, keyword, relevance

            for line in DebateDic[candidateName]:

                i = 0
                while i != len(line['keywords']):
                    candidate = candidateName
                    keyword = line['keywords'][i]['text']
                    relevance= line['keywords'][i]['relevance']
                    sentiment= line['keywords'][i]['sentiment']['type']
                    print "Inserting ", candidate, keyword

                    query_parameters = (candidate, keyword, relevance, sentiment)
                    cursor.execute(query_template, query_parameters)
                    con.commit()
                    i+=1


            cursor.close()
```

```
In [ ]: send2SQL('Trump', 'Debate1', debate1)
        send2SQL('Cruz', 'Debate1', debate1)
        send2SQL('Rubio', 'Debate1', debate1)
```

```
In [ ]: send2SQL('Trump', 'Debate2', debate2)
        send2SQL('Cruz', 'Debate2', debate2)
        send2SQL('Rubio', 'Debate2', debate2)

        send2SQL('Trump', 'Debate3', debate3)
        send2SQL('Cruz', 'Debate3', debate3)
        send2SQL('Rubio', 'Debate3', debate3)
```

```
In [14]: File1 = openFile(debates[1])
         textFile = cleanFile(File1)

         candidateLines= getCandidate('CRUZ', textFile)
         #print candidateLines
         cruzFile= {
           "status": "OK",
           "usage": "By accessing AlchemyAPI or using information generated by AlchemyAPI, you are agre
           "totalTransactions": "2",
           "language": "english",
           "text": "[u'CRUZ: Well, Megyn, you know, at the end of the day for the folks at home, this i
           "keywords": [
             {
               "relevance": "0.973902",
               "sentiment": {
                 "type": "neutral"
               },
               "text": "cruz"
             },
             {
               "relevance": "0.860171",
               "sentiment": {
                 "mixed": "1",
                 "score": "0.0353621",
                 "type": "positive"
               },
               "text": "Donald"
             },
             {
               "relevance": "0.769394",
               "sentiment": {
                 "score": "-0.376831",
                 "type": "negative"
               },
               "text": "Hillary Clinton"
             },
             {
```

```
    "relevance": "0.727488",
    "sentiment": {
      "score": "-0.449751",
      "type": "negative"
    },
    "text": "Donald Trump"
  },
  {
    "relevance": "0.713683",
    "sentiment": {
      "score": "-0.21383",
      "type": "negative"
    },
    "text": "u’CRUZ"
  },
  {
    "relevance": "0.710594",
    "sentiment": {
      "type": "neutral"
    },
    "text": "Supreme Court justices"
  },
  {
    "relevance": "0.693337",
    "sentiment": {
      "type": "neutral"
    },
    "text": "conservative Supreme Court"
  },
  {
    "relevance": "0.651944",
    "sentiment": {
      "score": "-0.579802",
      "type": "negative"
    },
    "text": "Harry Reid"
  },
  {
    "relevance": "0.611968",
    "sentiment": {
      "score": "-0.640245",
      "type": "negative"
    },
    "text": "New York Times"
  },
  {
    "relevance": "0.586689",
    "sentiment": {
      "score": "-0.563325",
      "type": "negative"
    },
    "text": "Jimmy Carter"
  },
  {
```

```
  "relevance": "0.578867",
  "sentiment": {
    "score": "-0.410417",
    "type": "negative"
  },
  "text": "head Donald Trump"
},
{
  "relevance": "0.528143",
  "sentiment": {
    "score": "-0.474125",
    "type": "negative"
  },
  "text": "American people"
},
{
  "relevance": "0.52794",
  "sentiment": {
    "type": "neutral"
  },
  "text": "Senator Cruz"
},
{
  "relevance": "0.499918",
  "sentiment": {
    "score": "-0.490873",
    "type": "negative"
  },
  "text": "simple flat tax"
},
{
  "relevance": "0.493251",
  "sentiment": {
    "score": "-0.563325",
    "type": "negative"
  },
  "text": "Ronald Reagan"
},
{
  "relevance": "0.491057",
  "sentiment": {
    "type": "neutral"
  },
  "text": "American workers"
},
{
  "relevance": "0.487158",
  "sentiment": {
    "score": "-0.437368",
    "type": "negative"
  },
  "text": "John Kerry"
},
{
  "relevance": "0.482618",
  "sentiment": {
    "score": "-0.437368",
    "type": "negative"
  },
  "text": "George W. Bush"
},
{
  "relevance": "0.474669",
  "sentiment": {
    "score": "-0.640245",
    "type": "negative"
  },
  "text": "York Times tape"
},
{
  "relevance": "0.472739",
  "sentiment": {
    "score": "-0.594748",
    "type": "negative"
  },
  "text": "United States government"
},
{
  "relevance": "0.469633",
  "sentiment": {
    "type": "neutral"
  },
  "text": "debate stage"
},
{
  "relevance": "0.467996",
  "sentiment": {
    "score": "-0.563325",
    "type": "negative"
  },
  "text": "Jimmy Carter administration"
},
{
  "relevance": "0.462909",
  "sentiment": {
    "type": "neutral"
  },
  "text": "Chuck Schumer sign"
},
{
  "relevance": "0.45866",
  "sentiment": {
    "score": "-0.23942",
    "type": "negative"
  },
  "text": "left-wing judicial activist"
},
{
  "relevance": "0.457682",
  "sentiment": {
    "score": "0.736703",
    "type": "positive"
  },
  "text": "South China Sea"
},
{
  "relevance": "0.456996",
  "sentiment": {
    "type": "neutral"
  },
  "text": "support Harry Reid"
},
{
  "relevance": "0.455043",
  "sentiment": {
    "type": "neutral"
  },
  "text": "support John Kerry"
},
{
  "relevance": "0.453574",
  "sentiment": {
    "score": "-0.410417",
    "type": "negative"
  },
  "text": "CNN poll"
},
{
  "relevance": "0.453177",
  "sentiment": {
    "type": "neutral"
  },
  "text": "Senate majority leader."
},
{
  "relevance": "0.452221",
  "sentiment": {
    "type": "neutral"
  },
  "text": "support Jimmy Carter"
},
{
  "relevance": "0.42519",
  "sentiment": {
    "score": "-0.446914",
    "type": "negative"
  },
  "text": "president"
},
{
  "relevance": "0.418681",
  "sentiment": {
    "type": "neutral"
  },
  "text": "Hillary Clinton."
},
{
  "relevance": "0.409659",
  "sentiment": {
    "score": "0.378171",
    "type": "positive"
  },
  "text": "Web site"
},
{
  "relevance": "0.408178",
  "sentiment": {
    "score": "-0.473597",
    "type": "negative"
  },
  "text": "Barack Obama."
},
{
  "relevance": "0.407642",
  "sentiment": {
    "score": "-0.584961",
    "type": "negative"
  },
  "text": "Mr. Trump"
},
{
  "relevance": "0.406459",
  "sentiment": {
    "score": "0.819239",
    "type": "positive"
  },
  "text": "astonishing statement"
},
{
  "relevance": "0.405331",
  "sentiment": {
    "score": "-0.293798",
    "type": "negative"
  },
  "text": "liberal Democrats"
},
{
  "relevance": "0.402876",
  "sentiment": {
    "type": "neutral"
  },
  "text": "actual record"
},
{
  "relevance": "0.400797",
  "sentiment": {
    "type": "neutral"
  },
  "text": "comprehensive investigation"
},
{
  "relevance": "0.400752",
  "sentiment": {
    "type": "neutral"
  },
  "text": "U.S. companies"
},
{
  "relevance": "0.40041",
  "sentiment": {
    "score": "-0.605438",
    "type": "negative"
  },
  "text": "troubling development"
},
{
  "relevance": "0.39998",
  "sentiment": {
    "score": "-0.281833",
    "type": "negative"
  },
  "text": "foreign workers"
},
{
  "relevance": "0.399422",
  "sentiment": {
    "score": "-0.640245",
    "type": "negative"
  },
  "text": "Editorial Board"
},
{
  "relevance": "0.399168",
  "sentiment": {
    "type": "neutral"
  },
  "text": "H1B program"
},
{
  "relevance": "0.398898",
  "sentiment": {
    "score": "-0.594748",
    "type": "negative"
  },
  "text": "American citizens"
},
{
  "relevance": "0.398311",
  "sentiment": {
    "score": "-0.573335",
        "type": "negative"
      },
      "text": "high-paying jobs"
    },
    {
      "relevance": "0.397868",
      "sentiment": {
        "score": "-0.531953",
        "type": "negative"
      },
      "text": "H1-B program"
    },
    {
      "relevance": "0.397636",
      "sentiment": {
        "score": "-0.66833",
        "type": "negative"
      },
      "text": "H1-B abuse"
    },
    {
      "relevance": "0.397633",
      "sentiment": {
        "score": "-0.574643",
        "type": "negative"
      },
      "text": "Nancy Pelosi"
    },
    {
      "relevance": "0.396027",
      "sentiment": {
        "type": "neutral"
      },
      "text": "Cold War."
    }
  ]
}
```

8 Alchemy API wouldn't work for Cruz Debate 2

```
In [15]: print len(cruzFile['keywords'])


         #for line in cruzFile['keywords']:
         #    print '\n' , "Keyword: ", line['text'], ", Relevance: ", line['relevance']
         #    print "Sentiment: ", line['sentiment']



         cursor = con.cursor()

         query_template = 'INSERT INTO Final_Project.Debate2(candidate, keyword, relevance, sentiment) '
```

```
for line in cruzFile['keywords']:

    candidate = 'Cruz'
    keyword = line['text']
    relevance= line['relevance']
    sentiment= line['sentiment']['type']
    print "Inserting ", candidate, keyword

    query_parameters = (candidate, keyword, relevance, sentiment)
    cursor.execute(query_template, query_parameters)
    con.commit()



cursor.close()
```

```
50
Inserting  Cruz cruz
Inserting  Cruz Donald
Inserting  Cruz Hillary Clinton
Inserting  Cruz Donald Trump
Inserting  Cruz u'CRUZ
Inserting  Cruz Supreme Court justices
Inserting  Cruz conservative Supreme Court
Inserting  Cruz Harry Reid
Inserting  Cruz New York Times
Inserting  Cruz Jimmy Carter
Inserting  Cruz head Donald Trump
Inserting  Cruz American people
Inserting  Cruz Senator Cruz
Inserting  Cruz simple flat tax
Inserting  Cruz Ronald Reagan
Inserting  Cruz American workers
Inserting  Cruz John Kerry
Inserting  Cruz George W. Bush
Inserting  Cruz York Times tape
Inserting  Cruz United States government
Inserting  Cruz debate stage
Inserting  Cruz Jimmy Carter administration
Inserting  Cruz Chuck Schumer sign
Inserting  Cruz left-wing judicial activist
Inserting  Cruz South China Sea
Inserting  Cruz support Harry Reid
Inserting  Cruz support John Kerry
Inserting  Cruz CNN poll
Inserting  Cruz Senate majority leader.
Inserting  Cruz support Jimmy Carter
Inserting  Cruz president
Inserting  Cruz Hillary Clinton.
Inserting  Cruz Web site
Inserting  Cruz Barack Obama.
Inserting  Cruz Mr. Trump
Inserting  Cruz astonishing statement
Inserting  Cruz liberal Democrats
Inserting  Cruz actual record
Inserting  Cruz comprehensive investigation
Inserting  Cruz U.S. companies
Inserting  Cruz troubling development
Inserting  Cruz foreign workers
Inserting  Cruz Editorial Board
Inserting  Cruz H1B program
Inserting  Cruz American citizens
Inserting  Cruz high-paying jobs
Inserting  Cruz H1-B program
Inserting  Cruz H1-B abuse
Inserting  Cruz Nancy Pelosi
Inserting  Cruz Cold War.
```

Twitter - Public Sentiment Analysis

May 16, 2016

1 Tweet Data load in CSV for Trump using Tweepy

```
In [ ]: from twython import Twython # pip install twython
        import time # standard lib
        import urllib
        import requests
        import tweepy
        from requests_oauthlib import OAuth1
        import pandas as pd
        import matplotlib.pyplot as plt
        import json
        from nltk.tokenize import word_tokenize
        from collections import defaultdict
        from nltk.corpus import stopwords
        import string
        import operator
        import csv
        from collections import Counter



        CONSUMER_KEY =’SFh6rygaDcA4eSKxD9HFW3Yq4’
        CONSUMER_SECRET = ’2PyhorQtbW7AQQCcNQqzlJg0Y9GW6XulBobeSz1oNXbVHH0eMW’

        ACCESS_KEY = ’130253651-gL2gsx1nyy4yi8S2w3gSdCE9rbMazLJ4ptyciN0q’
        ACCESS_SECRET = ’9DAQi4iDFBDOHtTiMsDZ2E5Xa6HaPVodYj7Eu7NiFUWLm’


        auth = tweepy.OAuthHandler(CONSUMER_KEY, CONSUMER_SECRET)
        auth.set_access_token(ACCESS_KEY, ACCESS_SECRET)

        #Trump API

        api = tweepy.API(auth)
        # Append data to CSV
        CSVF = open(’/home/ubuntu/data/Trump.csv’, ’a’)
        CSV Writer
        CSVW = csv.writer(CSVF)
        #most recent tweet id for iteration
        lis = [724910184376750080]
        x=0
        total_retweets=0
```

```
#print the_page

for i in range(0, 16):
    time.sleep(40)
    for id,tweet in enumerate (tweepy.Cursor(api.search,
                    q='Trump',
                    since="2016-04-26",
                    until="2016-05-03",
                    lang="en",
                    max_id=lis[-1]
                    ,include_retweets=False
                    ).items(200)):
        #Write a row to the csv file/ I use encode utf-8
        data = urllib.urlencode({"text":tweet.text.encode('utf-8')})
        u = urllib.urlopen("http://text-processing.com/api/sentiment/", data)
        the_page = u.read()

        lis.append(tweet.id)
        total_retweets+=tweet.retweet_count+ 1
        CSVW.writerow(['Trump',tweet.geo,tweet.created_at
                       ,tweet.retweet_count,the_page,tweet.text.encode('utf-8')])
        print x,'Trump',tweet.created_at, tweet.text,tweet.retweet_count,the_page
        print "Retweets Till now :",total_retweets
        x+=1
CSVF.close()

print "This is total retweet count"
print total_retweets
```

2 Tweet Data load in CSV for Cruz using Tweepy

```
In [ ]: #Cruz
        from twython import Twython # pip install twython
        import time # standard lib
        import urllib
        import requests
        import tweepy
        from requests_oauthlib import OAuth1
        import pandas as pd
        import matplotlib.pyplot as plt
        import json
        from nltk.tokenize import word_tokenize
        from collections import defaultdict
        from nltk.corpus import stopwords
        import string
        import operator
        import csv
        from collections import Counter


        CONSUMER_KEY ='SFh6rygaDcA4eSKxD9HFW3Yq4'
        CONSUMER_SECRET = '2PyhorQtbW7AQQCcNQqzlJg0Y9GW6XulBobeSz1oNXbVHH0eMW'
```

```
ACCESS_KEY = '130253651-gL2gsx1nyy4yi8S2w3gSdCE9rbMazLJ4ptyciN0q'
ACCESS_SECRET = '9DAQi4iDFBDOHtTiMsDZ2E5Xa6HaPVodYj7Eu7NiFUWLm'


auth = tweepy.OAuthHandler(CONSUMER_KEY, CONSUMER_SECRET)
auth.set_access_token(ACCESS_KEY, ACCESS_SECRET)

api = tweepy.API(auth)

CSVF3 = open('/home/ubuntu/data/Cruz.csv', 'a')
#CSV Writer
CSVW = csv.writer(CSVF3)

#get the lis value for most recent tweet
lis = [724910184376750080]
x=0
total_retweets=0

for i in range(0, 16):
    time.sleep(40)
    for id,tweet in enumerate (tweepy.Cursor(api.search,
                    q='Cruz',
                    since="2016-04-26",
                    until="2016-04-28",
                    lang="en",
                    max_id=lis[-1]
                    ,include_retweets=False
                    ).items(200)):
        #Write a row to the csv file/ I use encode utf-8
        data = urllib.urlencode({"text":tweet.text.encode('utf-8')})
        u = urllib.urlopen("http://text-processing.com/api/sentiment/", data)
        the_page = u.read()
        print x,'Cruz',tweet.created_at,tweet.geo, tweet.text,tweet.retweet_count,the_page
        lis.append(tweet.id)
        total_retweets+=tweet.retweet_count+ 1
        CSVW.writerow(['Cruz',tweet.geo,tweet.created_at
                       ,tweet.retweet_count,the_page,tweet.text.encode('utf-8')])
        print "Retweets Till now :",total_retweets
        x+=1
CSVF.close()
```

3 Tweet Data load in CSV for Kasich using Tweepy

```
In [ ]: #Kasich
        from twython import Twython # pip install twython
        import time # standard lib
        import urllib
        import requests
        import tweepy
        from requests_oauthlib import OAuth1
        import pandas as pd
        import matplotlib.pyplot as plt
        import json
```

```
from nltk.tokenize import word_tokenize
from collections import defaultdict
from nltk.corpus import stopwords
import string
import operator
import csv
from collections import Counter


CONSUMER_KEY =’SFh6rygaDcA4eSKxD9HFW3Yq4’
CONSUMER_SECRET = ’2PyhorQtbW7AQQCcNQqzlJgOY9GW6XulBobeSz1oNXbVHHOeMW’

ACCESS_KEY = ’130253651-gL2gsx1nyy4yi8S2w3gSdCE9rbMazLJ4ptyciN0q’
ACCESS_SECRET = ’9DAQi4iDFBDOHtTiMsDZ2E5Xa6HaPVodYj7Eu7NiFUWLm’


auth = tweepy.OAuthHandler(CONSUMER_KEY, CONSUMER_SECRET)
auth.set_access_token(ACCESS_KEY, ACCESS_SECRET)

api = tweepy.API(auth)


CSVF4 = open(’/home/ubuntu/data/Kasich.csv’, ’a’)
#CSV Writer
CSVW = csv.writer(CSVF4)

#get the lis value for most recent tweet
lis = [724910184376750080]
x=0
total_retweets=0

for i in range(0, 16):
    time.sleep(40)
    for id,tweet in enumerate (tweepy.Cursor(api.search,
                    q=’Kasich’,
                    since="2016-04-26",
                    until="2016-05-03",
                    lang="en",
                    max_id=lis[-1]
                    ,include_retweets=False
                    ).items(200)):
        #Write a row to the csv file/ I use encode utf-8
        data = urllib.urlencode({"text":tweet.text.encode(’utf-8’)})
        u = urllib.urlopen("http://text-processing.com/api/sentiment/", data)
        the_page = u.read()
        print x,’Kasich’,tweet.geo,tweet.place, tweet.text,tweet.retweet_count,the_page
        lis.append(tweet.id)
        total_retweets+=tweet.retweet_count+ 1
        CSVW.writerow([’Kasich’,tweet.geo,tweet.created_at
                       ,tweet.retweet_count,the_page,tweet.text.encode(’utf-8’)])
        print "Retweets Till now :",total_retweets
        x+=1
CSVF.close()
```

4 Reading and Transforming CSV data for Trump

```
In [ ]: !head /home/ubuntu/data/Trump.csv
```

```
In [ ]: !cut -f1,2,6,7,8,9,10,11 -d’,’ /home/ubuntu/data/Trump.csv > /home/ubuntu/data/Trump_reduced.cs
```

```
In [ ]: !head /home/ubuntu/data/Trump_reduced.csv
```

5 Reading and Transforming CSV data for Cruz

```
In [ ]: !head /home/ubuntu/data/Cruz.csv
```

```
In [ ]: !cut -f1,2,4,5,6,7,8,9 -d’,’ /home/ubuntu/data/Cruz.csv > /home/ubuntu/data/Cruz_reduced.csv
```

```
In [ ]: !head /home/ubuntu/data/Cruz_reduced.csv
```

6 Reading and Transforming CSV data for Kasich

```
In [ ]: !head /home/ubuntu/data/Kasich.csv
```

```
In [ ]: !cut -f1,2,4,5,6,7,8,9 -d’,’ /home/ubuntu/data/Kasich.csv > /home/ubuntu/data/Kasich_reduced.cs
```

```
In [ ]: !head /home/ubuntu/data/Kasich_reduced.csv
```

7 Making SQL Connection and creating the database

```
In [181]: #Now SQL Part
          import sys
          import MySQLdb


          connection = MySQLdb.connect(host = ’localhost’, user = ’root’
                                       , passwd = ’dwdstudent2015’, charset=’utf8’, use_unicode=True);
```

```
In [182]: cur = connection.cursor();
```

```
In [3]: #Creating HomeWork 5 database
        database = ’FinalProject’
        Q1 = "CREATE DATABASE IF NOT EXISTS {0} DEFAULT CHARACTER SET ’utf8’".format(database)
        cur.execute(Q1)
```

```
/usr/local/lib/python2.7/dist-packages/ipykernel/__main__.py:4: Warning: Can’t create database ’FinalProj
```

```
Out[3]: 1L
```

```
In [188]: %load_ext sql
```

```
The sql extension is already loaded. To reload it, use:
  %reload_ext sql
```

```
In [185]: %sql mysql://root:dwdstudent2015@localhost:3306/FinalProject?charset=utf8
```

```
Out[185]: u’Connected: root@FinalProject’
```

```
In [187]: %sql USE FinalProject
```

```
0 rows affected.
```

```
Out[187]: []
```

```
In [ ]: #%sql drop table FinalProject.Republican_debate
```

8 Creating Table for storing Candidate data

```
In [ ]: %sql create table Republican_debate(CandidateName varchar(250),Debate varchar(250)
                                            ,Retweets int,Semantics varchar(250),
                                            Tweet varchar(250));
```

9 Loading candidate data from CSVs into the database table

```
In [ ]: !mysql -u root password=dwdstudent2015 --local-infile FinalProject

        # It can be done in Terminal as well

        cur = connection.cursor()
        database = ’FinalProject’
        table = ’debate1’
        Q2 = ’’’load data local infile ’/home/ubuntu/data/Trump_reduced.csv’
        into table FinalProject.Republican_debate
        fields terminated by ’,’  enclosed by ’"’
        lines terminated by ’\n’
        ignore 1 rows;’’’.format(database, table)
```

```
In [ ]: !mysql -u root password=dwdstudent2015 --local-infile FinalProject

        # Do this in Terminal as well


        cur = connection.cursor()
        database = ’FinalProject’
        table = ’debate1’
        Q2 = ’’’load data local infile ’/home/ubuntu/data/Cruz_debate1_reduced.csv’
        into table FinalProject.Republican_debate
        fields terminated by ’,’  enclosed by ’"’
        lines terminated by ’\n’
        ignore 1 rows;’’’.format(database, table)
```

```
In [ ]: !mysql -u root password=dwdstudent2015 --local-infile FinalProject

        # Do this in Terminal as well


        cur = connection.cursor()
        database = ’FinalProject’
        table = ’debate1’
        Q2 = ’’’load data local infile ’/home/ubuntu/data/Kasich_reduced.csv’
        into table FinalProject.Republican_debate
        fields terminated by ’,’  enclosed by ’"’
        lines terminated by ’\n’
        ignore 1 rows;’’’.format(database, table)
```

10 Selecting candidate data from database table

```
In [ ]: %%sql select CandidateName,Retweets,Semantics,Tweet from FinalProject.Republican_debate
        where candidatename = ’TRUMP’ and Semantics not like ’%Throttled, wait%’
```

```
In [ ]: %%sql select CandidateName,Retweets,Semantics,Tweet from FinalProject.Republican_debate
        where candidatename = 'Cruz' and Semantics not like '%Throttled, wait%'
```

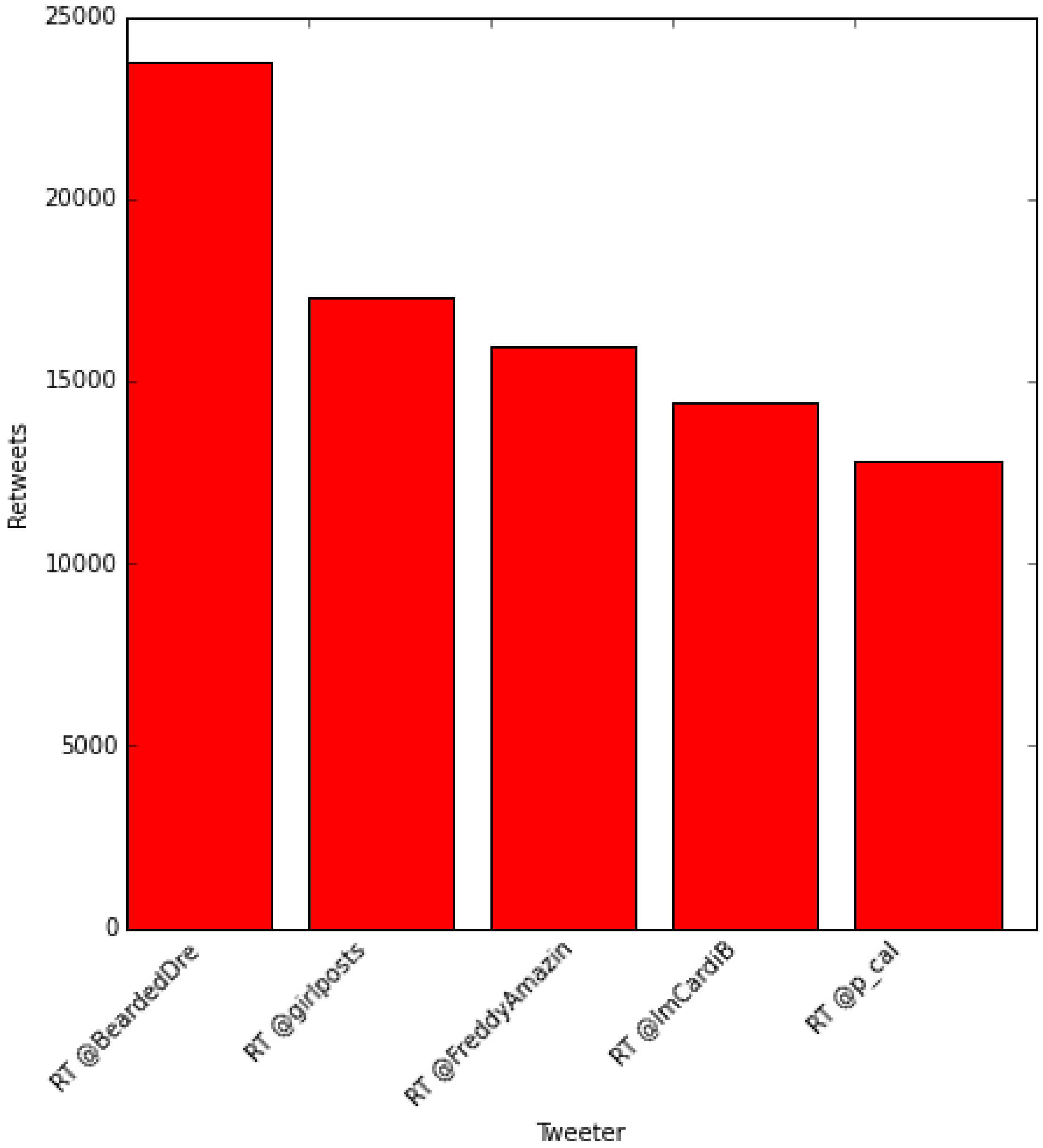
```
In [ ]: %%sql select CandidateName,Retweets,Semantics,Tweet from FinalProject.Republican_debate
        where candidatename = 'Kasich' and Semantics not like '%Throttled, wait%'
```

11 Displaying Top 5 Negative Tweets for Trump

```
In [179]: tr10=%%sql SELECT distinct Retweets, LEFT(Tweet,INSTR(Tweet,":")-1) as Tweeter
          from FinalProject.Republican_debate
          where candidatename = 'Trump' and Sentiment in ('Negative')
          and Retweets !=14964 order by Retweets desc limit 5
          tr10

5 rows affected.

Out[179]: [(23777L, u'RT @BeardedDre'),
           (17306L, u'RT @girlposts'),
           (16001L, u'RT @FreddyAmazin'),
           (14423L, u'RT @ImCardiB'),
           (12832L, u'RT @p_cal')]
```

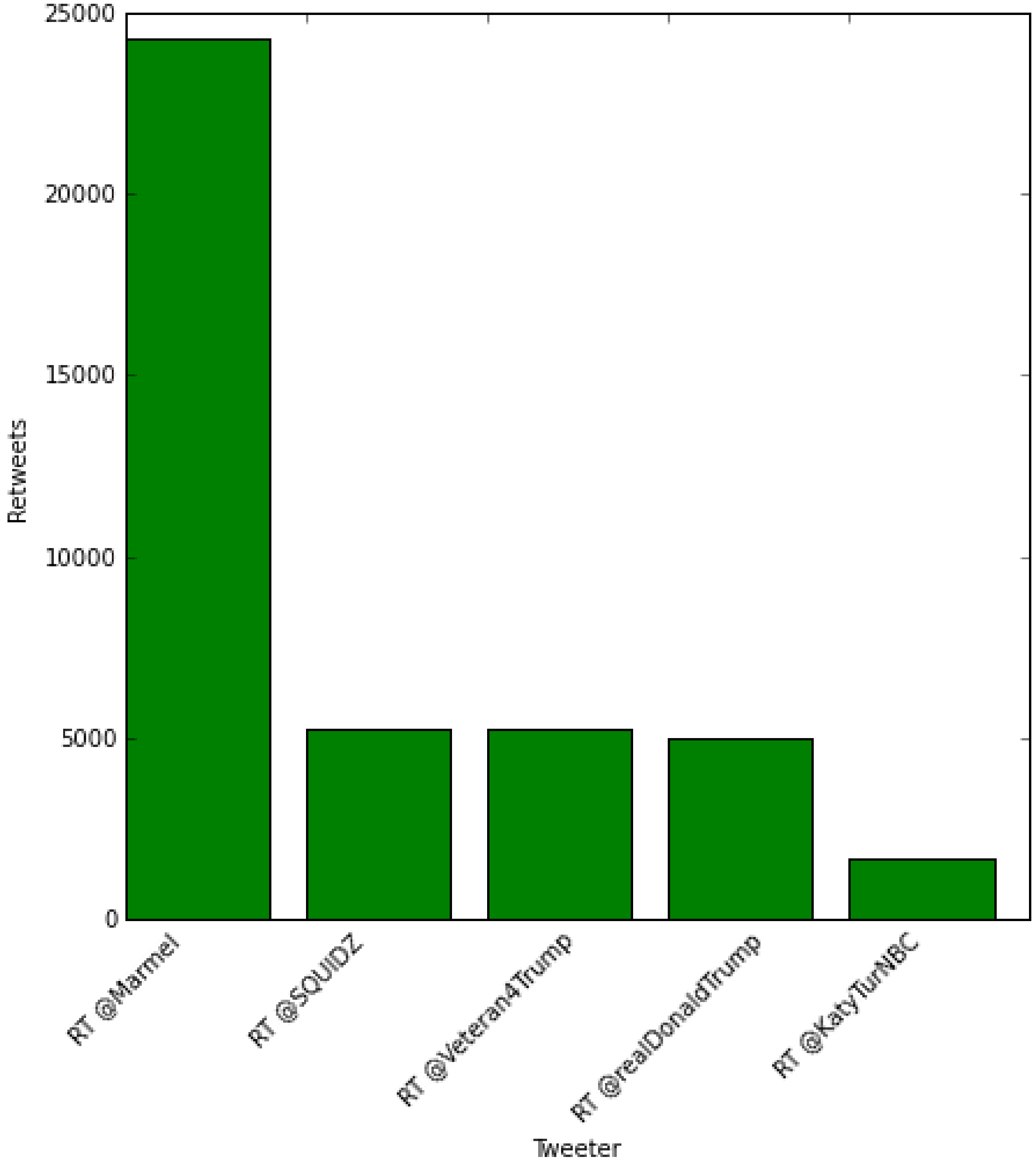
```
In [24]: tr9=%%sql select distinct Tweet from FinalProject.Republican_debate
         where candidatename = 'Trump' and Retweets !=14964
         and Sentiment in ('Negative') order by Retweets desc limit 5
         tr9

5 rows affected.

Out[24]: [(u"RT @BeardedDre: I pray and I pray trump doesn't get elected VOTE... https://t.co/V3EZHpXJj
          (u'RT @girlposts: me: green is like the ugliest color ever\ndonald trump: i hate the color gre
          (u"RT @FreddyAmazin: I'M SCREAMING THEY DROVE PAST A TRUMP RALLY AND PLAYED THIS https://t.co/
          (u'RT @ImCardiB: Donald trump gona deport all the foreign bitches that yall love fucking  ',)
          (u'RT @p_cal: Donald Trump rally vs Bernie Sanders rally https://t.co/ZFqfly9Zpf\r',)]
```

```
In [25]: from matplotlib import pyplot as plt
         plt.figure(figsize=(7,7))
         tr10.bar(color='r')
         tr9

Out[25]: [(u"RT @BeardedDre: I pray and I pray trump doesn't get elected VOTE... https://t.co/V3EZHpXJj
          (u'RT @girlposts: me: green is like the ugliest color ever\ndonald trump: i hate the color gre
          (u"RT @FreddyAmazin: I'M SCREAMING THEY DROVE PAST A TRUMP RALLY AND PLAYED THIS https://t.co/
          (u'RT @ImCardiB: Donald trump gona deport all the foreign bitches that yall love fucking  ',)
          (u'RT @p_cal: Donald Trump rally vs Bernie Sanders rally https://t.co/ZFqfly9Zpf\r',)]
```



12 Displaying Top 5 Positive Tweets for Trump

```
In [26]: tr11=%%sql select distinct Tweet from FinalProject.Republican_debate
         where candidatename = 'Trump' and Retweets !=14964
         and Sentiment in ('Positive') order by Retweets desc limit 5

         tr12=%%sql SELECT distinct Retweets, LEFT(Tweet,INSTR(Tweet,":")-1) as Tweeter
         from FinalProject.Republican_debate
         where candidatename = 'Trump' and Retweets !=14964 and Sentiment in ('Positive')
         order by Retweets desc limit 5
         plt.figure(figsize=(7,7))
         tr12.bar(color='g')
         tr11

5 rows affected.
5 rows affected.

Out[26]: [(u'RT @Marmel: Whoever made this\nTrump v. Manson. https://t.co/ztUx36aY1c"\r\n',),
          (u'RT @SQU1DZ: Mexicans and Black People teaming up against Donald Trump BOY LIFE BEAUTIFUL R
          (u"RT @Veteran4Trump: I'm a Veteran. I was born in Mexico\n",),
          (u'RT @realDonaldTrump: Thank you Wilkes-Barre\n#MakeAmericaGreatAgain #Trump2016 \nhttps://t
          (u'RT @KatyTurNBC: Wilkes Barre\n',)]
```

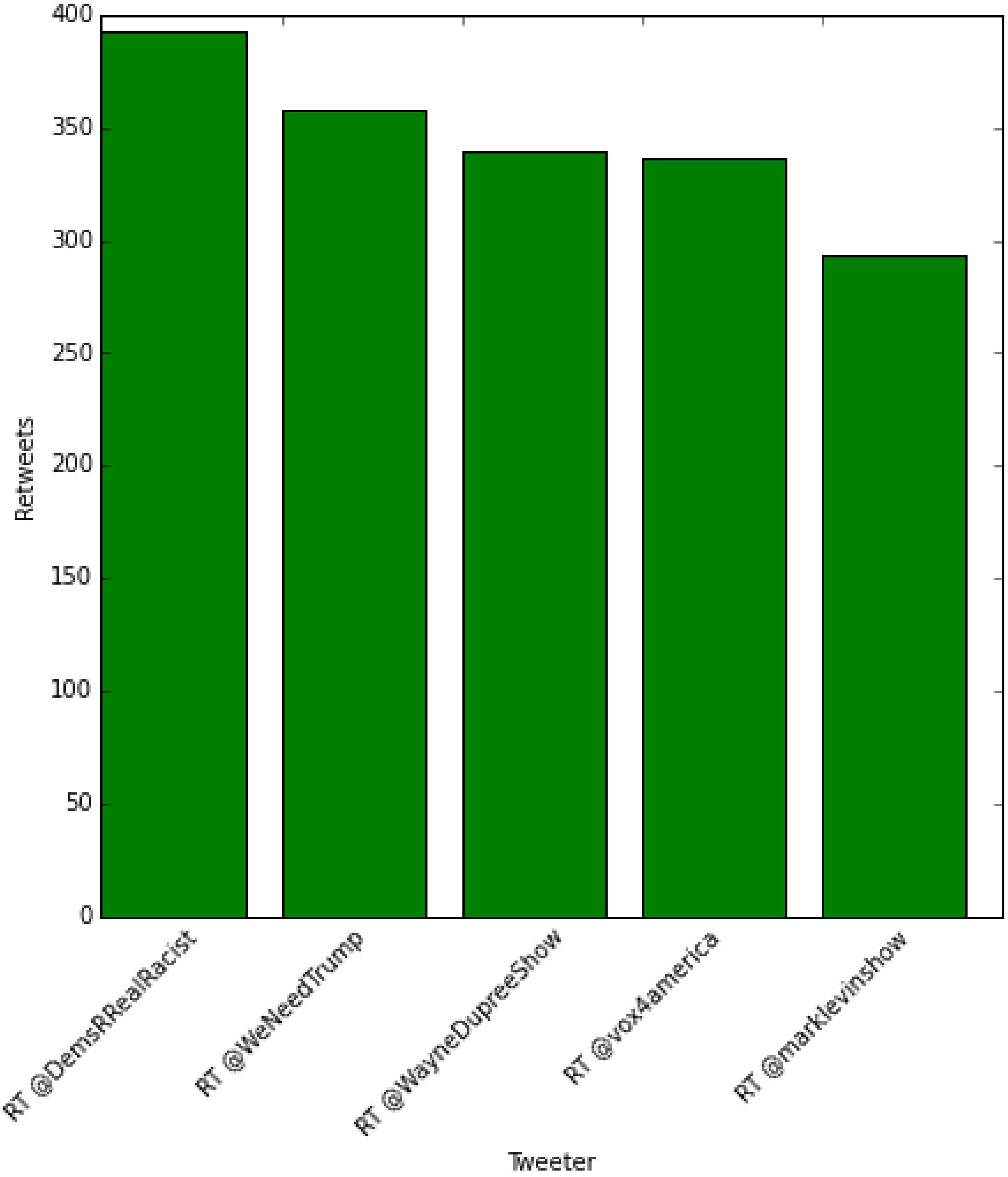


13 Displaying Top 5 Positive Tweets for Cruz

```
In [120]: tr13=%%sql select distinct Tweet,Retweets,sentiment
          from FinalProject.Republican_debate
          where candidatename = 'Cruz' and Sentiment in ('Positive')
          order by Retweets desc limit 5

          tr14=%%sql SELECT distinct Retweets,
          LEFT(Tweet,INSTR(Tweet,":")-1) as Tweeter
          from FinalProject.Republican_debate
          where candidatename = 'Cruz' and Sentiment in ('Positive')
          order by Retweets desc limit 5
          plt.figure(figsize=(7,7))
          tr14.bar(color='g')
          tr13
```

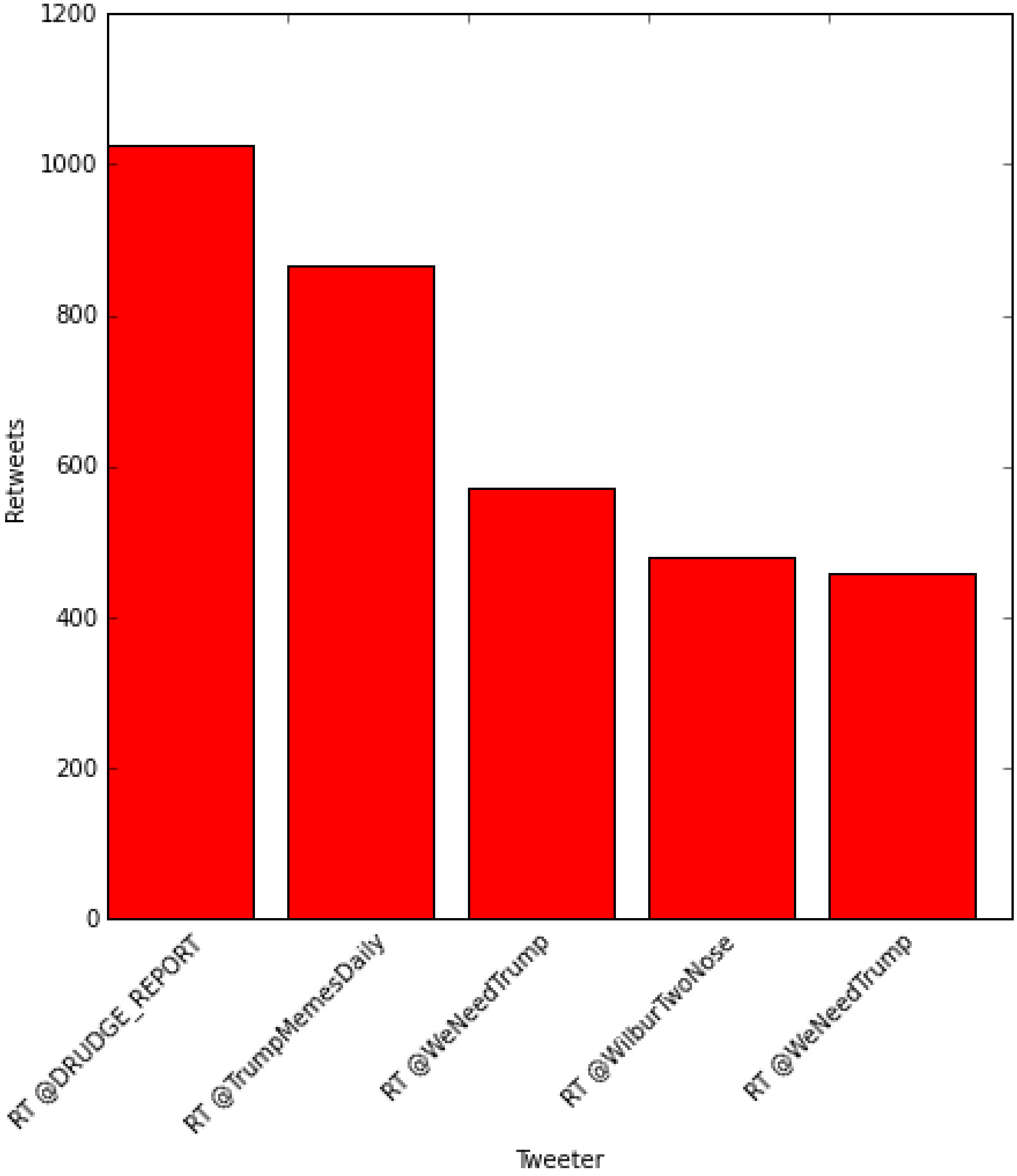
```
5 rows affected.
5 rows affected.
```

```
Out[120]: [(u'RT @DemsRRealRacist: Ted Cruz understands that step number one in defeating that nasty Wa
           (u'RT @WeNeedTrump: Cruz\n', 358L, u'Positive'),
           (u'RT @WayneDupreeShow: Now do you believe me that the Cruz campaign is struggling\n\n#Trump
           (u'RT @vox4america: On behalf of Trump supporters\n', 336L, u'Positive'),
           (u'RT @marklevinshow: Sellout? Nah\n', 293L, u'Positive')]
```



14 Displaying Top 5 Negative Tweets for Cruz

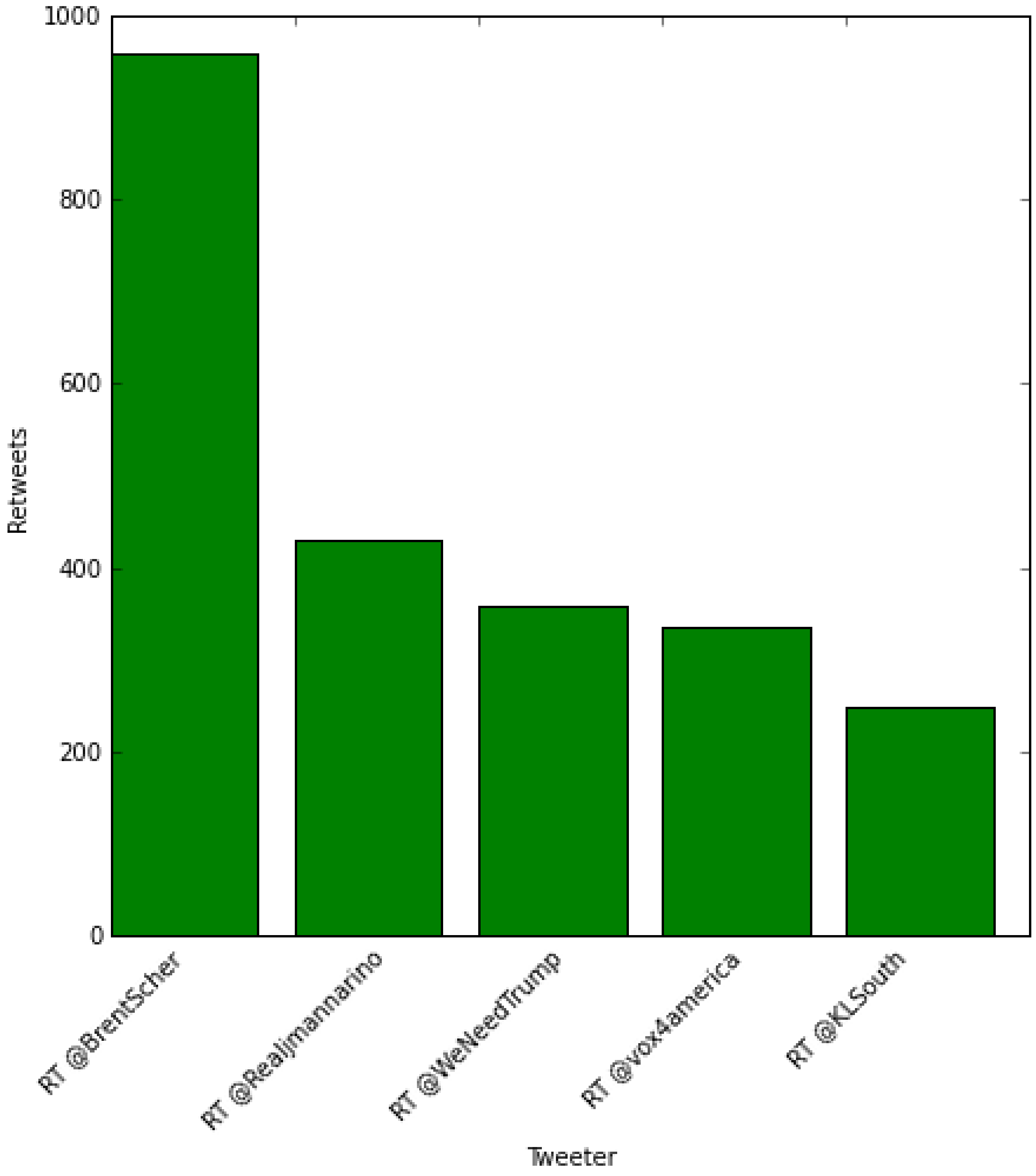
```
In [121]: tr15=%%sql select distinct Tweet
          from FinalProject.Republican_debate
          where candidatename = 'Cruz' and Sentiment in ('Negative')
          order by Retweets desc limit 5

          tr16=%%sql SELECT distinct Retweets,
          LEFT(Tweet,INSTR(Tweet,":")-1) as Tweeter
          from FinalProject.Republican_debate
          where candidatename = 'Cruz' and Sentiment in ('Negative')
          order by Retweets desc limit 5
          plt.figure(figsize=(7,7))
          tr16.bar(color='r')
          tr15

5 rows affected.
5 rows affected.

Out[121]: [(u'RT @DRUDGE_REPORT: CRUZ CONFRONTED: HOW CAN YOU HAVE DELEGATES WITHOUT A VOTE!? https://t.
           (u'RT @TrumpMemesDaily: Cruz and Kasich should just drop out drop out already\n#Trump2016 #Vo
           (u"RT @WeNeedTrump: The people aren't happy with the dirty politics Cruz is playing. It's ove
           (u'RT @WilburTwoNose: Cruz on CNN just said\n',),
           (u"RT @WeNeedTrump: RETWEET if you think Cruz and Kasich's attempt to subvert the popular vot
```



15 Displaying Top 5 Positive Tweets for Kasich

```
In [178]: tr17=%%sql select distinct Tweet,retweets
          from FinalProject.Republican_debate
          where candidatename = 'Kasich' and Sentiment in ('Positive')
          order by Retweets desc limit 5

          tr18=%%sql SELECT distinct Retweets,
          LEFT(Tweet,INSTR(Tweet,":")-1) as Tweeter
          from FinalProject.Republican_debate
          where candidatename = 'Kasich' and Sentiment in ('Positive')
          order by Retweets desc limit 5
          plt.figure(figsize=(7,7))
          tr18.bar(color='g')
          tr17

5 rows affected.
5 rows affected.
```

```
Out[178]: [(u'RT @BrentScher: Am I crazy\nKasic', 959L),
           (u'RT @Realjmannarino: RETWEET THIS POLL SO WE CAN GET A BIG PICTURE IDEA! \n\nCruz and Kasic
           (u'RT @WeNeedTrump: Cruz\nKasic', 358L),
           (u'RT @vox4america: On behalf of Trump supporters\nKasich', 336L),
           (u'RT @KLSouth: #Cruz #Kasich are publicly confessing they\u2019re nothing more than spoilers
```

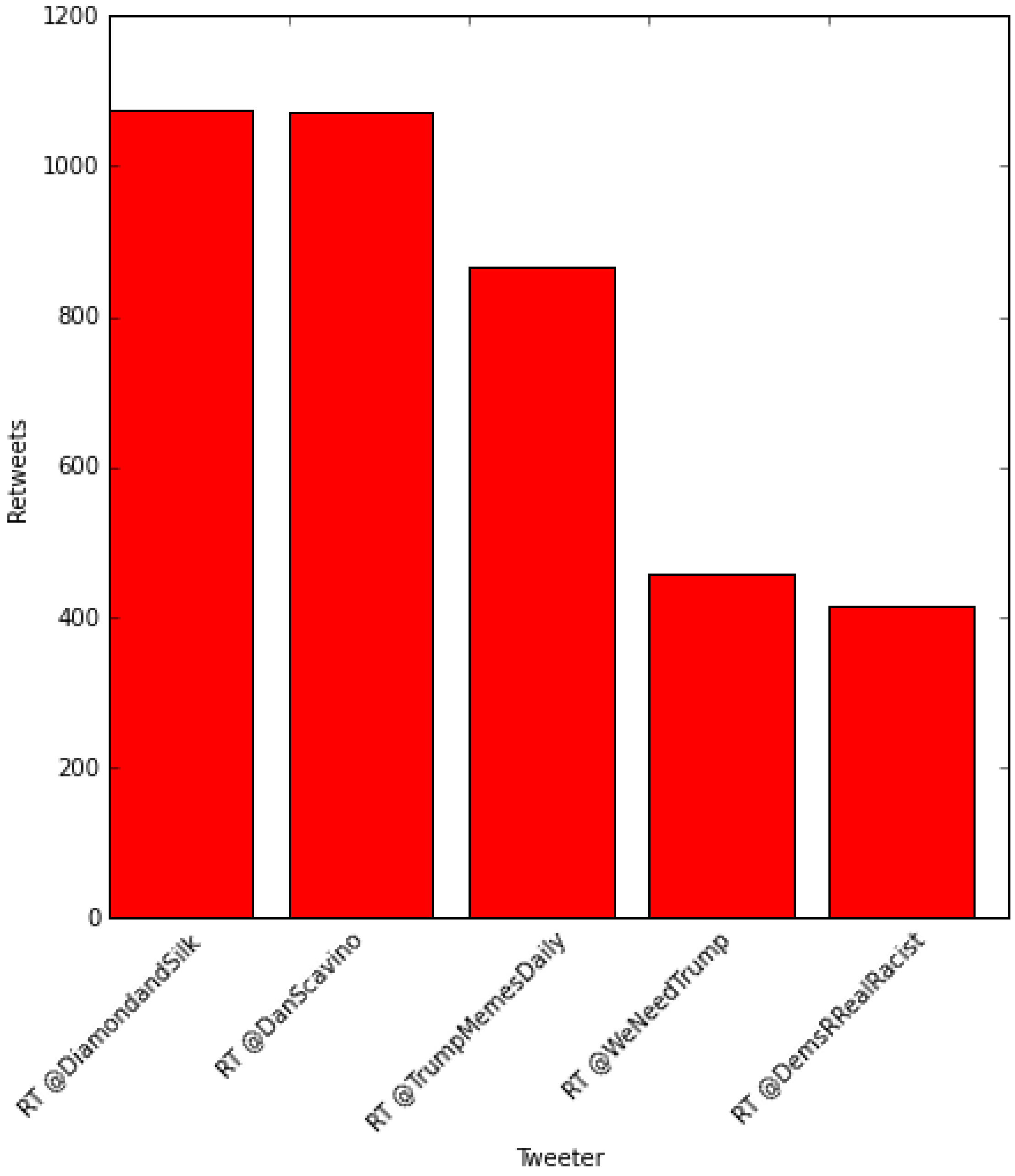


16 Displaying Top 5 Negative Tweets for Kasich

```
In [152]: tr19=%%sql select distinct Tweet
          from FinalProject.Republican_debate
          where candidatename = 'Kasich' and Sentiment in ('Negative')
          order by Retweets desc limit 5

          tr20=%%sql SELECT distinct Retweets,
          LEFT(Tweet,INSTR(Tweet,":")-1) as Tweeter
          from FinalProject.Republican_debate
          where candidatename = 'Kasich' and Sentiment in ('Negative')
          order by Retweets desc limit 5
          plt.figure(figsize=(7,7))
          tr20.bar(color='r')
          tr19
```

```
5 rows affected.
5 rows affected.
```

```
Out[152]: [(u"RT @DiamondandSilk: Lyin' Ted &amp; Lunatic Kasich It will be a cold day inside of a Volca
           (u"RT @DanScavino: Should say: Follow talking points in Kasich deal. WE ARE LOSING &amp; WE A
           (u'RT @TrumpMemesDaily: Cruz and Kasich should just drop out drop out already\n#Trump2016 #Vo
           (u"RT @WeNeedTrump: RETWEET if you think Cruz and Kasich's attempt to subvert the popular vot
           (u"RT @DemsRRealRacist: Attention Cruz and Kasich supporters: read your e-mail CAREFULLY so y
```



17 Running queries to transform and check table data

```
In [ ]: %%sql select distinct Tweet,CandidateName,Retweets,Semantics
        from FinalProject.Republican_debate
        where candidatename = 'Cruz'
        and Semantics not like '%Throttled, wait%'
        order by Retweets desc limit 10
```

```
In [ ]: %%sql select distinct Tweet,Retweets,Semantics,CandidateName
        from FinalProject.Republican_debate
        where candidatename = 'Kasich'
        and Semantics not like '%Throttled, wait%'
        order by Retweets desc limit 10
```

```
In [ ]: %%sql alter table FinalProject.Republican_debate
        add Sentiment varchar(250)
```

```
In [ ]: %%sql update FinalProject.Republican_debate
        SET Sentiment = substring(Semantics,-5)
```

```
In [ ]: %%sql select distinct Sentiment
        from FinalProject.Republican_debate
        where candidatename='Trump'
        and Semantics not like '%Throttled, wait%'
```

```
In [ ]: %%sql select distinct candidatename
        from FinalProject.Republican_debate
        where Semantics not like '%Throttled, wait%'
```

18 Counting Positive, Negative and Neutral Tweets (No Retweet)

```
In [ ]: ### Count of  Original Tweets as Neutral/Positive/Negative for candidates

        %%sql select CandidateName,
        SUM(CASE Sentiment WHEN 'ral"}' THEN 1 else 0 END) AS Neutral,
        SUM(CASE Sentiment WHEN 'pos"}' THEN 1 else 0 END) AS Positive,
        SUM(CASE Sentiment WHEN 'neg"}' THEN 1 else 0 END) AS Negative
        from FinalProject.Republican_debate
        where Semantics not like '%Throttled, wait%'
        and Candidatename in ('Trump','Cruz','Kasich')
        Group by CandidateName
```

19 Counting Positive, Negative and Neutral Tweets (with Retweet)

```
In [ ]: ### Count of Tweets + Retweets as Neutral/Positive/Negative for candidates
        %%sql select CandidateName,
        SUM(CASE Sentiment WHEN 'ral"}' THEN (Retweets+1) else 0 END) AS Neutral,
        SUM(CASE Sentiment WHEN 'pos"}' THEN (Retweets+1) else 0 END) AS Positive,
        SUM(CASE Sentiment WHEN 'neg"}' THEN (Retweets+1) else 0 END) AS Negative
        from FinalProject.Republican_debate
        where Semantics not like '%Throttled, wait%'
        and Candidatename in ('Trump','Cruz','Kasich')
        Group by CandidateName
```

```
In [ ]: %sql select distinct candidatename from Republican_debate
```

20 Selecting Positive, Negative and Neutral Tweets (with Retweets) for Trump

```
In [189]: tr= %%sql select CandidateName,
          Sentiment,SUM(Retweets+1) as Retweets
          from FinalProject.Republican_debate
          where Sentiment in ('Neutral','Positive','Negative')
          and CandidateName='Trump'
          Group by Sentiment,CandidateName

3 rows affected.
```

21 Selecting Positive, Negative and Neutral Tweets (with Retweets) for Cruz

```
In [190]: tr2= %%sql select CandidateName,
          Sentiment,SUM(Retweets+1) as Retweets
          from FinalProject.Republican_debate
          where Sentiment in ('Neutral','Positive','Negative')
          and CandidateName='Cruz'
          Group by Sentiment,CandidateName

3 rows affected.
```

22 Selecting Positive, Negative and Neutral Tweets (with Retweets) for Kasich

```
In [191]: tr3= %%sql select CandidateName,
          Sentiment,SUM(Retweets+1) as Retweets
          from FinalProject.Republican_debate
          where Sentiment in ('Neutral','Positive','Negative')
          and CandidateName='Kasich'
          Group by Sentiment,CandidateName

3 rows affected.
```

```
In [ ]: %sql select * from Republican_debate
```

```
In [ ]: %sql select distinct Sentiment from Republican_debate
```

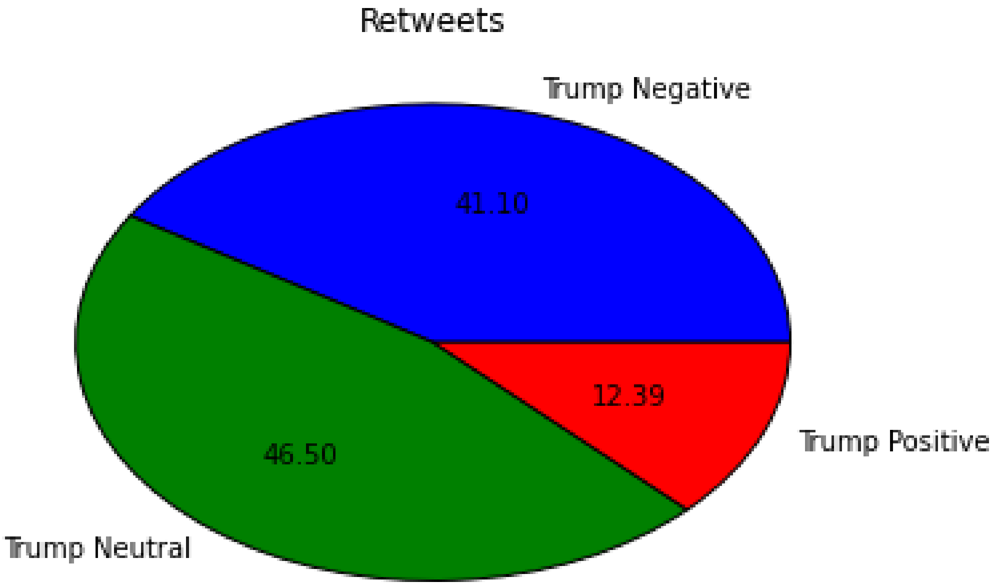
23 Using Pandas, data frames for data visualization

```
In [192]: import pandas as pd
          df_docks = pd.DataFrame(tr, columns=tr.keys)
          df_docks

Out[192]:   CandidateName Sentiment Retweets
          0         Trump  Negative   254404
          1         Trump   Neutral   287854
          2         Trump  Positive    76722
```

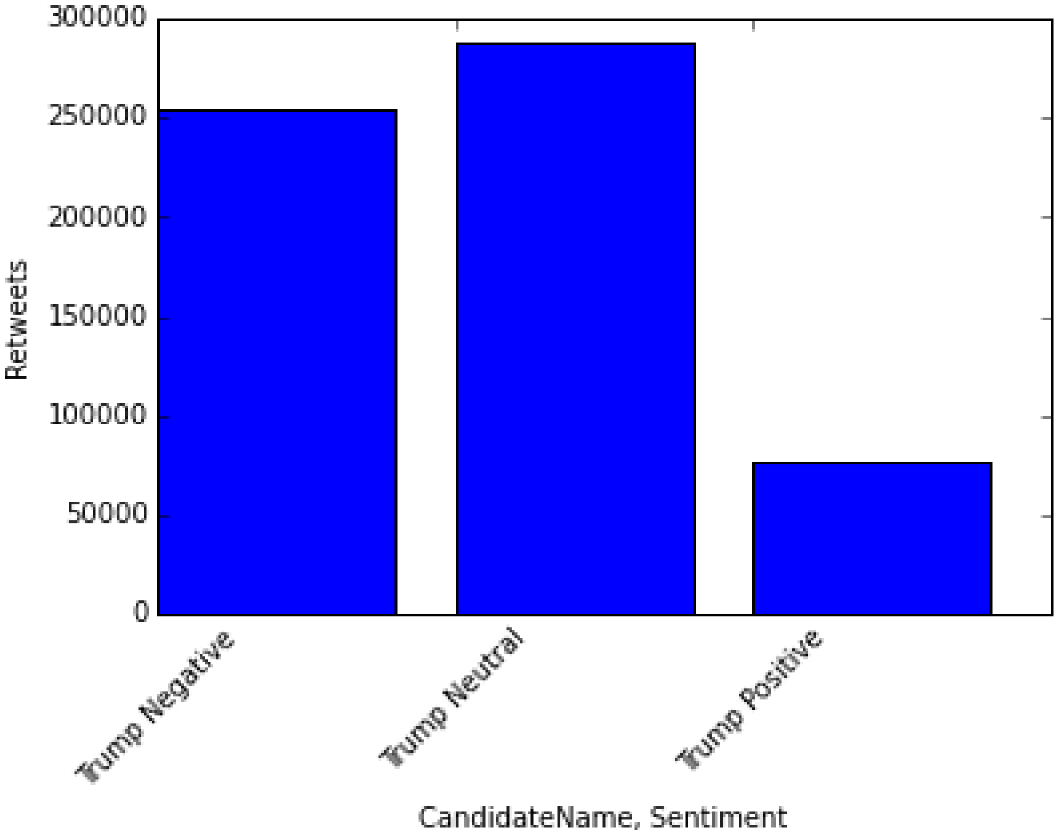
24 Percentage of Positive, Negative and Neutral Tweets + Retweets for trump

```
In [13]: %matplotlib inline
         tr.pie(autopct='%.2f')
```

```
Out[13]: ([<matplotlib.patches.Wedge at 0x7f4e0e5311d0>,
           <matplotlib.patches.Wedge at 0x7f4e0e543050>,
           <matplotlib.patches.Wedge at 0x7f4e0e543e10>],
          [<matplotlib.text.Text at 0x7f4e0e531690>,
           <matplotlib.text.Text at 0x7f4e0e543610>,
           <matplotlib.text.Text at 0x7f4e0e551350>],
          [<matplotlib.text.Text at 0x7f4e0e531bd0>,
           <matplotlib.text.Text at 0x7f4e0e5439d0>,
           <matplotlib.text.Text at 0x7f4e0e551850>])
```



```
In [14]: tr.bar()

Out[14]: <Container object of 3 artists>
```

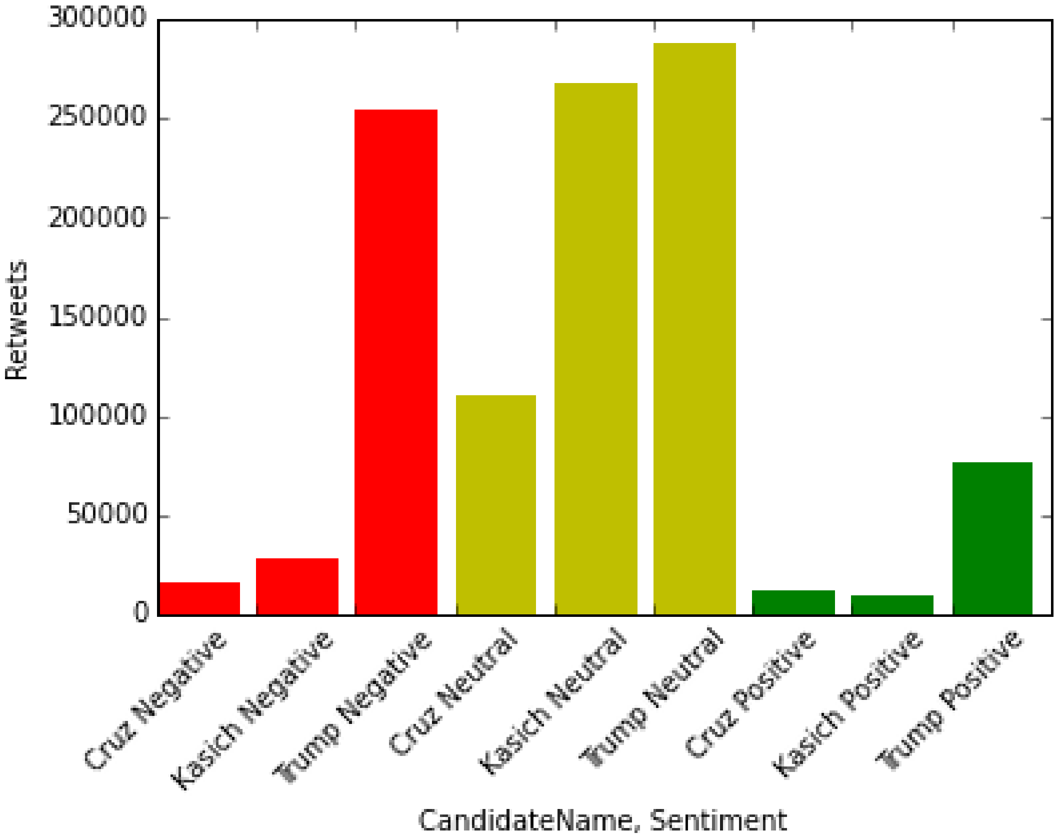


```
In [19]: tr4= %%sql select CandidateName,
         Sentiment,SUM(Retweets+1) as Retweets
         from FinalProject.Republican_debate
         where Sentiment in ('Neutral','Positive','Negative')
         Group by Sentiment,CandidateName

9 rows affected.

In [20]: tr5= %%sql select CandidateName,
         Sentiment,SUM(Retweets+1) as Retweets
         from FinalProject.Republican_debate
         where Sentiment in ('Neutral','Positive','Negative')
         Group by Sentiment,CandidateName

9 rows affected.
```

25 Bar chart showing absolute values of Positive, Negative and Neutral Tweets+ Retweets for Trump, Cruz and Kasich

```
In [21]: import matplotlib.pyplot as plt
         from matplotlib.dates import date2num
         import datetime
         import plotly.plotly as py
```

```
barlist=tr4.bar()
barlist[0].set_color(’r’)
barlist[1].set_color(’r’)
barlist[2].set_color(’r’)
barlist[3].set_color(’y’)
barlist[4].set_color(’y’)
barlist[5].set_color(’y’)
barlist[6].set_color(’g’)
barlist[7].set_color(’g’)
barlist[8].set_color(’g’)
plt.show()
```



```
In [17]: !sudo pip install plotly
```

```
The directory ’/home/ubuntu/.cache/pip/http’ or its parent directory is not owned by the current user an
The directory ’/home/ubuntu/.cache/pip’ or its parent directory is not owned by the current user and ca
Collecting plotly
  Downloading plotly-1.9.10.tar.gz (560kB)
ent already satisfied (use --upgrade to upgrade): requests in /usr/local/lib/python2.7/dist-packages (fi
Requirement already satisfied (use --upgrade to upgrade): six in /usr/local/lib/python2.7/dist-packages
Requirement already satisfied (use --upgrade to upgrade): pytz in /usr/local/lib/python2.7/dist-packages
Installing collected packages: plotly
  Running setup.py install for plotly
```

```
Successfully installed plotly-1.9.10
You are using pip version 7.1.2, however version 8.1.1 is available.You should consider upgrading via t
```

```
In [47]: df_docks2 = pd.DataFrame(tr2, columns=tr.keys)
         df_docks2
```

```
Out[47]:   CandidateName Sentiment Retweets
         0          Cruz  Negative    21721
         1          Cruz   Neutral   110934
         2          Cruz  Positive    12535
```

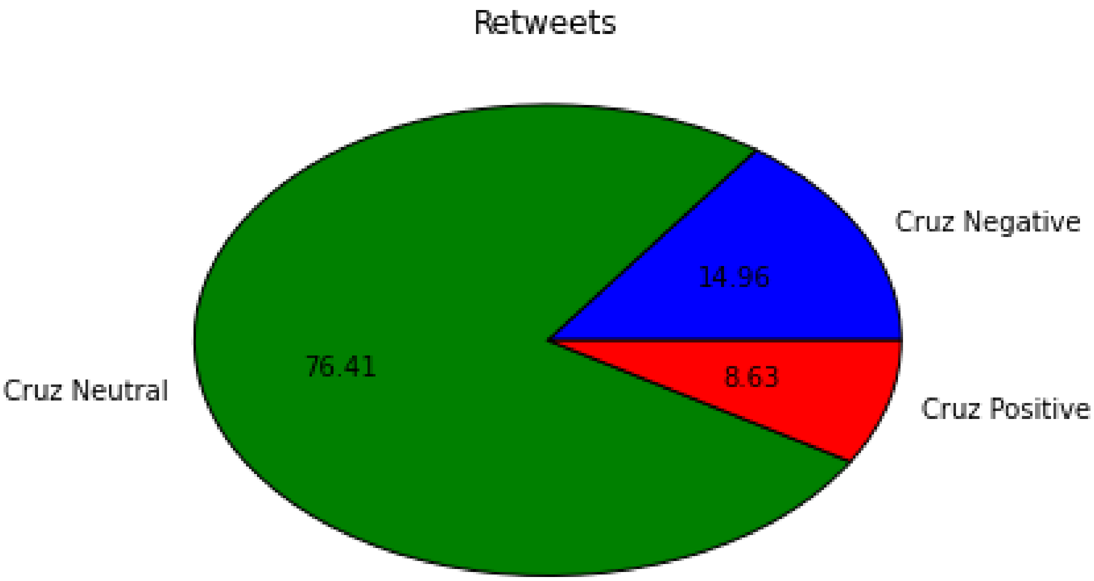
```
In [48]: #df_docks2['Retweets'].hist()
         df_docks2.groupby('Sentiment').Retweets.sum()
         #.plot(kind='bar')
         #df_docks2.plot(kind='bar', stacked=True, color=['red','blue','Yellow'], grid=True)
```

```
Out[48]: Sentiment
         Negative     21721
         Neutral     110934
         Positive     12535
         Name: Retweets, dtype: object
```

26 Percentage of Positive, Negative and Neutral Tweets + Retweets for Cruz

```
In [49]: tr2.pie(autopct='%.2f')
```

```
Out[49]: ([<matplotlib.patches.Wedge at 0x7fc7b69d0fd0>,
           <matplotlib.patches.Wedge at 0x7fc7b69dbe10>,
           <matplotlib.patches.Wedge at 0x7fc7b69e6c10>],
          [<matplotlib.text.Text at 0x7fc7b69db590>,
           <matplotlib.text.Text at 0x7fc7b69e6410>,
           <matplotlib.text.Text at 0x7fc7b69f2210>],
          [<matplotlib.text.Text at 0x7fc7b69db9d0>,
           <matplotlib.text.Text at 0x7fc7b69e67d0>,
           <matplotlib.text.Text at 0x7fc7b69f25d0>])
```



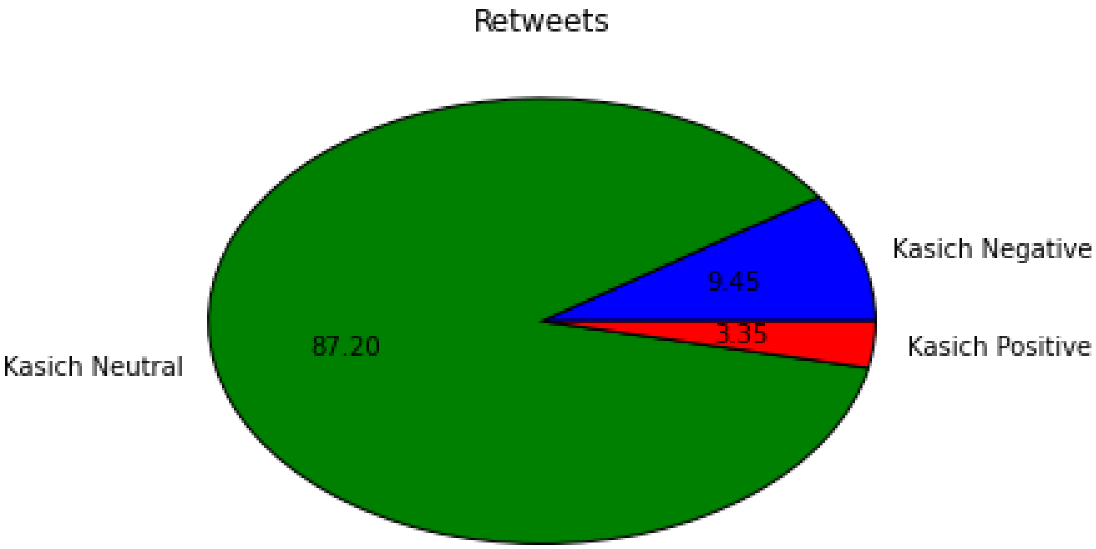
```
In [50]: df_docks3 = pd.DataFrame(tr3, columns=tr.keys)
         df_docks3
```

```
Out[50]:   CandidateName Sentiment Retweets
         0        Kasich  Negative    28981
         1        Kasich   Neutral   267516
         2        Kasich  Positive    10292
```

27 Percentage of Positive, Negative and Neutral Tweets + Retweets for Kasich

```
In [51]: tr3.pie(autopct='%.2f')
```

```
Out[51]: ([<matplotlib.patches.Wedge at 0x7fc7b6970750>,
           <matplotlib.patches.Wedge at 0x7fc7b697c610>,
           <matplotlib.patches.Wedge at 0x7fc7b6908490>],
          [<matplotlib.text.Text at 0x7fc7b6970c10>,
           <matplotlib.text.Text at 0x7fc7b697cb10>,
           <matplotlib.text.Text at 0x7fc7b6908990>],
          [<matplotlib.text.Text at 0x7fc7b697c1d0>,
           <matplotlib.text.Text at 0x7fc7b6908050>,
           <matplotlib.text.Text at 0x7fc7b6908e90>])
```



```
In [ ]: x=pd.read_csv("/home/ubuntu/data/Trump_debate1.csv", dtype=unicode,index_col=["Trump"], encoding
```

```
In [ ]: x
```

```
In [ ]: x.describe()
```

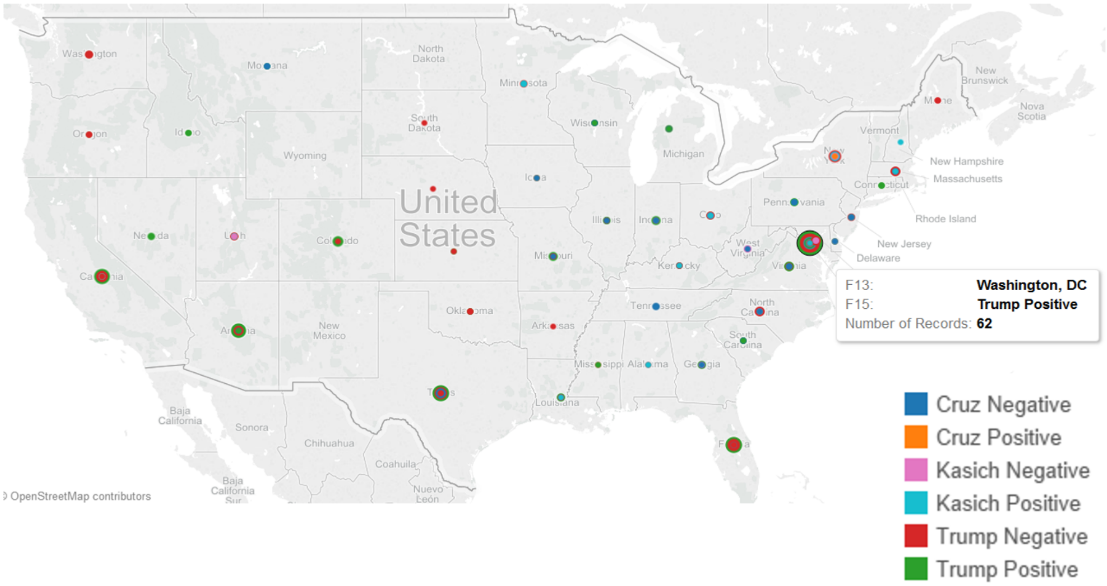
Conclusion

May 15, 2016

1 Sentiment Plot on a U.S map in Tableau by Candidate

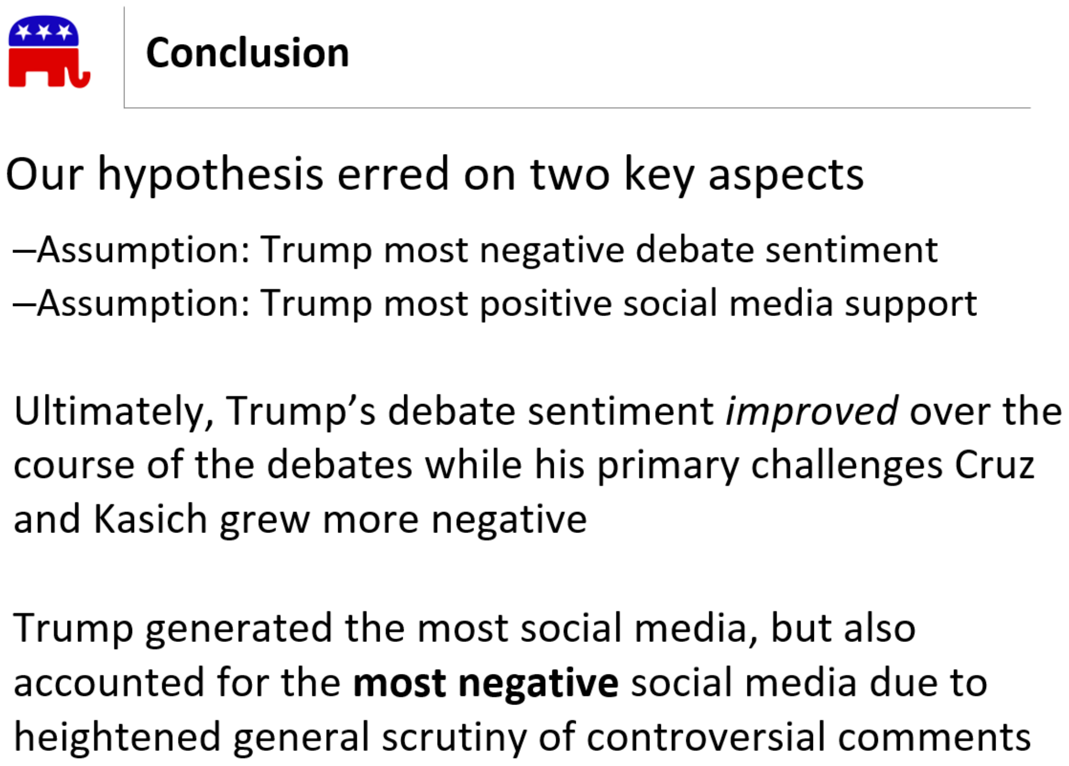
```
In [6]: from IPython.display import Image

        Image(filename='Tableau-Map.PNG')
```

```
Out[6]:
```



```
In [4]: from IPython.display import Image

        Image(filename='Conclusion.PNG')
```

```
Out[4]:
```



Conclusion

Our hypothesis erred on two key aspects

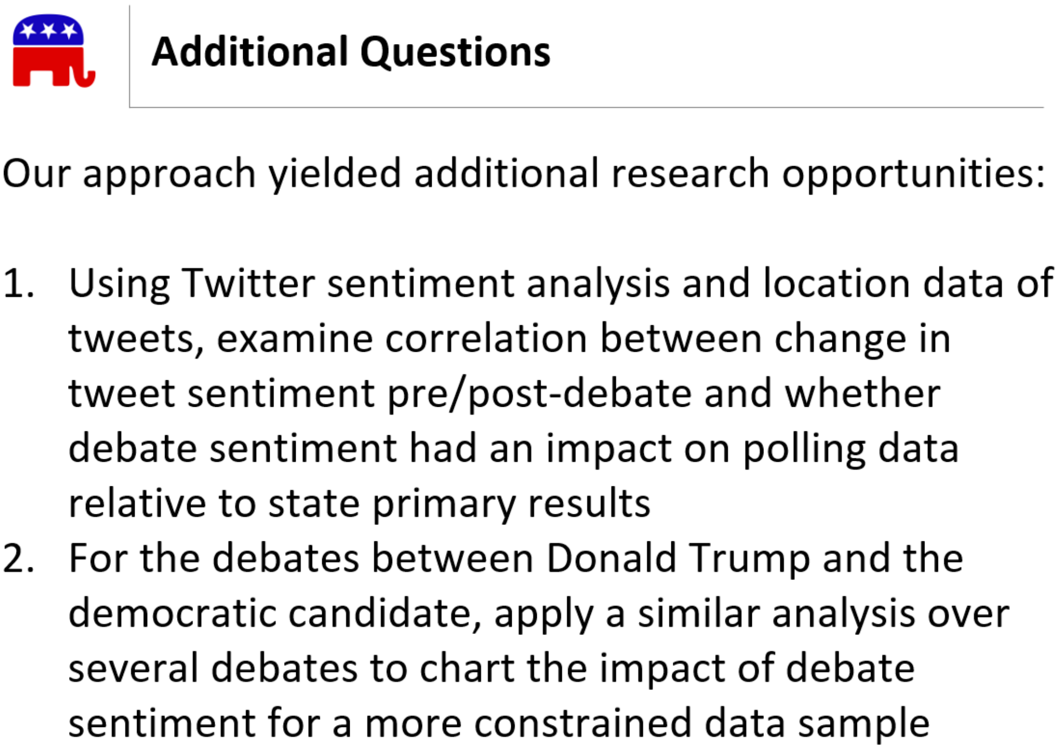
–Assumption: Trump most negative debate sentiment

–Assumption: Trump most positive social media support

Ultimately, Trump's debate sentiment *improved* over the course of the debates while his primary challenges Cruz and Kasich grew more negative

Trump generated the most social media, but also accounted for the **most negative** social media due to heightened general scrutiny of controversial comments

```
In [5]: from IPython.display import Image

        Image(filename='AdditionalQuestions.PNG')

Out[5]:
```



Additional Questions

Our approach yielded additional research opportunities:

1. Using Twitter sentiment analysis and location data of tweets, examine correlation between change in tweet sentiment pre/post-debate and whether debate sentiment had an impact on polling data relative to state primary results
2. For the debates between Donald Trump and the democratic candidate, apply a similar analysis over several debates to chart the impact of debate sentiment for a more constrained data sample

```
In [ ]:
```