Social Media & Text Analysis

lecture 2 - Twitter API

CSE 5539-0010 Ohio State University

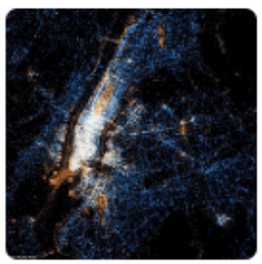
Instructor: Wei Xu

Website: socialmedia-class.org

Course Website

socialmedia-class.org

Social Media & Text Analytics Syllabus Twitter API Tutorial Homework



A visualization showing the location of Twitter messages (blue) and Flickr photos (orange) in New York City by Eric Fischer

Social media provides a massive amount of valuable information and shows us how language is actually used by lots of people. This course will give an overview of prominent research findings on language use in social media. The course will also cover several machine learning algorithms and the core natural language processing techniques for obtaining and processing Twitter data.

Instructor

Wei Xu is an assistant professor in the Department of Computer Science and Engineering at the Ohio State University. Her research interests lie at the intersection of machine learning, natural language processing, and social media. She holds a PhD in Computer Science from New York University. Prior to joining OSU, she was a postdoc at the University of Pennsylvania. She is organizing the ACL/COLING Workshop on Noisy User-generated Text, serving as a workshop co-chair for ACL 2017, an area chair for EMNLP 2016 and the publicity chair for NAACL 2016.

Time/Place new

Fall 2016, CSE 5539-0010 **The Ohio State University**
Cockins Hall **Room 218 | Wednesday 2:20PM – 4:10PM**
dual-listed undergraduate and graduate course

Prerequisites

In order to succeed in this course, you should know basic probability and statistics, such as the chain rule of probability and Bayes' rule. On the programming side, all projects will be in Python. You should understand basic computer science concepts (like recursion), basic data structures (trees, graphs), and basic algorithms (search, sorting, etc).

Course Readings

Various academic papers

Previous Offerings

Summer 2016, The North American Summer School on Logic, Language, and Information (NASSLLI)
Teaching evaluation was 5.72 out of 6 at NASSLLI; average across all instructors was 5.23.
Summer 2015, University of Pennsylvania (where this course was first designed and taught)

This is a **Special Topic** Class

- It is about NLP **research**, not programming. (pre-requirements: familiar with Python programming)

- As students request, I am planning to teach deep learning and have a homework on implementing word2vec — see **Quiz #2**

- It is **difficult** (meant for **PhD** students, though open to advanced master and undergraduate students).

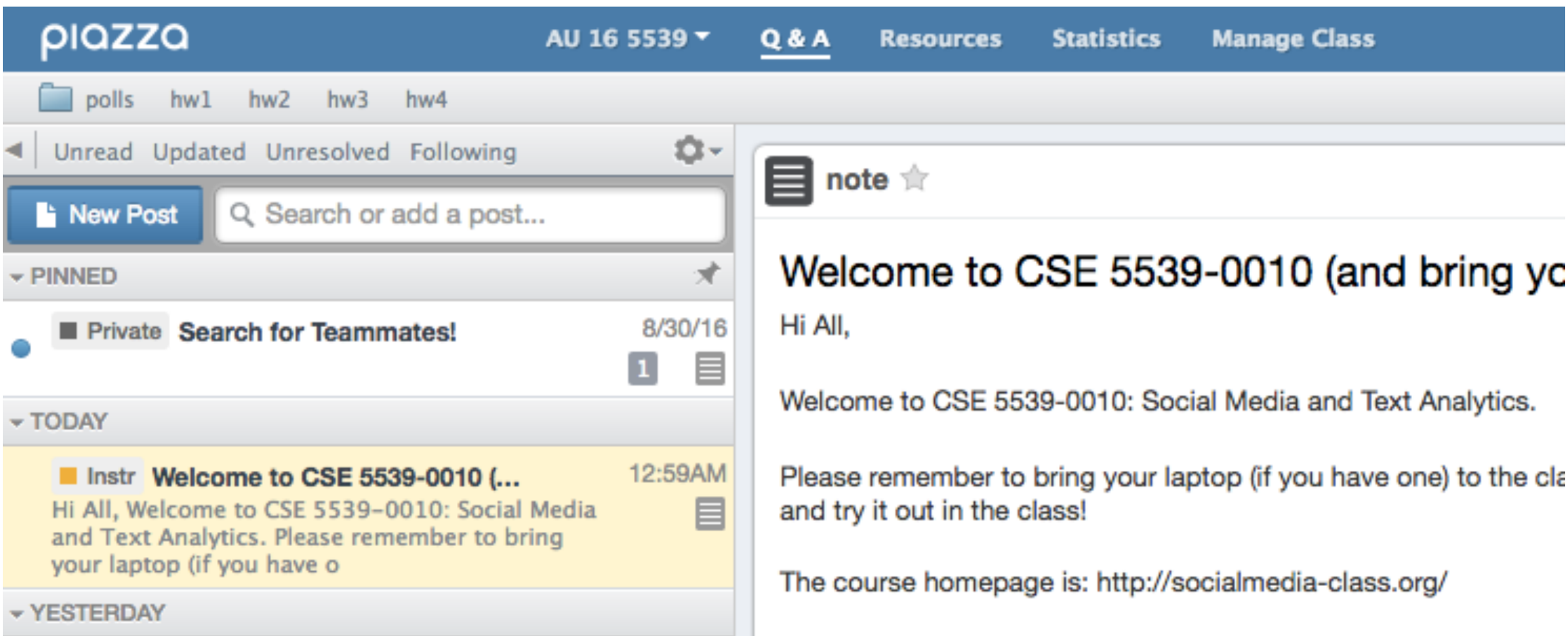
- **No TA and no grader**

Alternatives

- **audit** the course (won't hurt your GPA)
- take this course **next year** (most likely will re-occur)
- **other related courses**:
  - CSE 5525 Foundations of Speech and Language Processing
  - CSE 5523 Machine Learning
  - CSE 5522 Survey of Artificial Intelligence II: Advanced Techniques
  - CSE 5526 Introduction to Neural Networks

Have a Question?

- **Ask in class!**
- **Office Hour:** Wed 4:15 pm — 5:15 pm, Dreese 495
- **Piazza Q&A Board** (a Module within OSU Canvas)



Updated Grading

- two programing assignments (50 points)
- a 3rd assignment or a research project (30 points)
- in-class presentation (20 points)
- several Quiz/Survey (bonus 10 points)
- **in-class and Piazza participation (bonus 10 points)**

Quiz #1

- For events A and B, prove

$$P(A|B) = \frac{P(B|A)P(A)}{P(B)}$$

Quiz #1

- What does this regular expression mean?

```
147    Hashtag = "#[a-zA-Z0-9_]+"
```

Quiz #1

- Softmax function is defined as $softmax(\mathbf{x})_i = \frac{e^{x_i}}{\sum_j e^{x_j}}$
- prove

$$softmax(\mathbf{x}) = softmax(\mathbf{x} + c)$$

Quiz #2

- implement Softmax function in Python (need to be computationally efficient)

```python
import numpy as np

def softmax(x):

    # Handle the special case: when vector x is only 1-dimensional
    if x.ndim <= 1:
        x = x - np.max(x)
        ex = np.exp(x)
        return ex / np.sum(ex)


    ### YOUR CODE HERE  -- for vectors that are not 1-dimensional




    ### END YOUR CODE

    return dist


# Check your Softmax implementation

print softmax(np.array([[101,102],[-1,-2]]))
```

Homework #1 is out
Due in a week

- **Canvas:** submit homework
- **Piazza:**
  - Q&A Discussion
  - Announcements

Twitter API Tutorial: socialmedia-class.org

Social Media & Text Analytics | Syllabus | Twitter API Tutorial | Homework Assignments

Twitter's 404 error page -- the Fail Whale

Twitter API tutorial

by Wei Xu (July 1, 2015)

Follow @cocoweixu

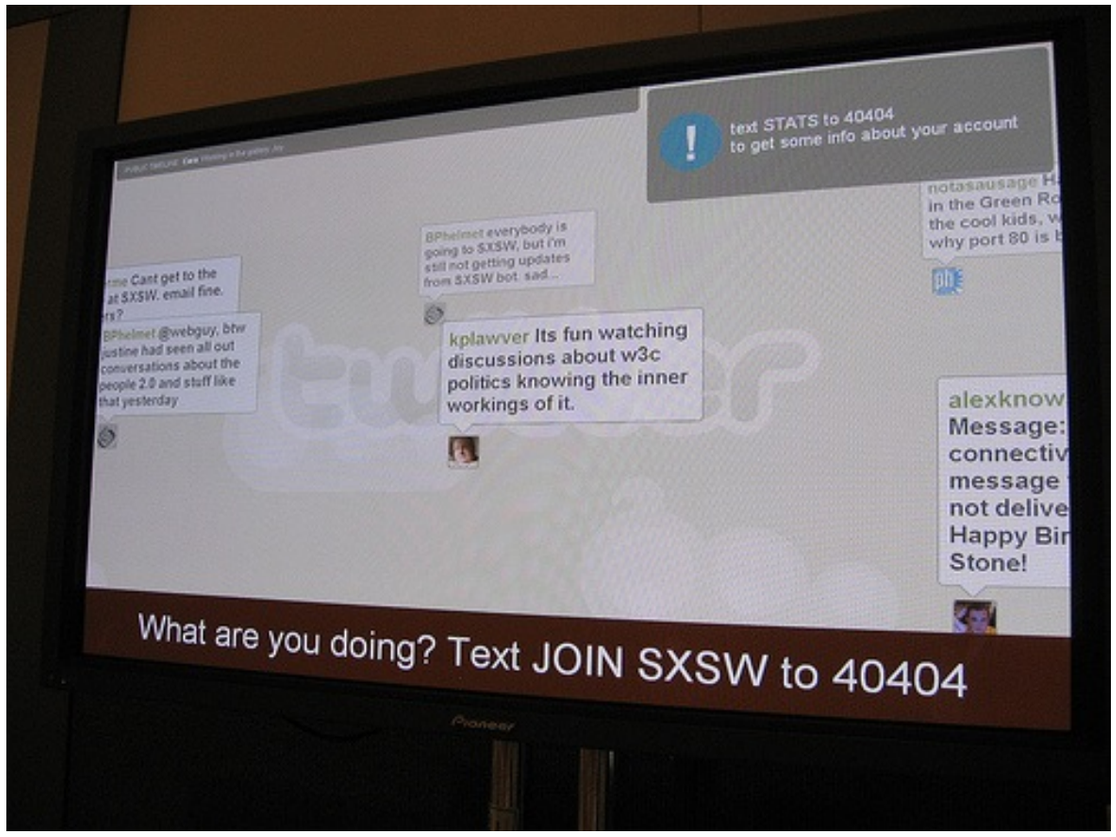
1. Getting Twitter API keys

To start with, you will need to have a Twitter account and obtain credentia
Twitter developer site to access the Twitter API, following these steps:

- Create a Twitter user account if you do not already have one.
- Go to https://apps.twitter.com/ and log in with your Twitter user acc
  your user account.
- Click "Create New App"

Twitter History

- Jack Dorsey's idea
  (a NYU undergraduate then)
- 1st tweet on March 21, 2006
- exploded at SXSW 2007
  (20k→60k tweets/day)
- 100m tweets/quarter in 2008,
  50m tweets/day in 2010,
  400m tweets/day in 2013
- Huge API usage was
  unexpected as was the rise of
  the @ sign for replies



Twitter staff received the festival's Web Award prize with the remark "we'd like to thank you in 140 characters or less. And we just did!"

Twitter History

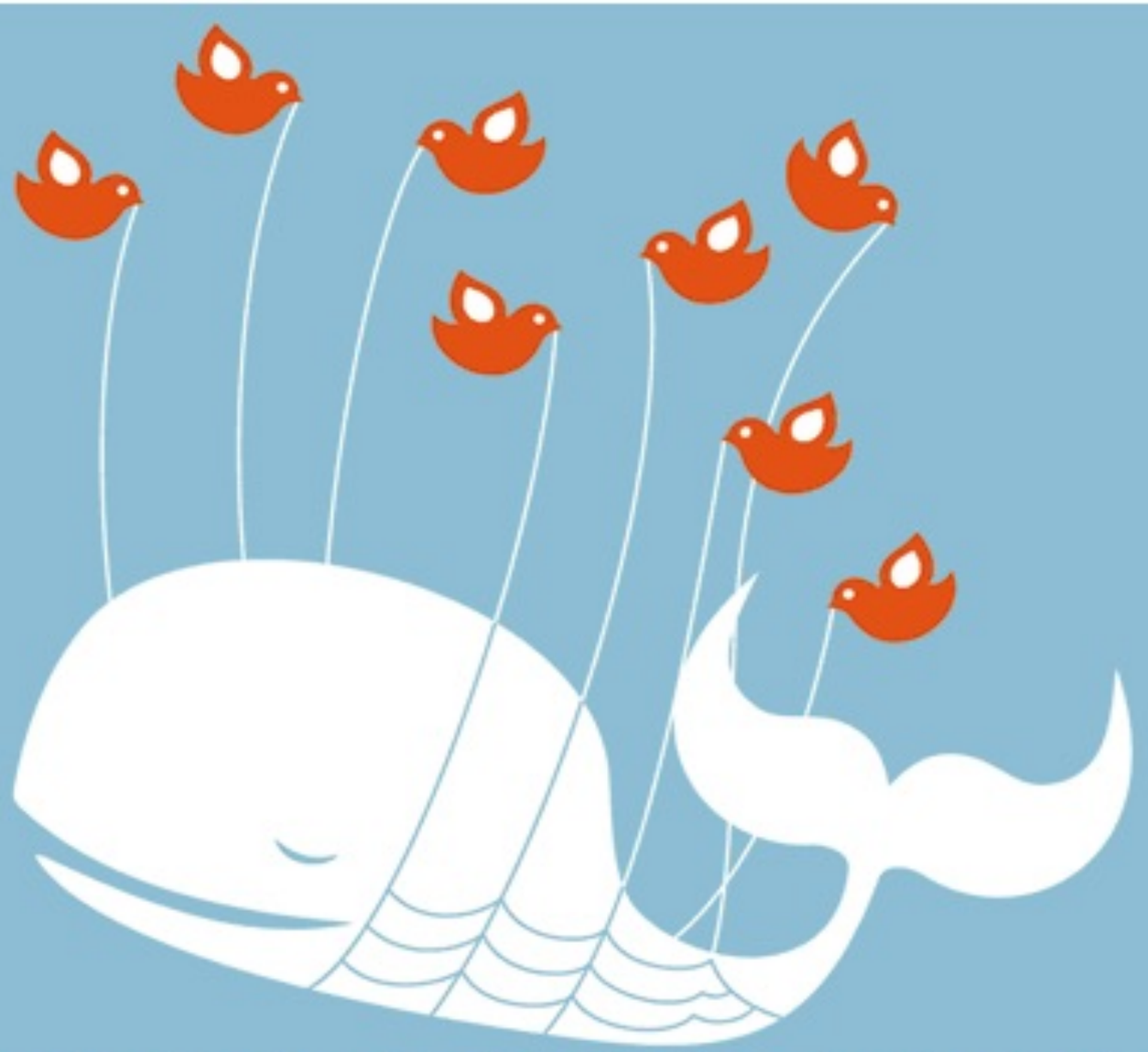
- IPO in 2013 Q4
- market value $24b, revenue $435m, net loss $162m in 2015 Q1
- CEO Dick Costolo resigned July 1st, 2015

twitter

Home ›

Twitter is over capacity.

Please wait a moment and try again. For more information, check out Twitter Status »



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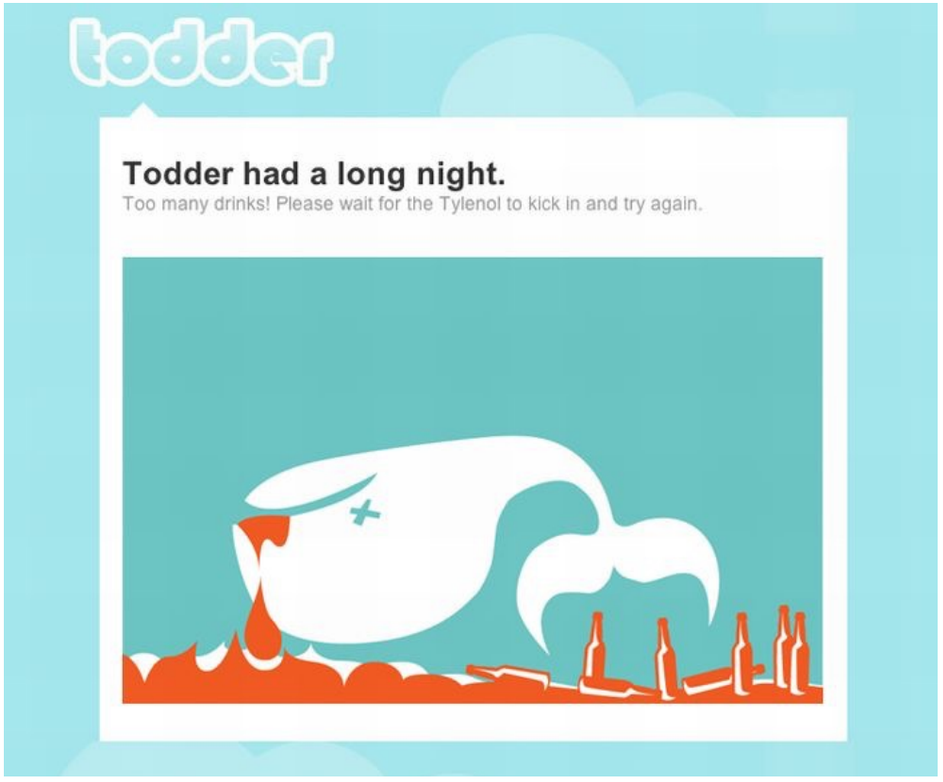
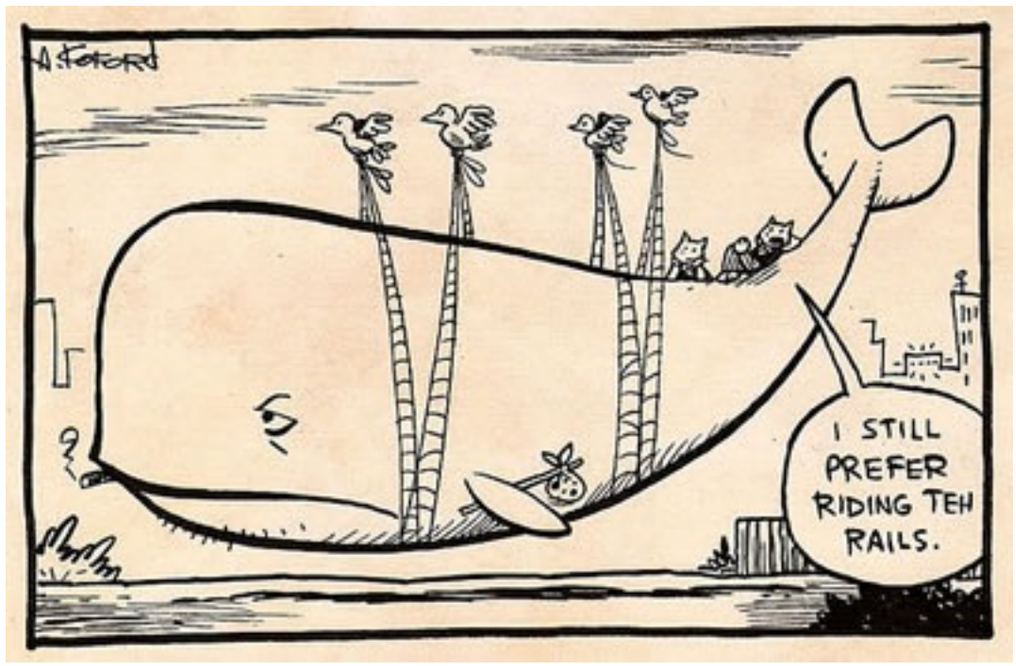
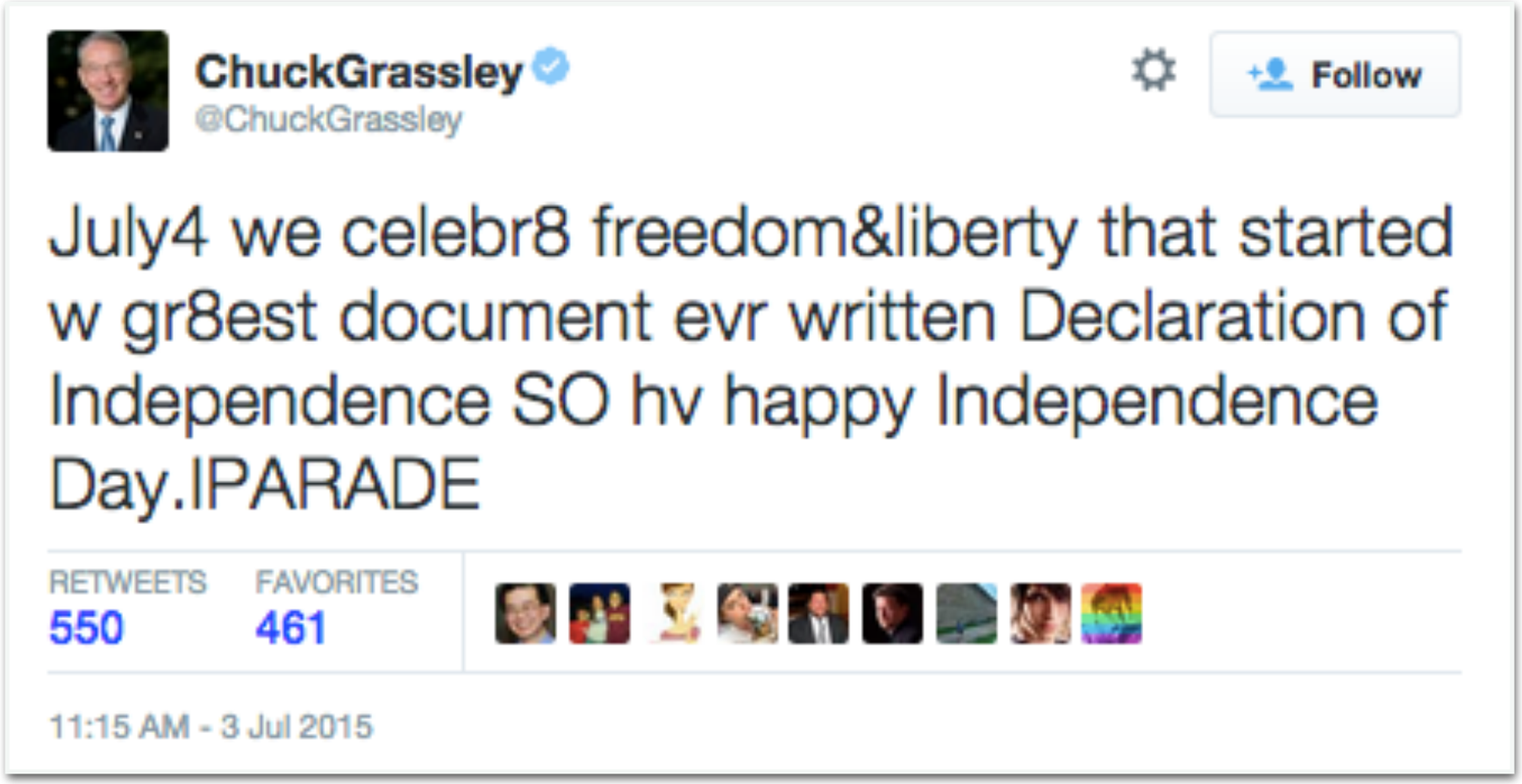
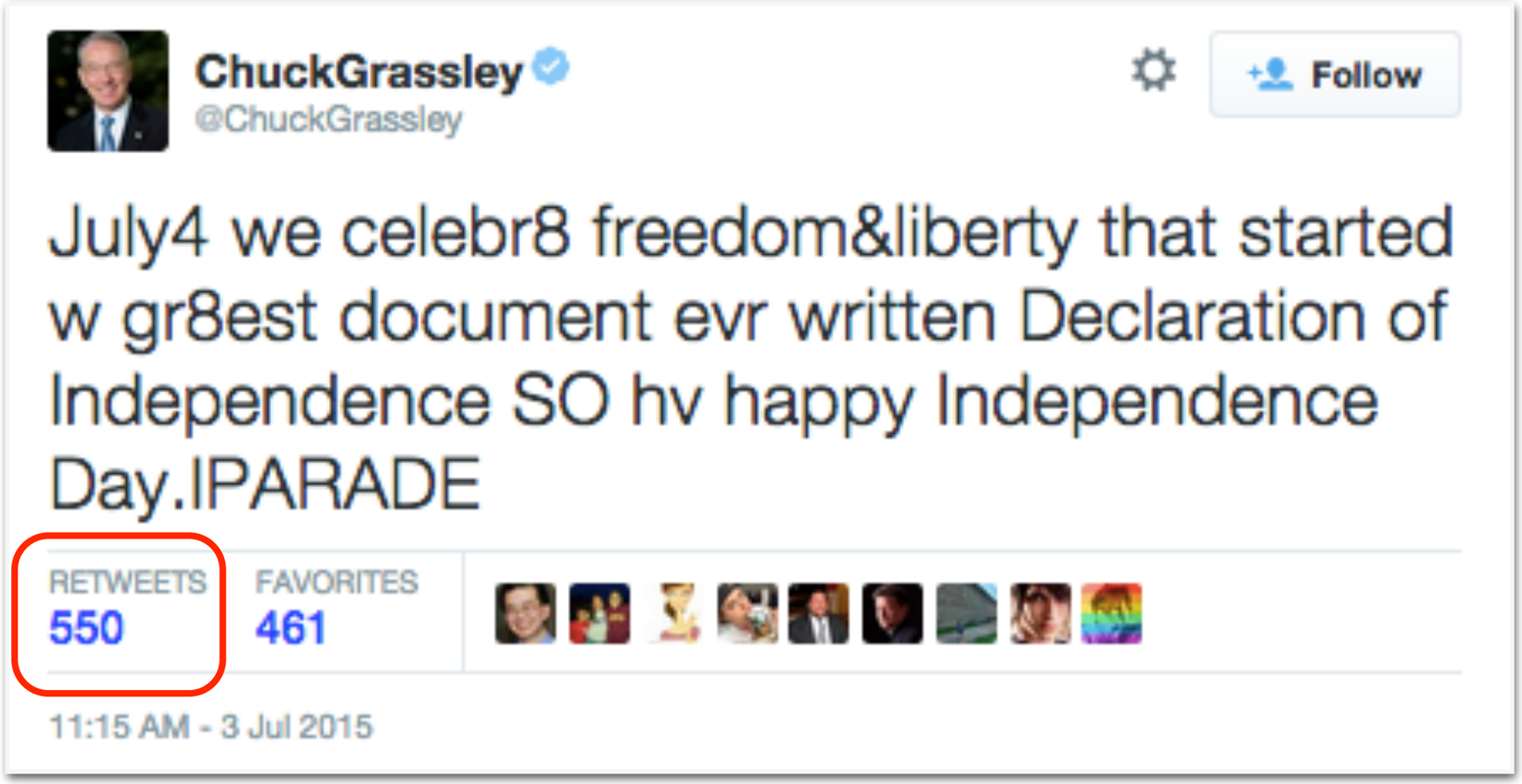

todder
Todder had a long night.
Too many drinks! Please wait for the Tylenol to kick in and try again.


I STILL PREFER RIDING TEH RAILS.

Tweets


ChuckGrassley
@ChuckGrassley
Follow
July4 we celebr8 freedom&liberty that started w gr8est document evr written Declaration of Independence SO hv happy Independence Day.IPARADE
RETWEETS
550
FAVORITES
461
11:15 AM - 3 Jul 2015

ReTweets

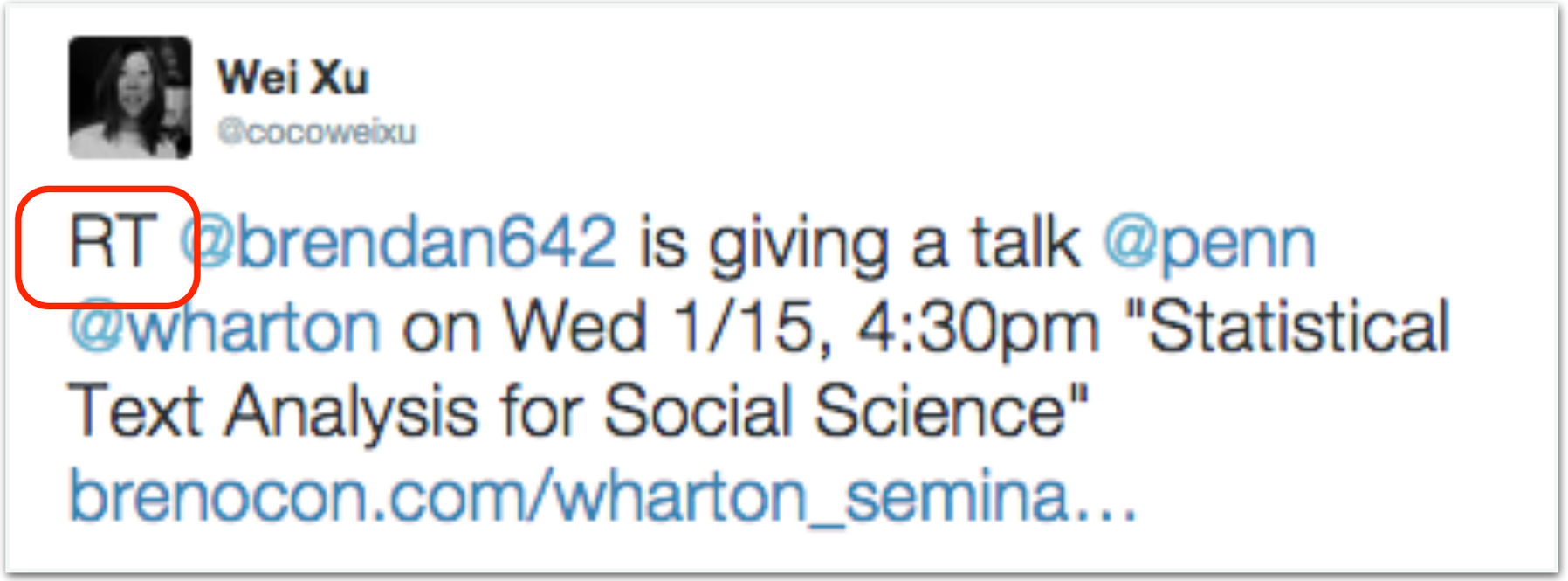


a re-posting of someone else's Tweet

Disclaimer:

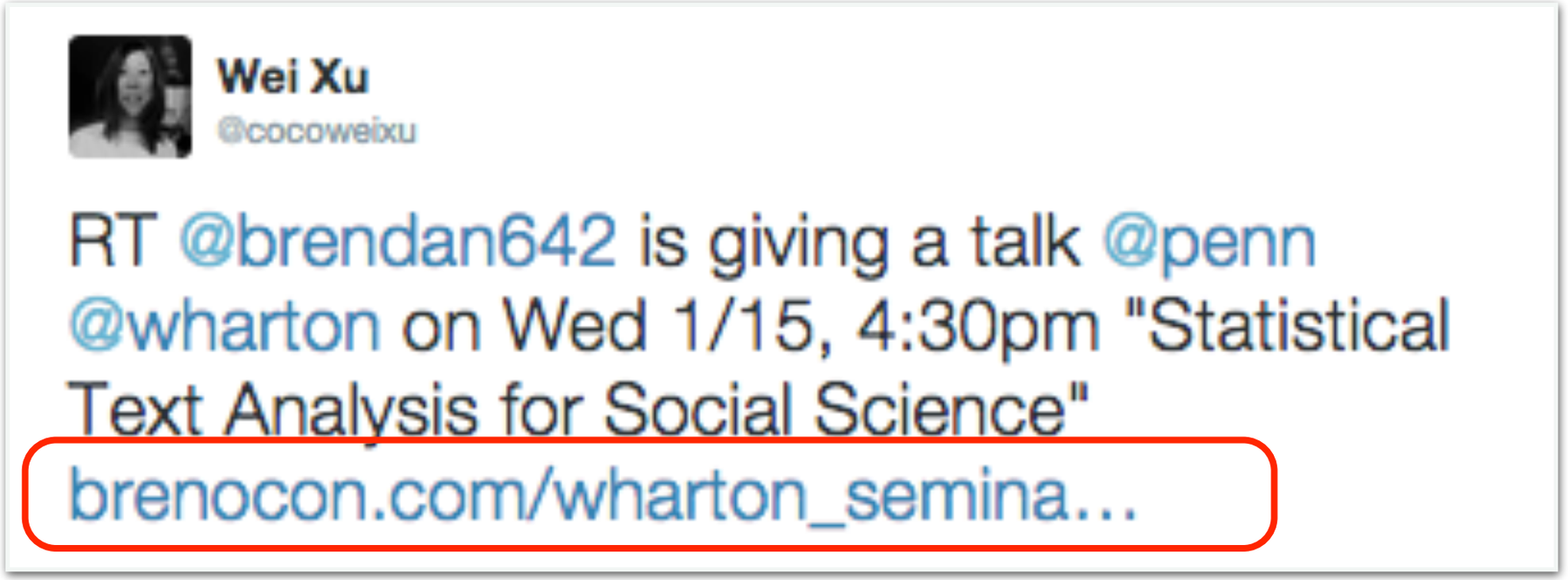
I am going to use many of my own tweets as examples in the slides …

ReTweets



- not an official Twitter feature
- often signifies quoting another user
- sometimes creates problems for data analytics

Embedded Links



- shortened for display

Embedded Links

- can provide extra external information for text processing

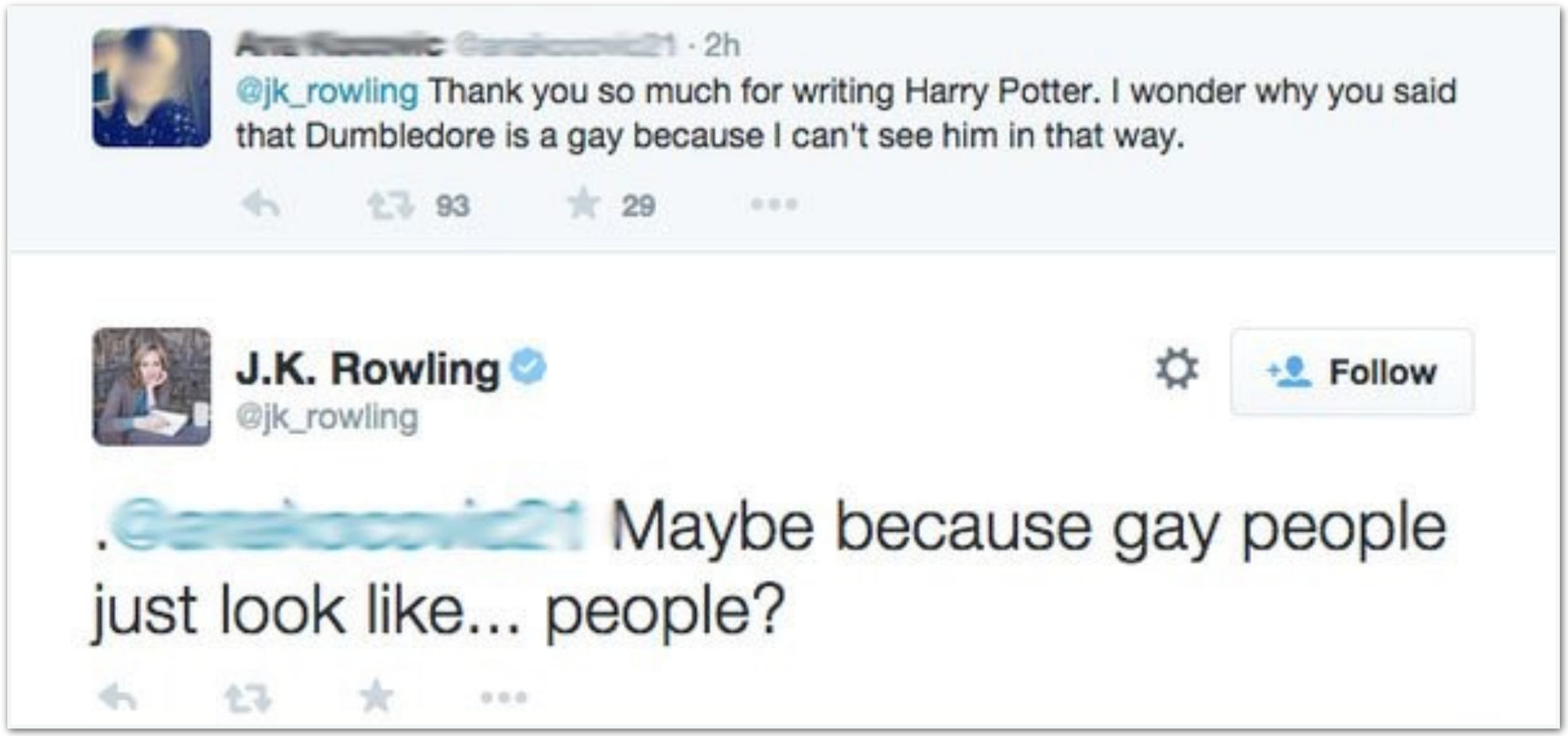
Mentions

Wei Xu
@cocoweixu

RT @brendan642 is giving a talk @penn @wharton on Wed 1/15, 4:30pm "Statistical Text Analysis for Social Science" brenocon.com/wharton_semina…

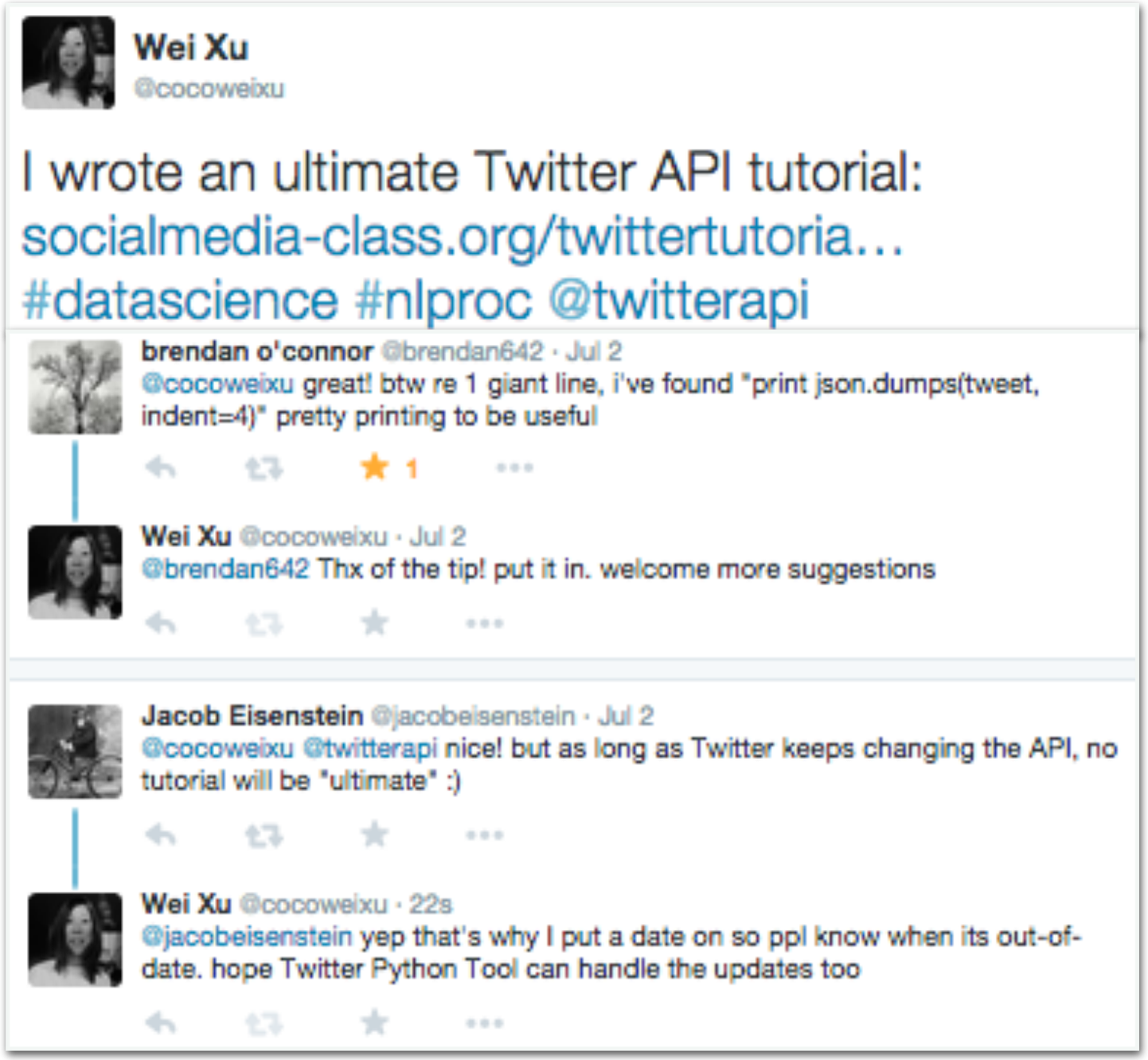
- user's @username anywhere in the body of the Tweet

Replies/Conversations



- Tweet starts with a @username

Replies/Conversations

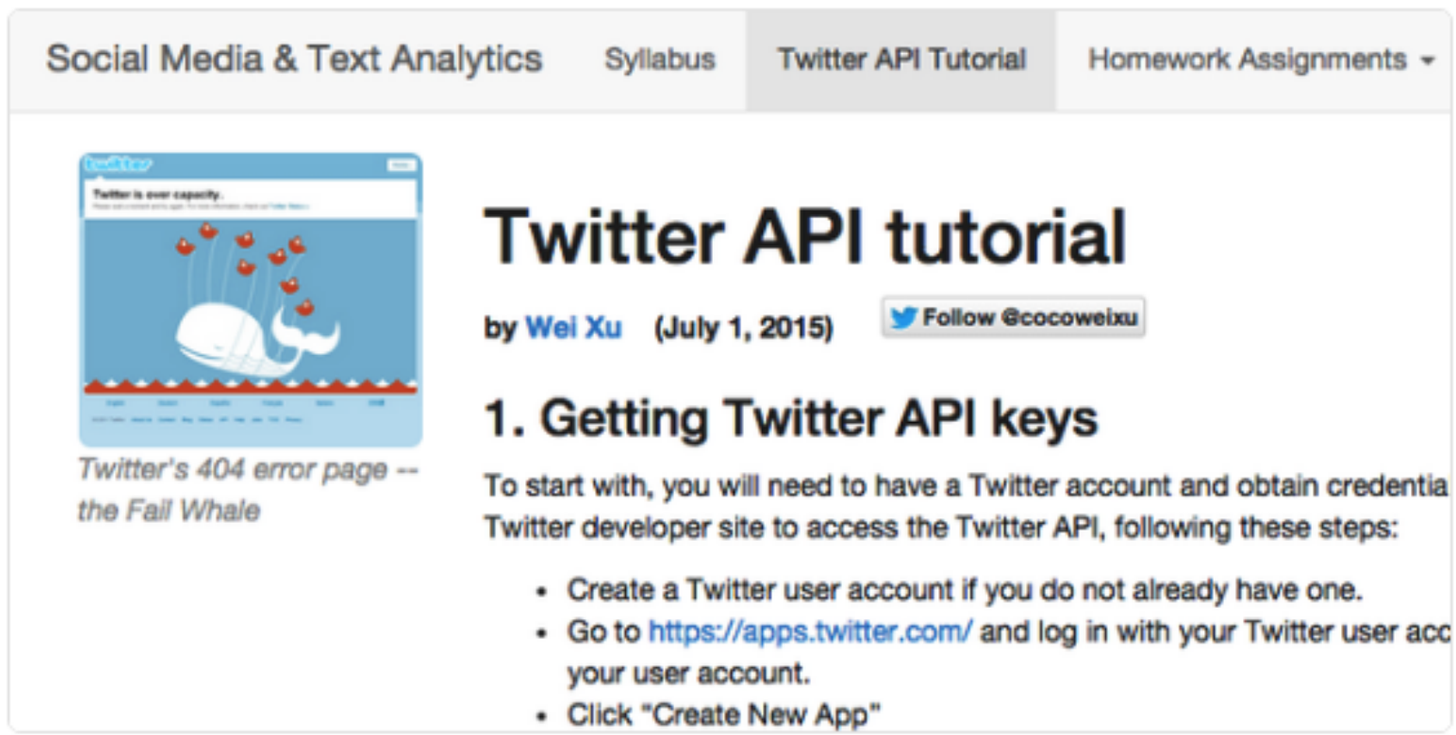


- can have multi-round conversations

Images

Wei Xu
@cocoweixu

I wrote an ultimate Twitter API tutorial:
socialmedia-class.org/twittertutoria…
#datascience #nlproc @twitterapi



Twitter's 404 error page -- the Fail Whale

RETWEETS 45 LIKES 79

11:55 AM - 2 Jul 2015

45 79

Hashtags

Wei Xu
@cocoweixu

I wrote an ultimate Twitter API tutorial:
socialmedia-class.org/twittertutoria…
#datascience #nlproc @twitterapi

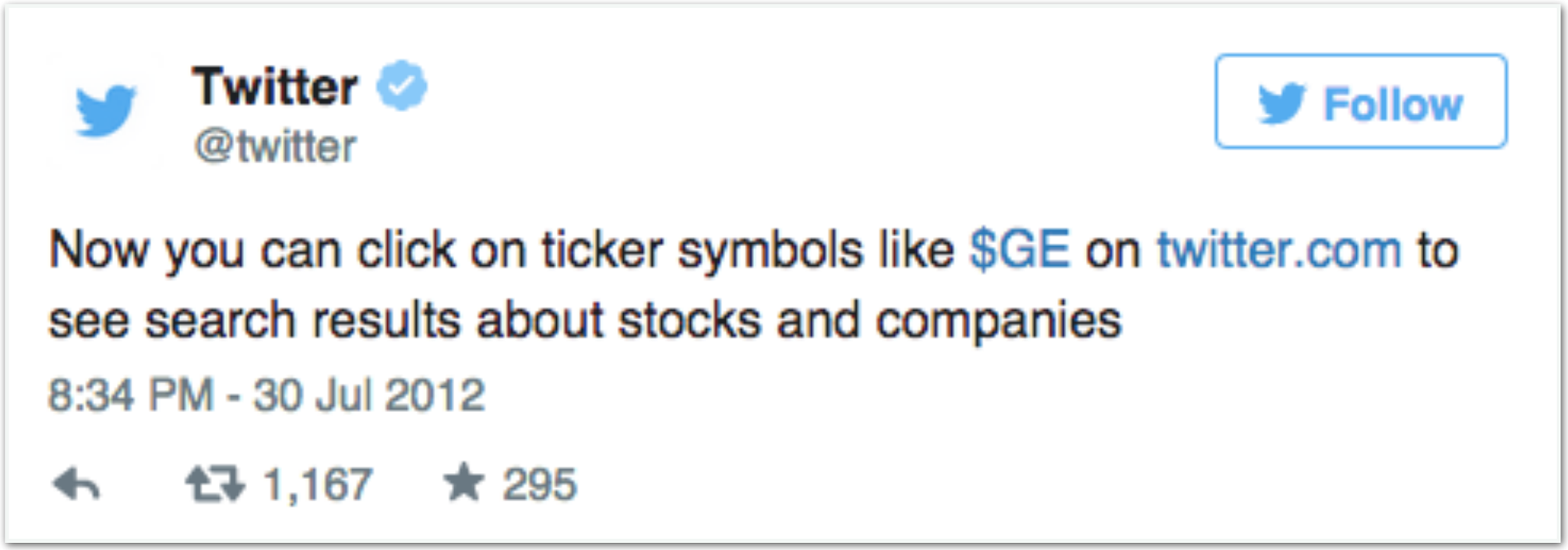
RETWEETS 45 LIKES 79

11:55 AM - 2 Jul 2015

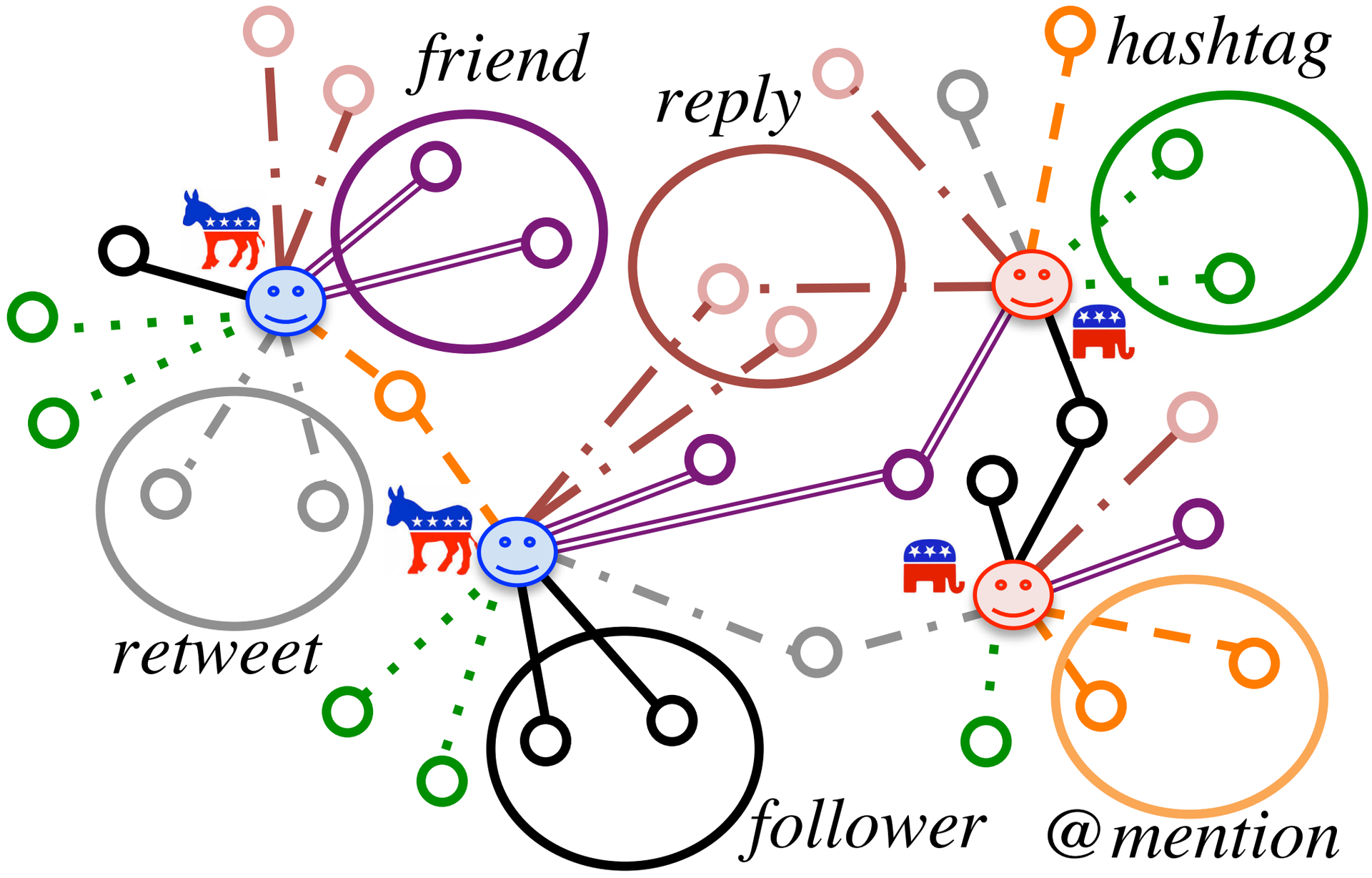
45 79

hashtags are powerful

Cashtags


Twitter
@twitter
Follow
Now you can click on ticker symbols like $GE on twitter.com to see search results about stocks and companies
8:34 PM - 30 Jul 2012
1,167
295

Twitter's Social Graph



Source: Volkova, Van Durme, Yarowsky, Bachrach
"Tutorial on Social Media Predictive Analytics" NAACL 2015

Twitter API

What is an API?

Application **P**rogramming **I**nterface

API is a set of protocols that specify how software programs communicate with each other.

What is an API?

> **Without API:**
> An app finds the current weather in London by opening http://www.weather.com/ and reading the webpage like a human does, interpreting the content.

> **With API:**
> An app finds the current weather in London by sending a message to the weather.com API (in a structured format like XML). The weather.com API then replies with a structured response.

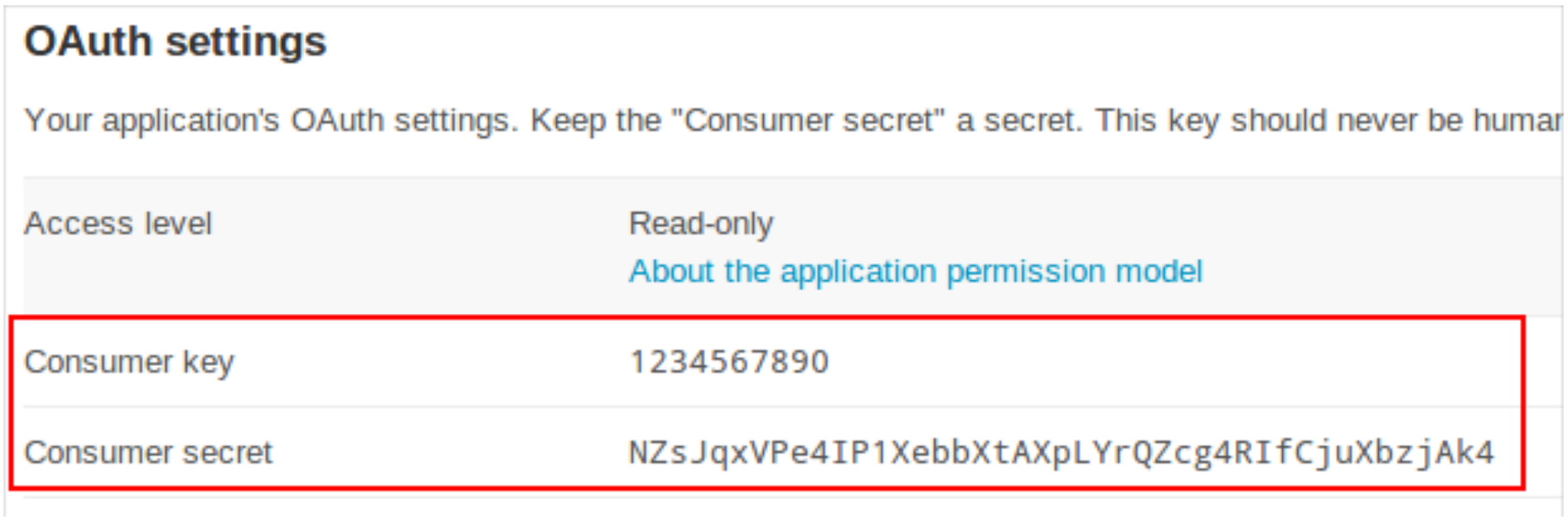
Source: Chris Beach @ Quora

Two Most Popular APIs

Streaming API	**REST API**
a sample of public tweets and events as they published on Twitter (can specify search terms or users)	- search - trends - read author profile and follower data - post / modify
only real-time data	historical data up to a week
continuous net connection	one-time request
no limit	rate limit (varies for different requests)

OAuth

- Twitter uses OAuth to provide authorized access to its API.
- which means, to start with needs:
  - a Twitter account
  - OAuth access tokens from apps.twitter.com



Python Twitter Tools

Streaming API

```
# Import the necessary package to process data in JSON format
try:
    import json
except ImportError:
    import simplejson as json

# Import the necessary methods from "twitter" library
from twitter import Twitter, OAuth, TwitterHTTPError, TwitterStream

# Variables that contains the user credentials to access Twitter API
ACCESS_TOKEN = 'YOUR ACCESS TOKEN"'
ACCESS_SECRET = 'YOUR ACCESS TOKEN SECRET'
CONSUMER_KEY = 'YOUR API KEY'
CONSUMER_SECRET = 'ENTER YOUR API SECRET'

oauth = OAuth(ACCESS_TOKEN, ACCESS_SECRET, CONSUMER_KEY, CONSUMER_SECRET)

# Initiate the connection to Twitter Streaming API
twitter_stream = TwitterStream(auth=oauth)

# Get a sample of the public data following through Twitter
iterator = twitter_stream.statuses.sample()
```

OAuth →

connection →

JSON

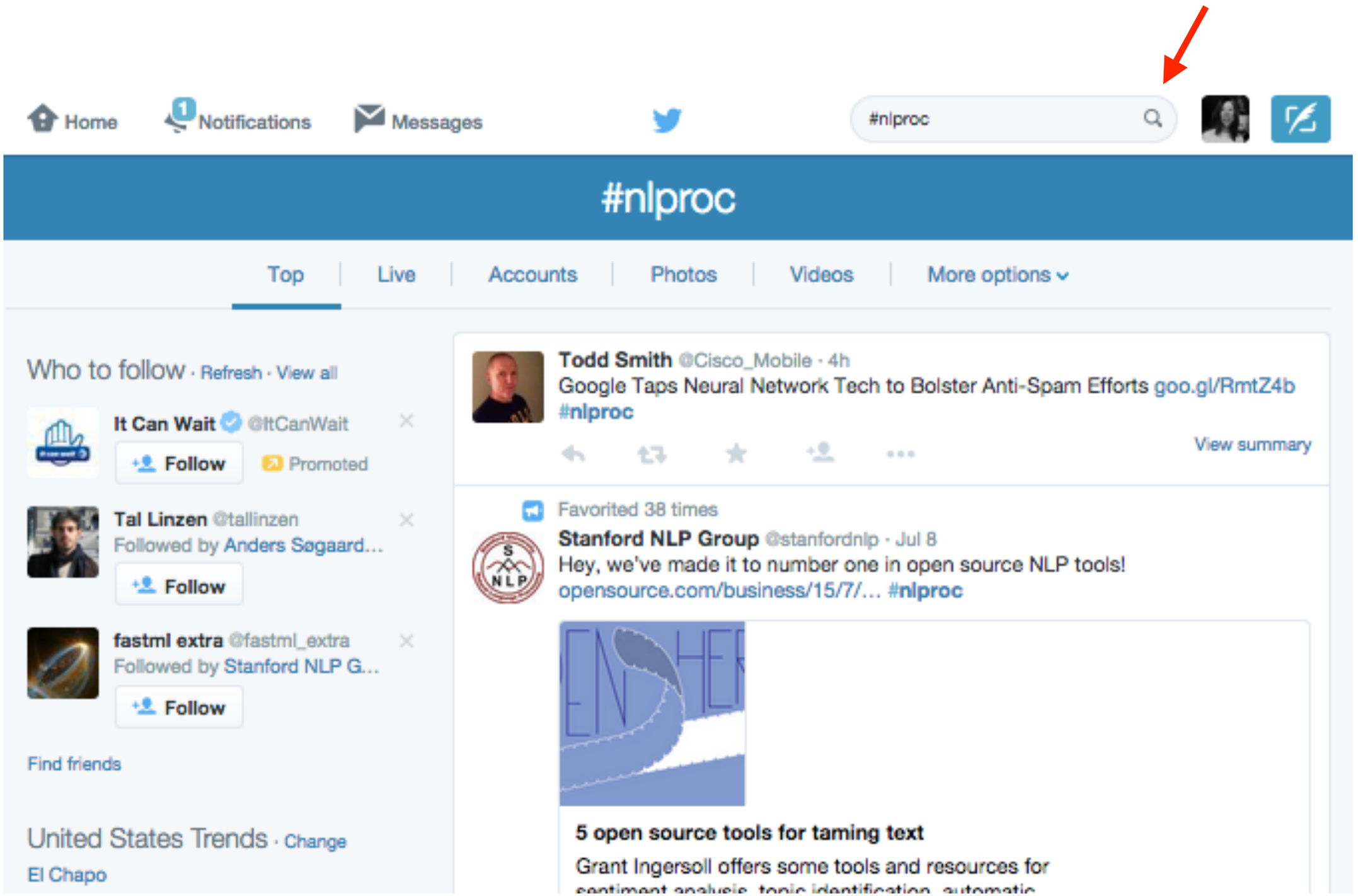
JavaScript Object Notation

JSON is a minimal, readable format for structuring data.

A Tweet in JSON

```
{
   "favorited": false,
   "contributors": null,
   "truncated": false,
   "text": "#CFP Workshop on Noisy User-generated Text at ACL - Beijing 31 July 2015. Papers due: 11 May 2015. http://t.co/rcygyEowqH   #NLProc #WNUT15",
   "possibly_sensitive": false,
   "in_reply_to_status_id": null,
   "user": {
      "follow_request_sent": null,
      "profile_use_background_image": true,
      "default_profile_image": false,
      "id": 237918251,
      "verified": false,
      "profile_image_url_https": "https://pbs.twimg.com/profile_images/527088456967544832/Dn
```

Search


Home
Notifications
Messages
#nlproc
#nlproc
Top
Live
Accounts
Photos
Videos
More options
Who to follow · Refresh · View all
It Can Wait @ItCanWait
Follow
Promoted
Tal Linzen @tallinzen
Followed by Anders Søgaard...
Follow
fastml extra @fastml_extra
Followed by Stanford NLP G...
Follow
Find friends
United States Trends · Change
El Chapo
Todd Smith @Cisco_Mobile · 4h
Google Taps Neural Network Tech to Bolster Anti-Spam Efforts goo.gl/RmtZ4b #nlproc
View summary
Favorited 38 times
Stanford NLP Group @stanfordnlp · Jul 8
Hey, we've made it to number one in open source NLP tools!
opensource.com/business/15/7/... #nlproc
5 open source tools for taming text
Grant Ingersoll offers some tools and resources for

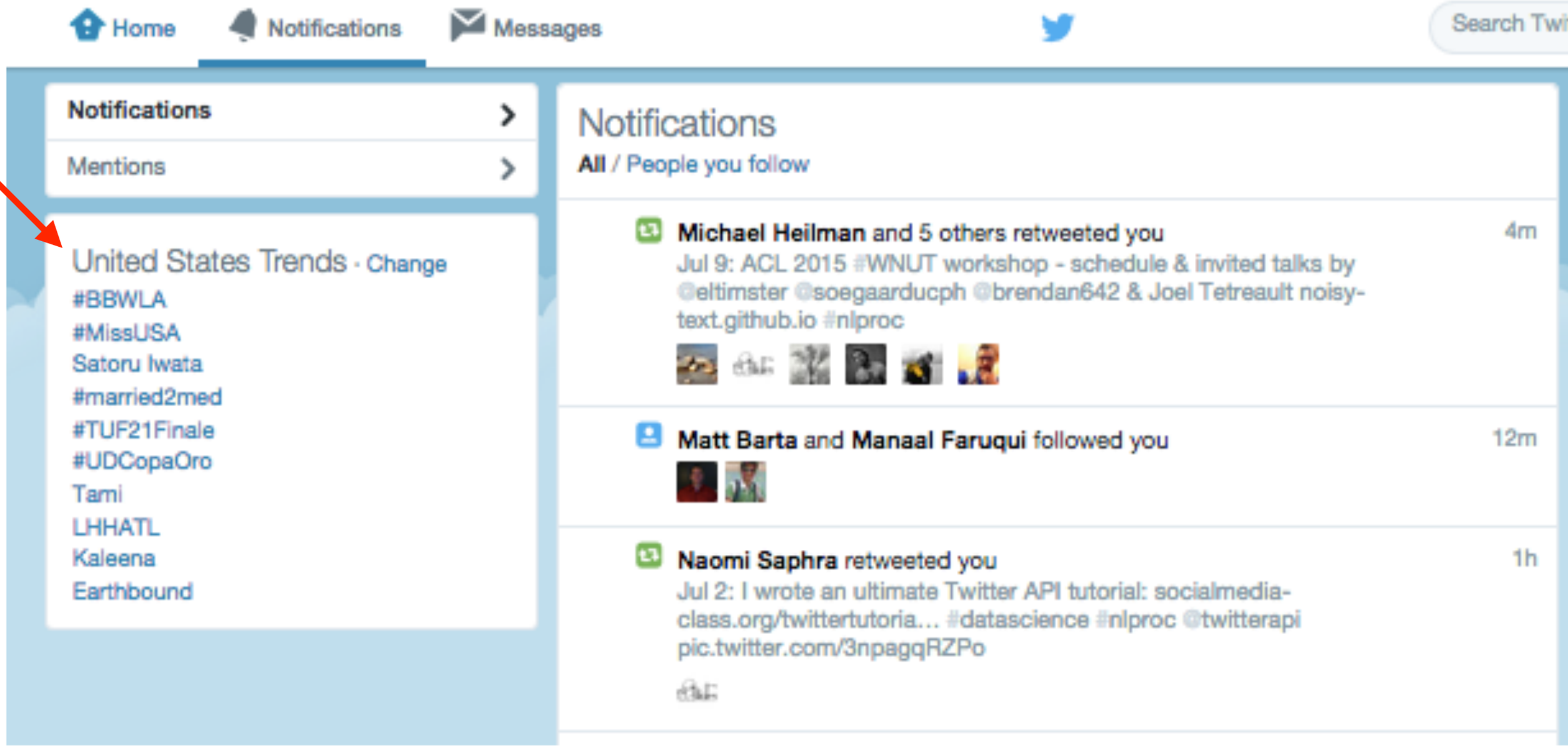
Search API

```
# Initiate the connection to Twitter REST API
twitter = Twitter(auth=oauth)
```

```
# Search for latest tweets about "#nlproc"
twitter.search.tweets(q='#nlproc')
```

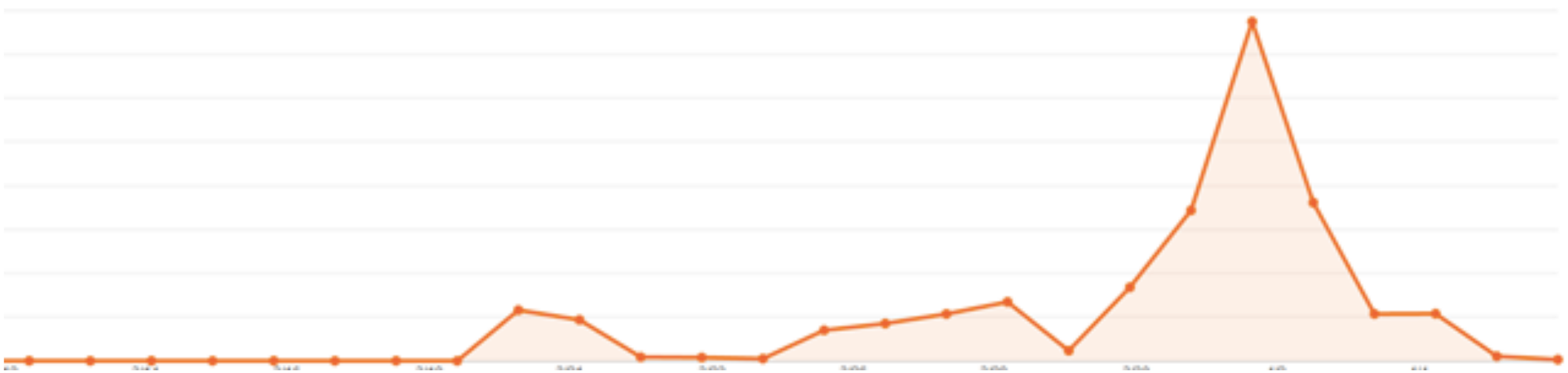
```
twitter.search.tweets(q='#nlproc', result_type='recent', lang='en', count=10)
```

Trends


Home
Notifications
Messages
Search Twi
Notifications
Mentions
United States Trends · Change
#BBWLA
#MissUSA
Satoru Iwata
#married2med
#TUF21Finale
#UDCopaOro
Tami
LHHATL
Kaleena
Earthbound
Notifications
All / People you follow
Michael Heilman and 5 others retweeted you
4m
Jul 9: ACL 2015 #WNUT workshop - schedule & invited talks by @eltimster @soegaarducph @brendan642 & Joel Tetreault noisy-text.github.io #nlproc
Matt Barta and Manaal Faruqui followed you
12m
Naomi Saphra retweeted you
1h
Jul 2: I wrote an ultimate Twitter API tutorial: socialmedia-class.org/twittertutoria… #datascience #nlproc @twitterapi pic.twitter.com/3npagqRZPo

Trends

trending topics are determined by an unpublished algorithm, which finds words, phrases and hashtags that have had a sharp increase in popularity, as opposed to overall volume.



Trends API

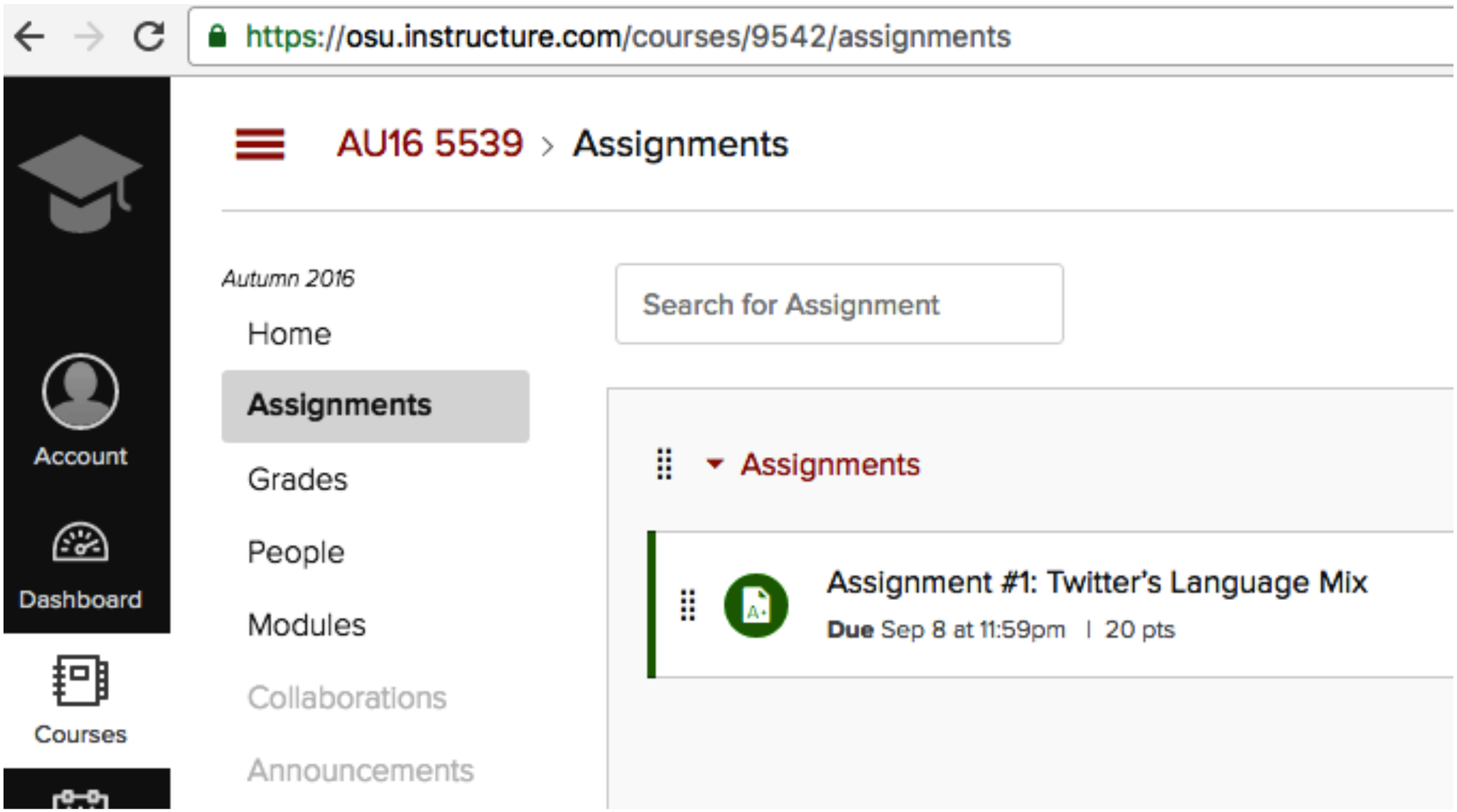
Where On Earth ID

```
# Get all (it's always 10) trending topics in San Francisco (its WOEID is 2487956)
sfo_trends = twitter.trends.place(_id = 2487956)
```


```
{
   "created_at":"2015-07-01T22:09:55Z",
   "trends":[
      {
         "url":"http://twitter.com/search?q=%23LiesIveToldMyParents",
         "query":"%23LiesIveToldMyParents",
         "name":"#LiesIveToldMyParents",
         "promoted_content":null
      },
      {
         "url":"http://twitter.com/search?q=%22Kevin+Love%22",
         "query":"%22Kevin+Love%22",
         "name":"Kevin Love",
         "promoted_content":null
      },

      ... [and another 8 trends omitted here to save space]
```

In-class Exercise

- Become a Twitter User (if you haven't)
- Learn to use Twitter API
- Work on homework #1

Homework #1 is out
Due in a week