

Social Media & Text Analysis

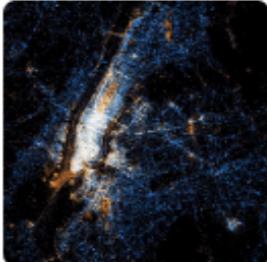
lecture 2 - Twitter API

CSE 5539-0010 Ohio State University
Instructor: Alan Ritter
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)

Have a Question?

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

The screenshot shows the Piazza Q&A Board interface for the course CSE 5539-0010. The top navigation bar includes links for AU 16 5539, Q & A (which is underlined), Resources, Statistics, and Manage Class. Below the navigation is a toolbar with links for polls, hw1, hw2, hw3, hw4, and a New Post button. The main content area shows a note titled "Welcome to CSE 5539-0010 (and bring yo". The note text reads: "Hi All, Welcome to CSE 5539-0010: Social Media and Text Analytics. Please remember to bring your laptop (if you have one) to the class and try it out in the class! The course homepage is: http://socialmedia-class.org/".

PIAZZA

AU 16 5539 ▾ Q & A Resources Statistics Manage Class

polls hw1 hw2 hw3 hw4

Unread Updated Unresolved Following

New Post Search or add a post...

PINNED

Private Search for Teammates! 8/30/16 1

TODAY

Instr Welcome to CSE 5539-0010 (...) 12:59AM

Hi All, Welcome to CSE 5539-0010: Social Media and Text Analytics. Please remember to bring your laptop (if you have one) to the class and try it out in the class!

YESTERDAY

Welcome to CSE 5539-0010 (and bring yo

Hi All,

Welcome to CSE 5539-0010: Social Media and Text Analytics.

Please remember to bring your laptop (if you have one) to the class and try it out in the class!

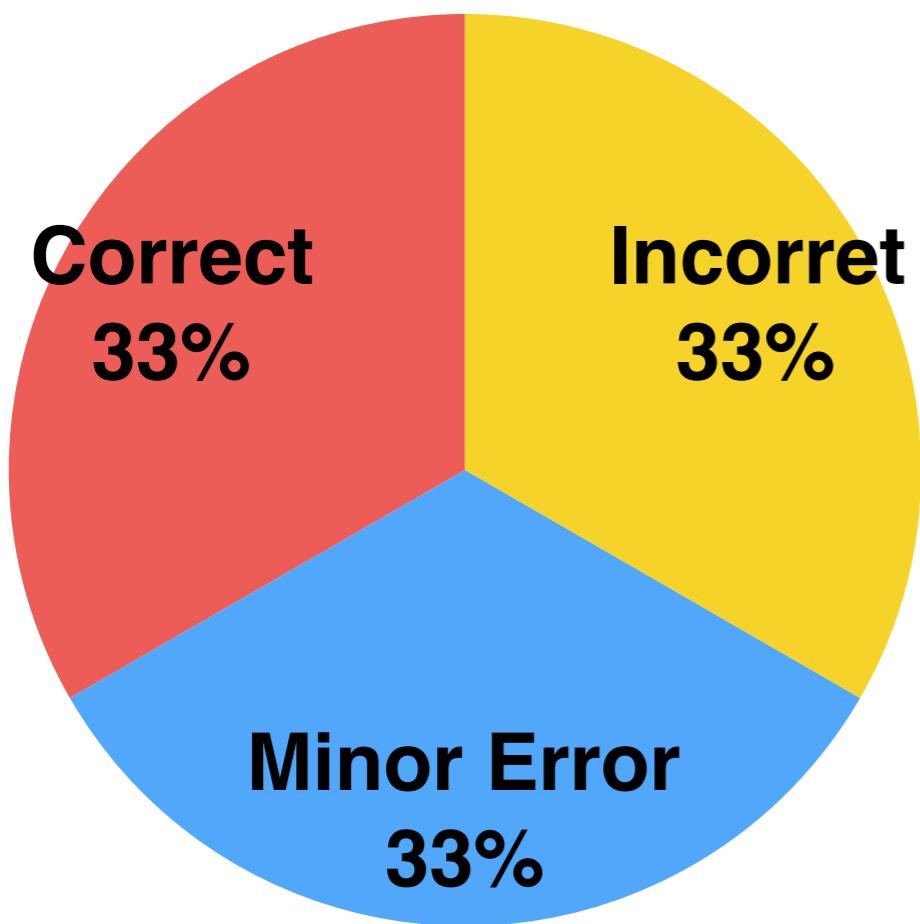
The course homepage is: <http://socialmedia-class.org/>

This is a Special Topic Class

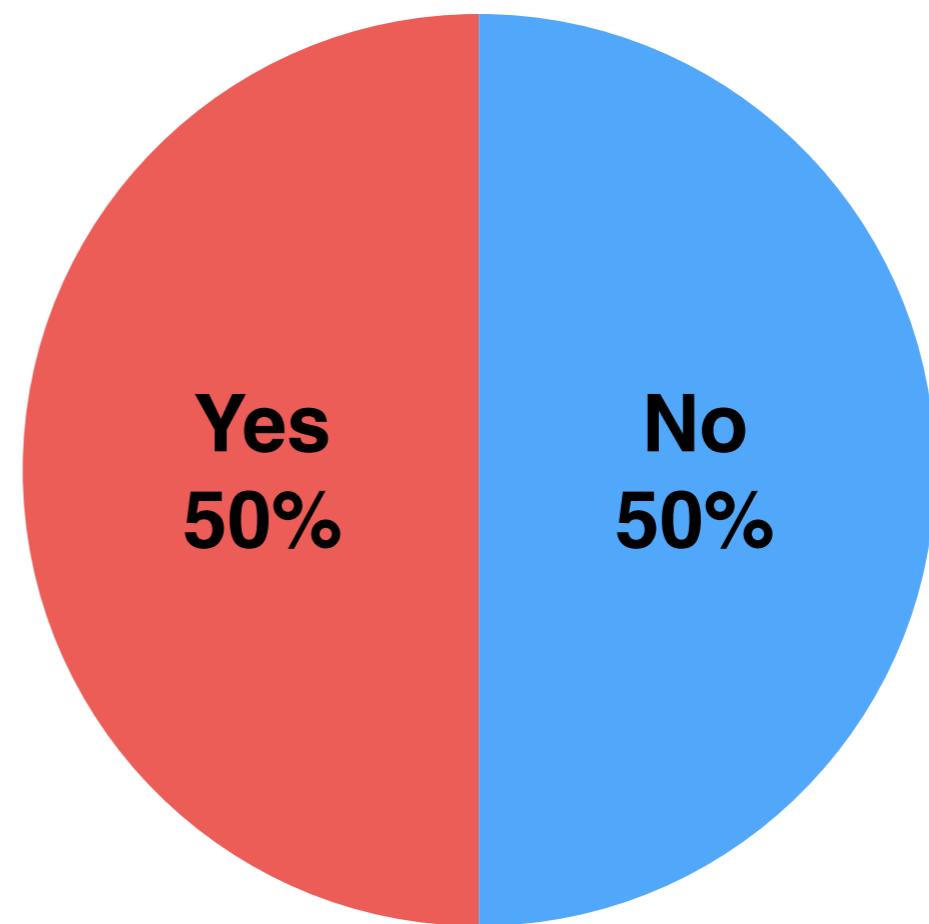
- It is about NLP **research**, not programming.
(pre-requirements: familiar with Python programming)
- Homework #2 can be **difficult** (not about software engineering, but machine learning algorithm — difficult to debug).
- Students are required to think hard and **independently** for solutions.

Homework #2 (last year)

HW#2
(Main Algorithm)



HW#2
(Axillary Algorithm)



Alternatives

- **audit** the course or take LING 5801 (Computational Linguistics I)
- **more background:** CSE 3521, 5521, 3522, Stat 3460, 3470
- **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

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 $\text{softmax}(\mathbf{x})_i = \frac{e^{x_i}}{\sum_j e^{x_j}}$
- prove

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

Useful for improving the numerical stability of the computation!

Quiz #1

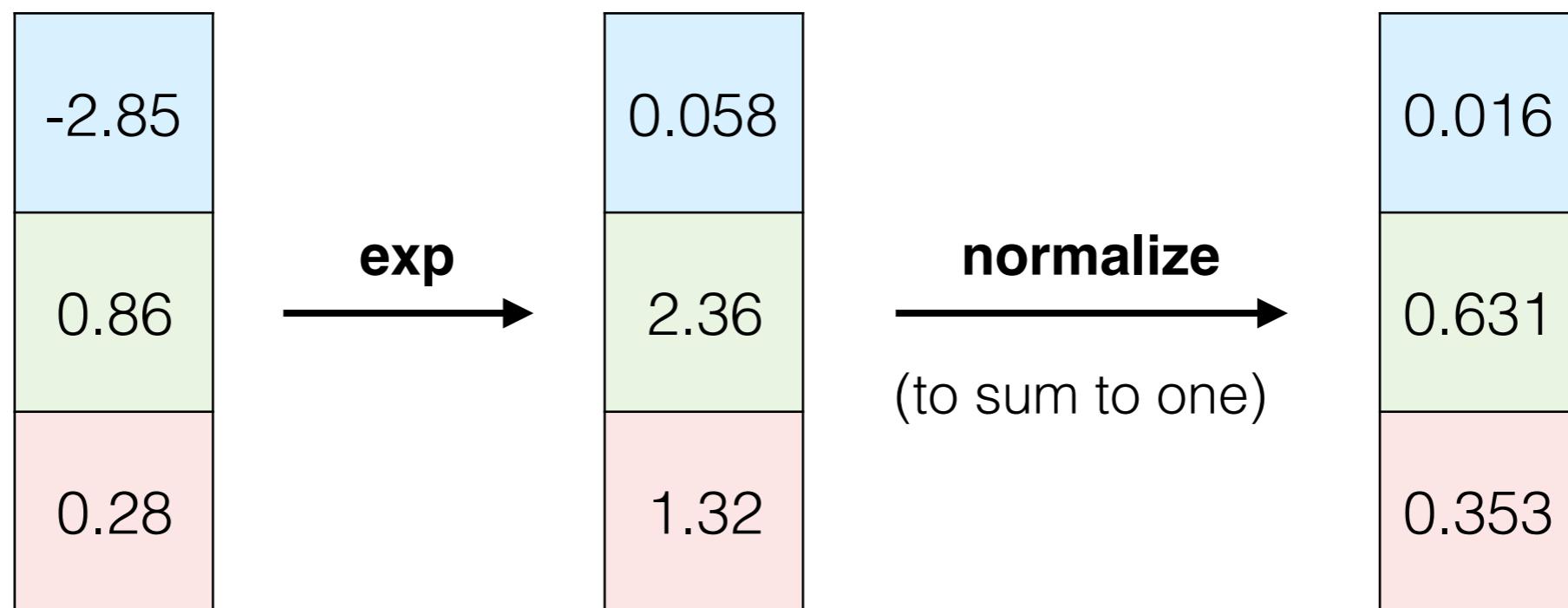
- implement Softmax function in Python
(need to be computationally efficient)

```
1 import numpy as np
2
3 def softmax(x):
4
5     # Handle the special case: when vector x is only 1-dimensional
6     if x.ndim <= 1:
7         x = x - np.max(x)           ← A normalization trick for numerical stability!
8         ex = np.exp(x)             (highest value in the vector becomes 0)
9         return ex / np.sum(ex)
10
11
12     ### YOUR CODE HERE -- for vectors that are not 1-dimensional
13
14
15
16
17
18
19     ### END YOUR CODE
20
21     return dist
22
23
24 # Check your Softmax implementation
25
26 print softmax(np.array([[101,102],[-1,-2]]))
```

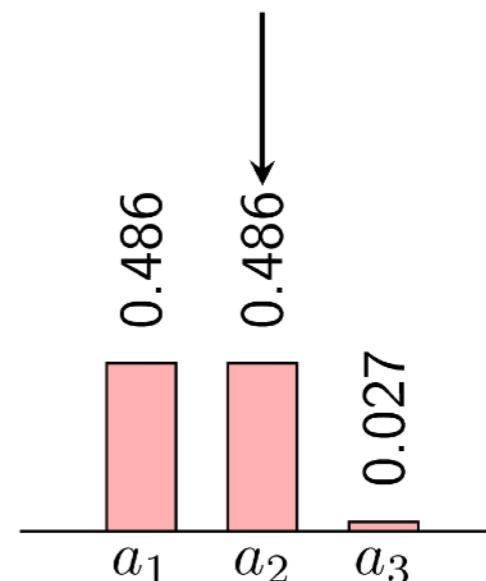
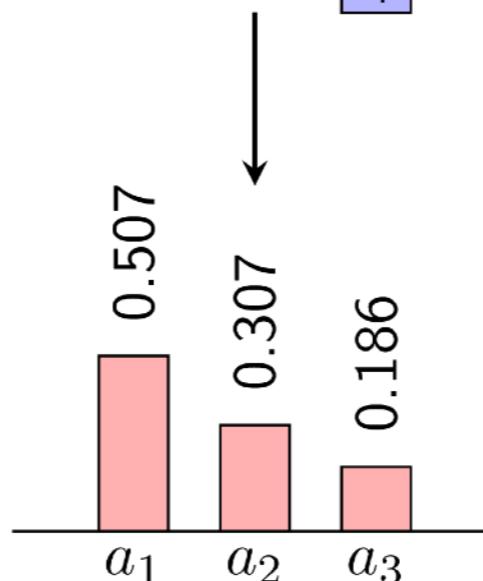
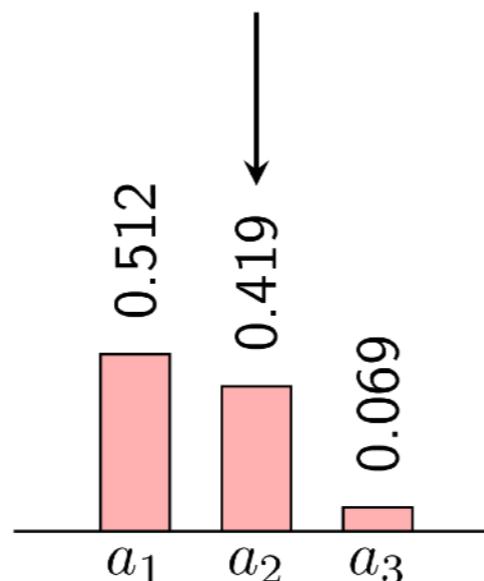
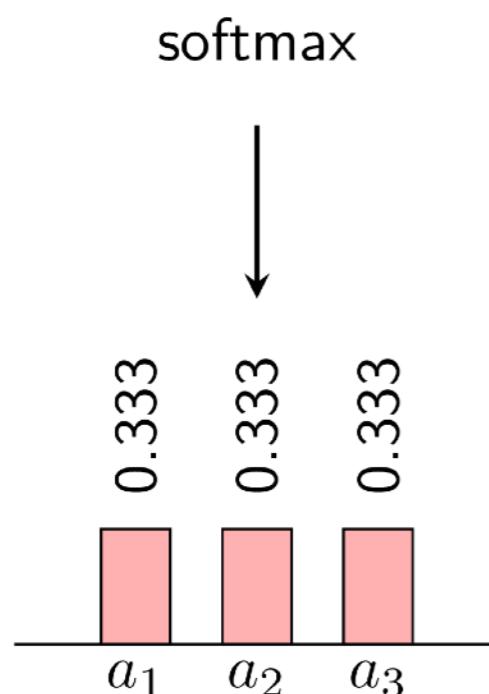
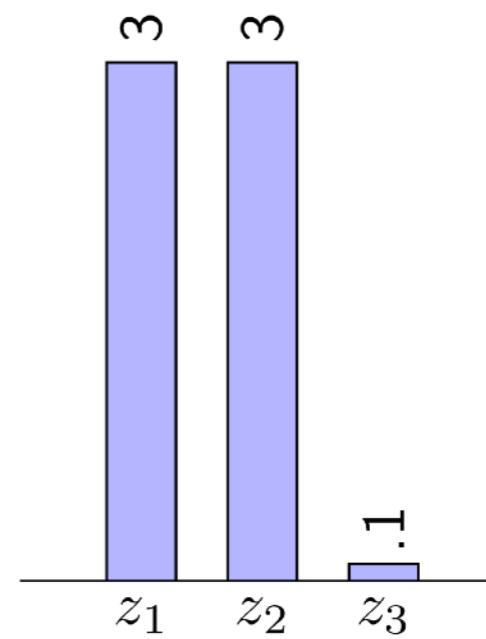
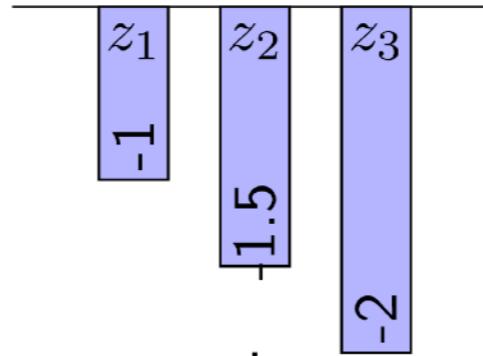
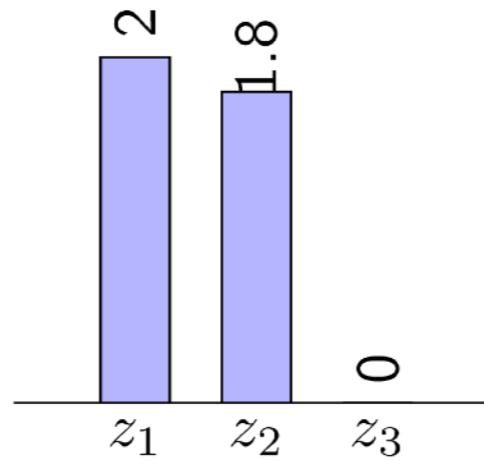
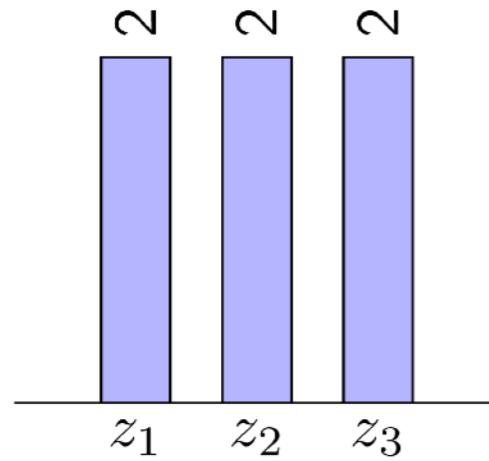
A normalization trick for numerical stability!
(highest value in the vector becomes 0)

Softmax Function

$$\text{softmax}(\mathbf{x})_i = \frac{e^{x_i}}{\sum_j e^{x_j}}$$



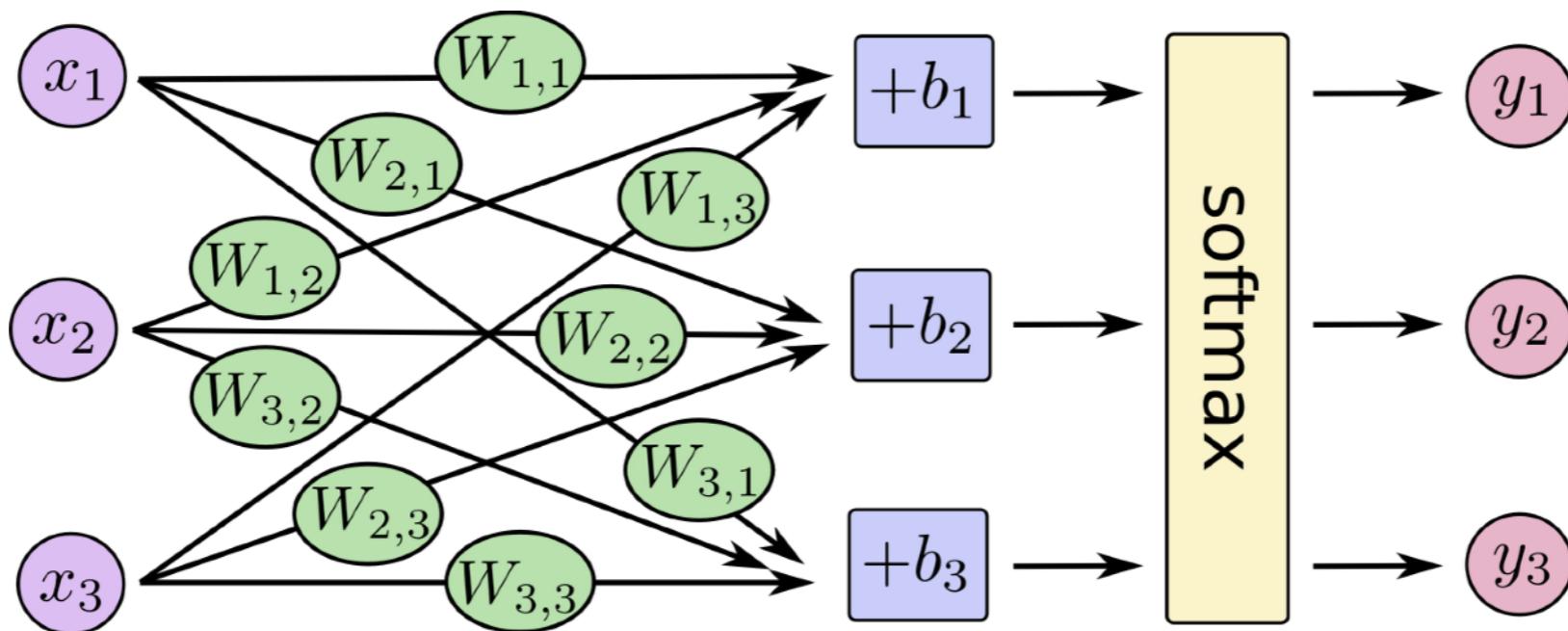
Softmax



see also: <http://cs231n.github.io/linear-classify/#softmax>

Softmax Function

- softmax regression (multinomial logistic regression)
- often used as the output layer in neural networks



- We will learn later in the class

Quiz #2

- derivative of the Sigmoid function:
- use the chain rule:

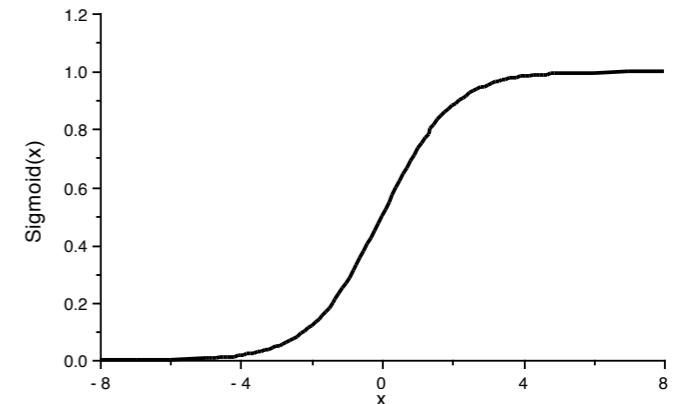
if $f = g(u)$ and $u = h(x)$, i.e. $f(x) = g(h(x))$, then:

$$\frac{df}{dx} = \frac{df}{du} \frac{du}{dx} = \frac{dg(u)}{du} \frac{dh(x)}{dx}$$

The Derivative of a Sigmoid

We noted earlier that the Sigmoid is a smooth (i.e. differentiable) threshold function:

$$f(x) = \text{Sigmoid}(x) = \frac{1}{1 + e^{-x}}$$

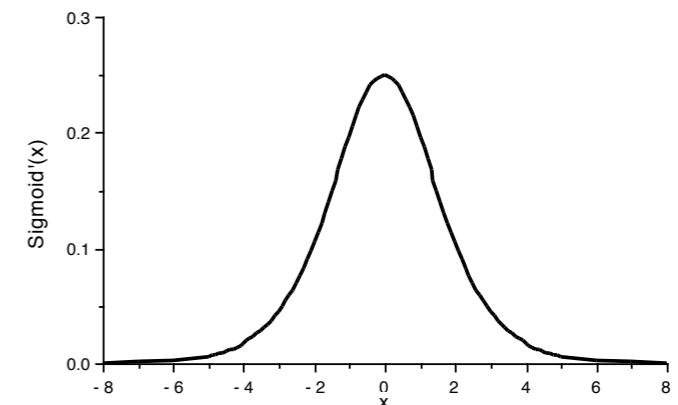


We can use the chain rule by putting $f(x) = g(h(x))$ with $g(h) = h^{-1}$ and $h(x) = 1 + e^{-x}$ so

$$\frac{\partial g(h)}{\partial h} = -\frac{1}{h^2} \quad \text{and} \quad \frac{\partial h(x)}{\partial x} = -e^{-x}$$

$$\frac{\partial f(x)}{\partial x} = -\frac{1}{(1 + e^{-x})^2} \cdot (-e^{-x}) = \left(\frac{1}{1 + e^{-x}}\right) \cdot \left(\frac{1 + e^{-x} - 1}{1 + e^{-x}}\right)$$

$$f'(x) = \frac{\partial f(x)}{\partial x} = f(x) \cdot (1 - f(x))$$



This simple relation will make our equations much easier and save a lot of computing time!

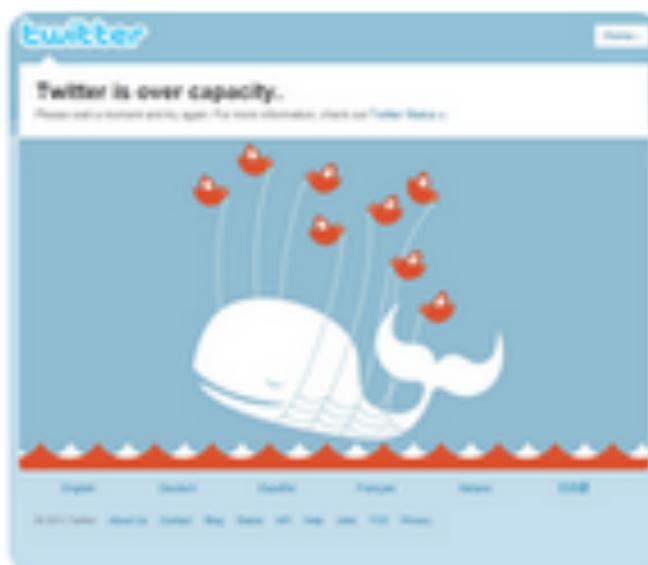
Twitter API Tutorial: socialmedia-class.org

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](#)

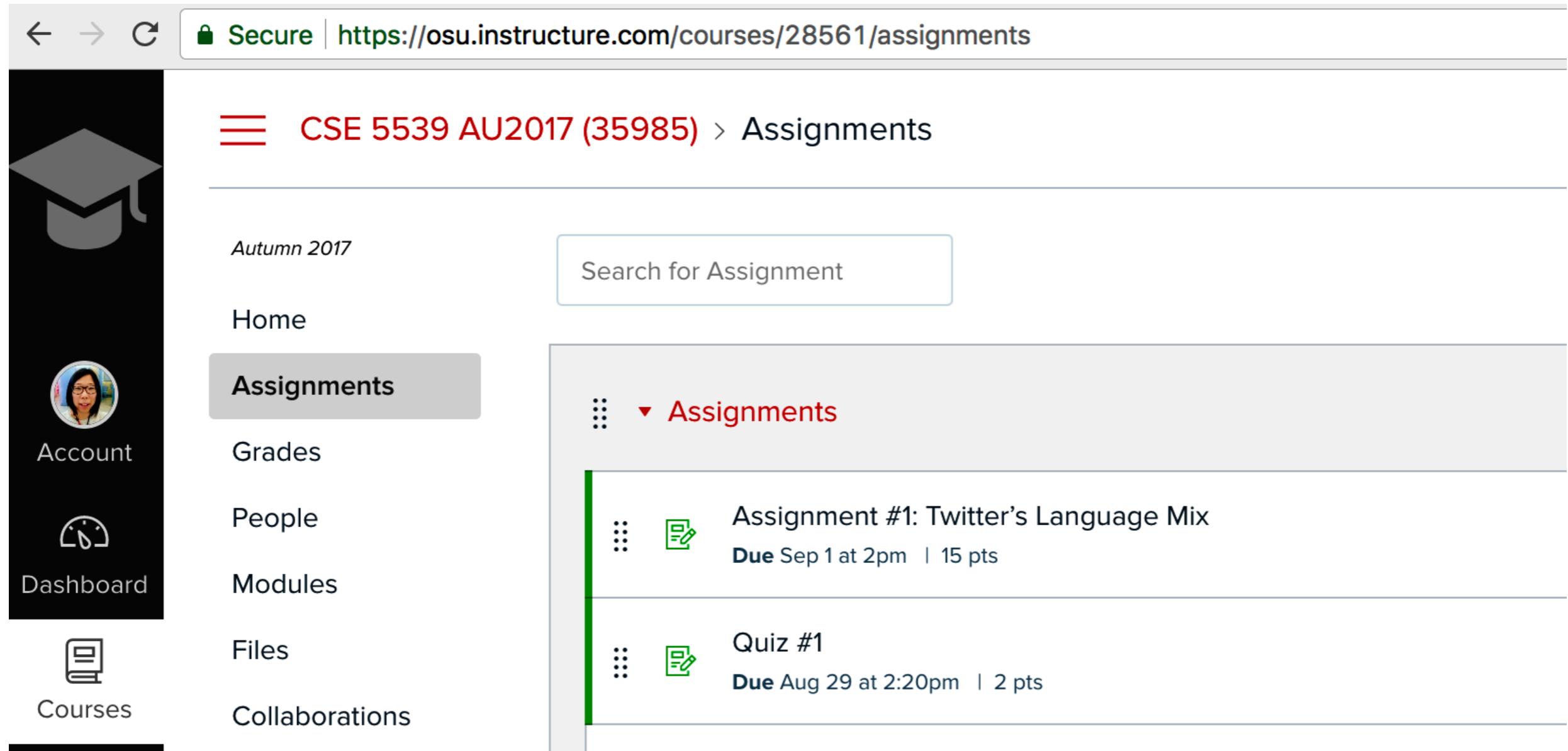
1. Getting Twitter API keys

To start with, you will need to have a Twitter account and obtain credentials from the 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 account.
- Click "Create New App"

Homework #1 is out

Due next Tuesday (Sep 5)



The screenshot shows the Canvas Learning Management System interface. The top navigation bar is secure and shows the URL <https://osu.instructure.com/courses/28561/assignments>. The main title is "CSE 5539 AU2017 (35985) > Assignments". On the left, there is a sidebar with icons for Account (profile picture), Dashboard (clock), Courses (book), and Collaborations. The "Assignments" tab is selected and highlighted in grey. The main content area displays the "Autumn 2017" term and a search bar labeled "Search for Assignment". Below this, there is a section titled "Assignments" with two items listed:

- Assignment #1: Twitter's Language Mix**
Due Sep 1 at 2pm | 15 pts
- Quiz #1**
Due Aug 29 at 2:20pm | 2 pts

Reading #1 is out

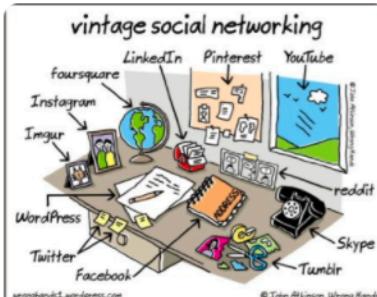
Due Sep 12

Social Media & Text Analytics

Syllabus

Twitter API Tutorial

Homework ▾



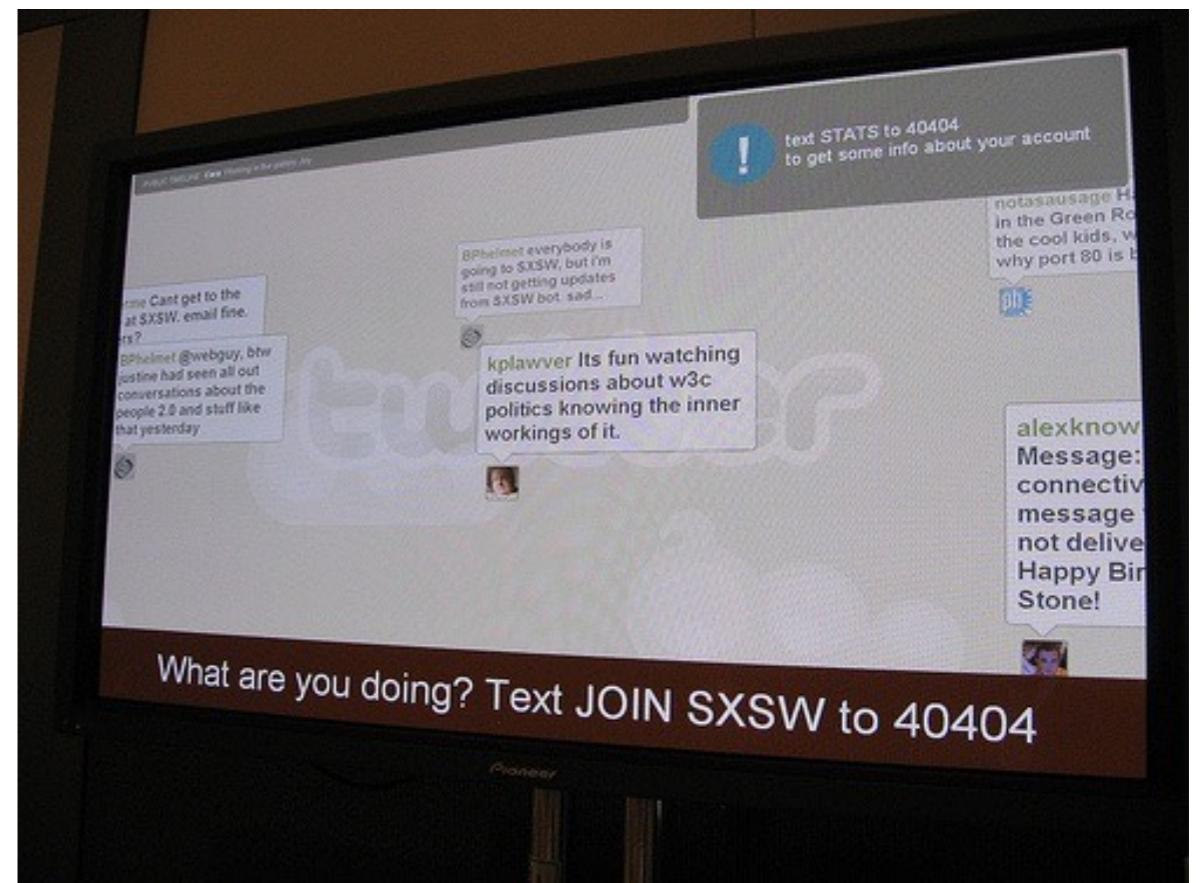
Vintage Social Media

Subject to change as the Fall 2017 term progresses. ★ marks the required reading.

Lecture	Topic	Readings
August 22, 2017	Introduction <ul style="list-style-type: none">• Introduction of social media and natural language processing research• Overview of the course	<p>★ Diurnal and Seasonal Mood Vary with Work, Sleep, and Daylength Across Diverse Cultures by Golder and Macy (Science 2011)</p> <p>Psychological Language on Twitter Predicts County-Level Heart Disease Mortality by Eichstaedt et al. (Psychological Science 2015)</p> <p>Google's Python class by Nick Parlante</p> <p>Intro to NLP in Python by Bird, Klein, Loper</p>
August 29, 2017	Twitter and Twitter API Tutorial [Quiz1 due] <ul style="list-style-type: none">• Brief history of Twitter• Key features of Twitter• Hands-on instructions on obtaining Twitter data via APIs	<p>★ Twitter API Tutorial by the instructor Wei Xu</p> <p>★ What is Twitter, a Social Network or a News Media? by Kwak, Lee, Park and Moon (WWW 2010)</p>

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

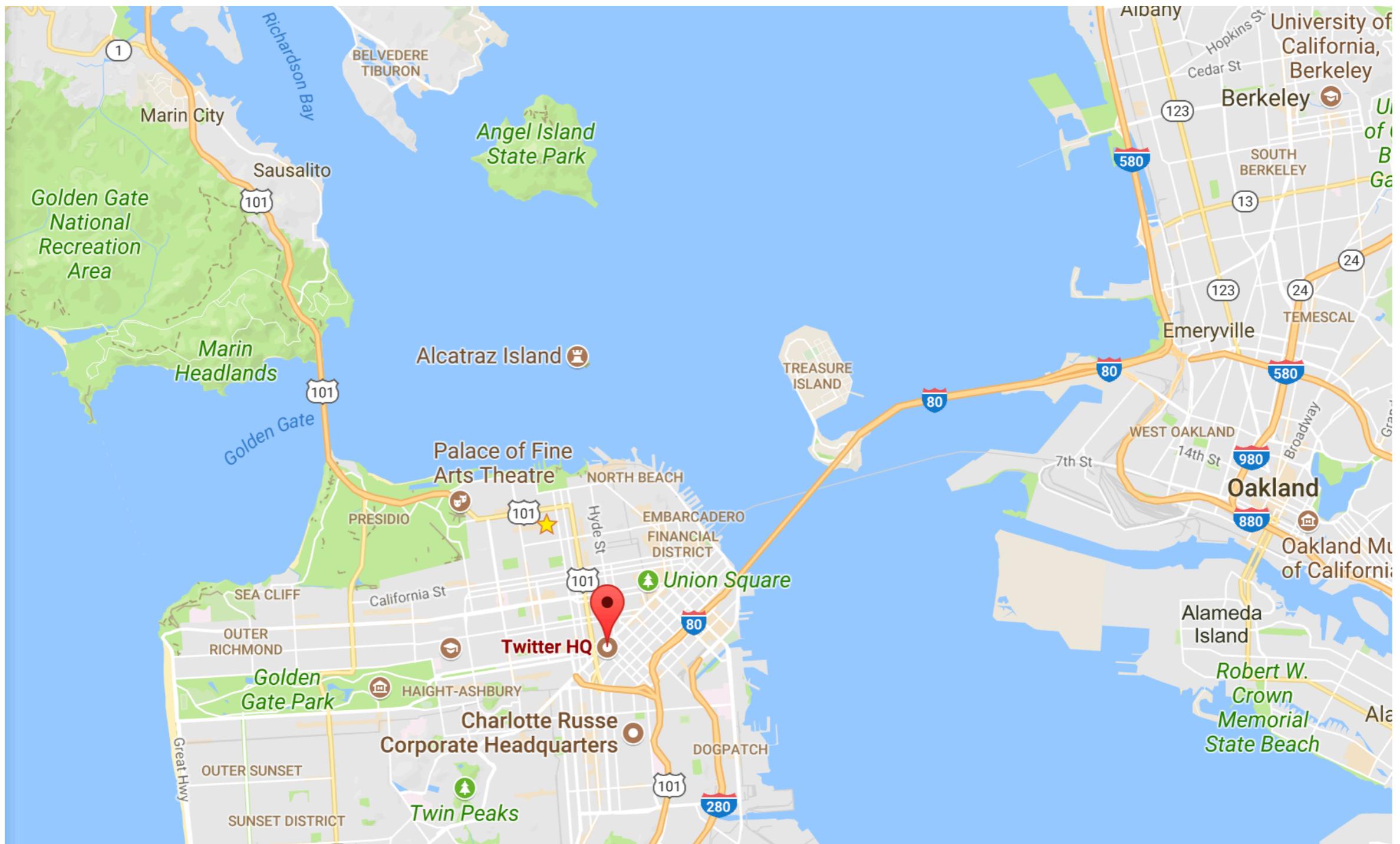
- IPO in 2013 Q4
- market value \$24b,
revenue \$435m, net loss
\$162m in 2015 Q1
- CEO Dick Costolo resigned
July 1st, 2015

Market summary > Twitter Inc
NYSE: TWTR - Jan 17, 6:51 PM EST

24.56 USD **↓0.10 (0.41%)**
After-hours: 24.56 0.00%

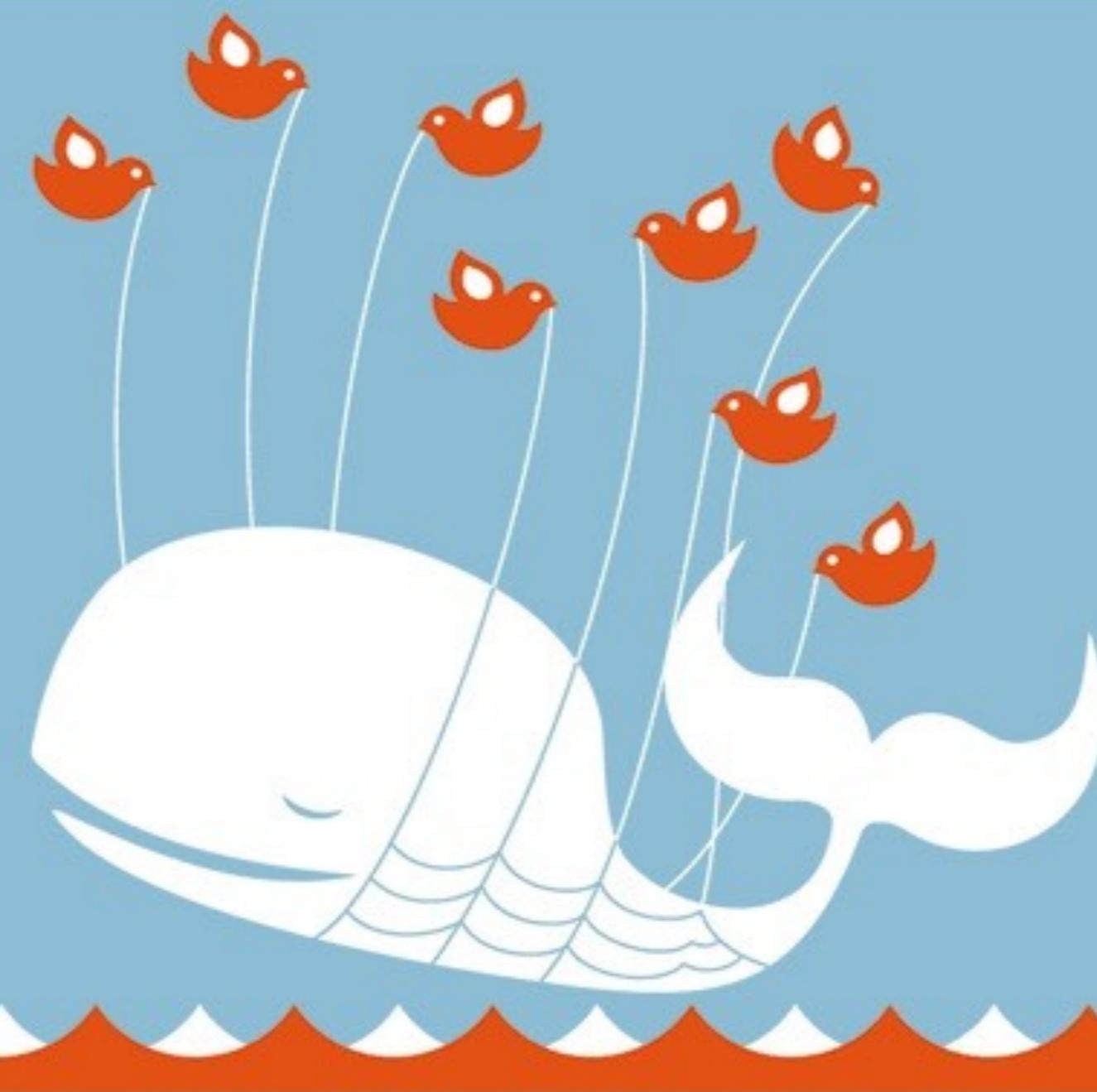


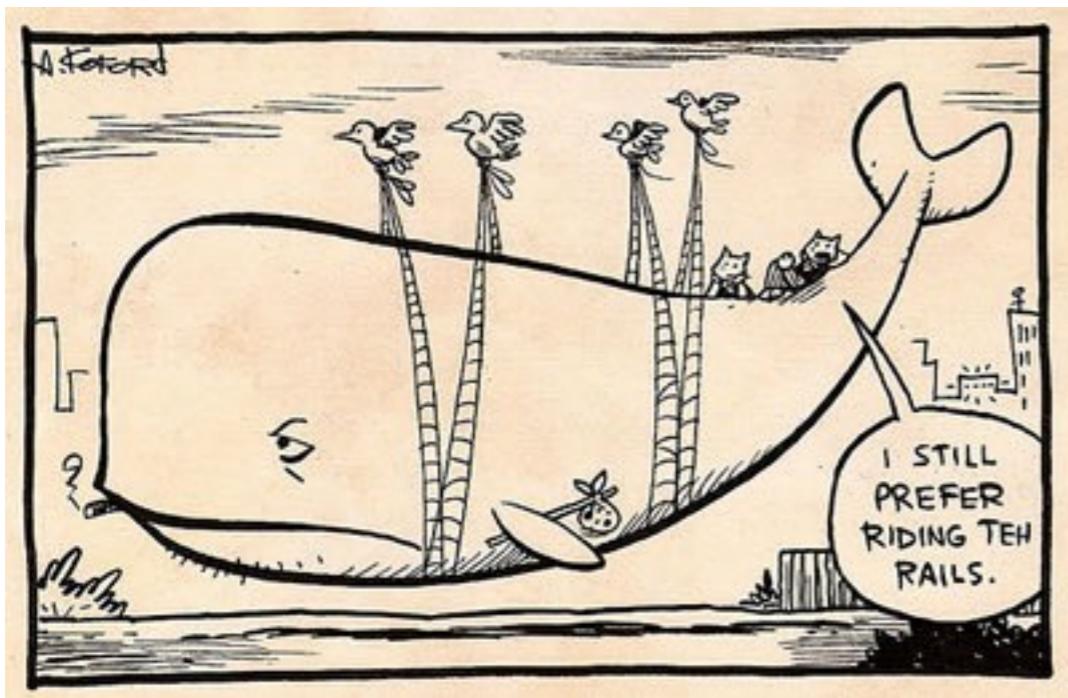
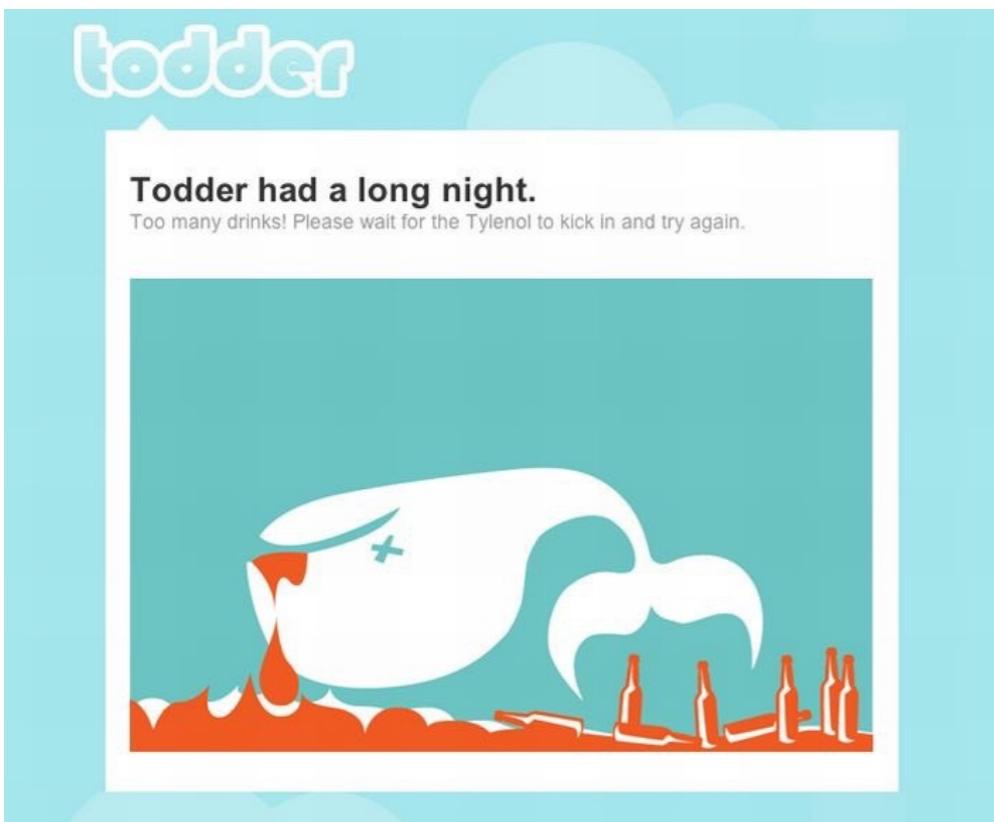
Twitter HQ (since 2012)



Twitter is over capacity.

Please wait a moment and try again. For more information, check out [Twitter Status »](#)

[English](#)[Deutsch](#)[Español](#)[Français](#)[Italiano](#)[日本語](#)



Tweets

 **ChuckGrassley** 
@ChuckGrassley

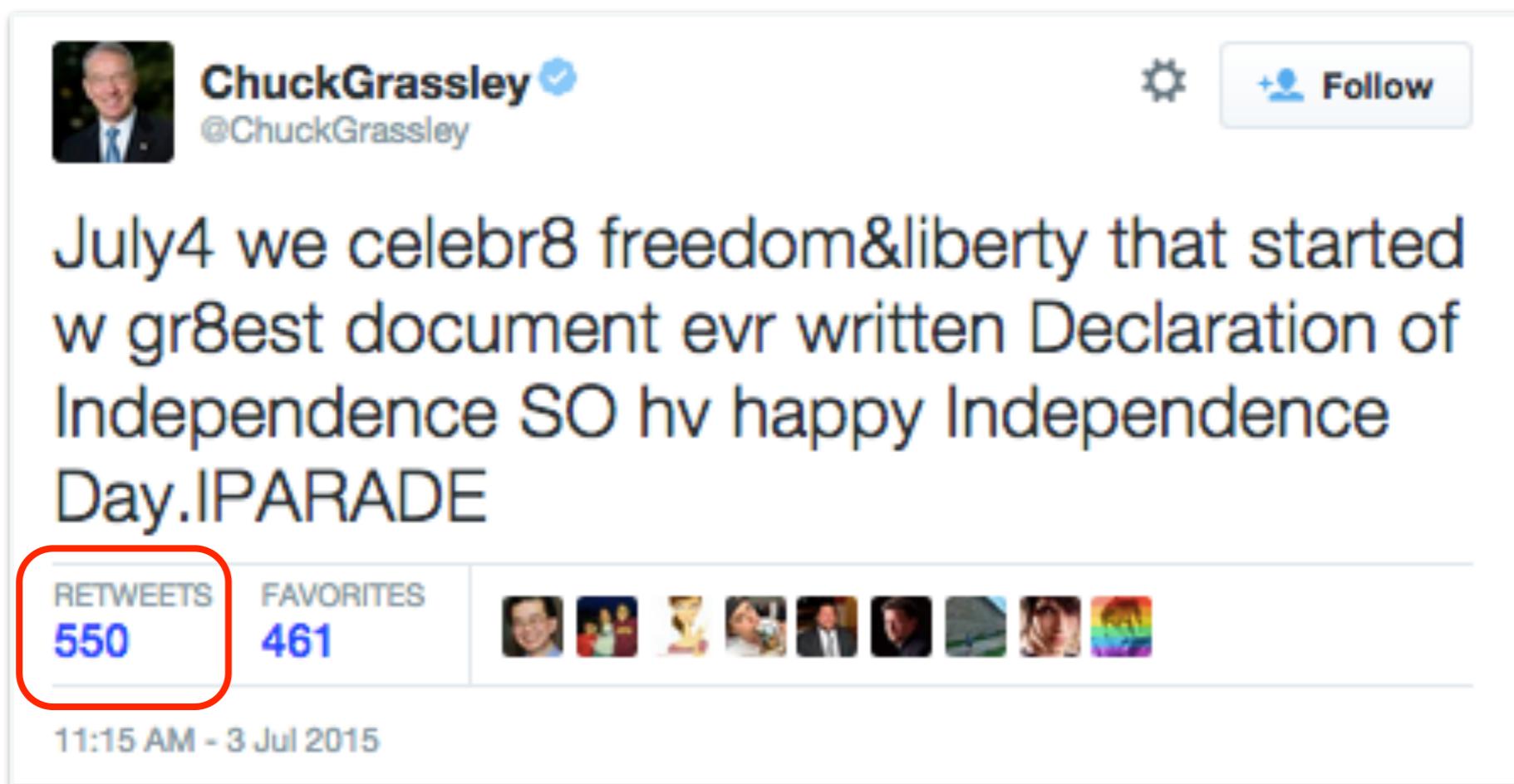
July4 we celeb8 freedom&liberty that started
w gr8est document evr written Declaration of
Independence SO hv happy Independence
Day.IPARADE

RETWEETS FAVORITES
550 **461**



11:15 AM - 3 Jul 2015

ReTweets



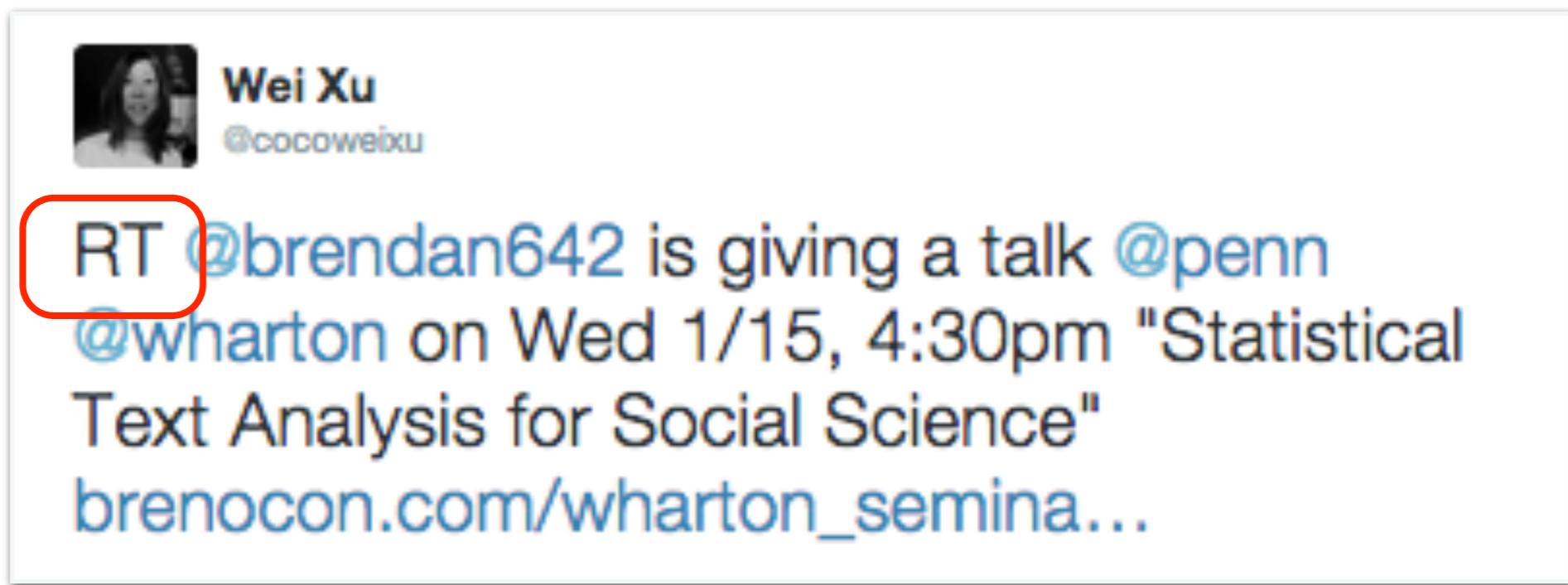
July4 we celeb8 freedom&liberty that started w gr8est document evr written Declaration of Independence SO hv happy Independence Day. IPARADE

RETWEETS 550 FAVORITES 461

11:15 AM - 3 Jul 2015

a re-posting of someone else's Tweet

ReTweets



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...

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

Embedded Links



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...

- shortened for display

Embedded Links

 **Richard Henry** @richardhenry 4m
That's a whole lot of people... nyti.ms/yzg6Wq

[Hide summary](#) [Reply](#) [Retweet](#) [Favorite](#)

Parade of Fans for Houston's Funeral

By Sarah Maslin Nir @SarahMaslinNir

NEWARK — The guest list and the parade of limousines with celebrities emerging from them seemed a little more suited to a red carpet event in Hollywood or ...

 **The New York Times** @nytimes



9:03 PM Sep 27 via Twitter for Mac · View Tweet page

- 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

A screenshot of a Twitter conversation. The first tweet is from a user whose profile picture is blurred, posted 2 hours ago. They say: "@jk_rowling Thank you so much for writing Harry Potter. I wonder why you said that Dumbledore is a gay because I can't see him in that way." Below this tweet are icons for reply, retweet, favorite, and more. The second tweet is from J.K. Rowling (@jk_rowling), verified with a blue checkmark. She replies: ". Maybe because gay people just look like... people?" Below this tweet are icons for reply, retweet, favorite, and more.

- Tweet starts with a @username

Replies/Conversations



Wei Xu

@cocoweixu

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

11:55 AM - 2 Jul 2015

51 Retweets 105 Likes



6



51



105



- can have multi-round conversations

Tweet your reply



Jacob Eisenstein @jacobeisenstein · 2 Jul 2015

Replies to @cocoweixu

@cocoweixu @twitterapi nice! but as long as Twitter keeps changing the API, no tutorial will be "ultimate" :)



1



1



1



Wei Xu @cocoweixu · 12 Jul 2015

@jacobeisenstein yep that's why I put a date on so ppl know when its out-of-date. hope Twitter Python Tool can handle the updates too



1



1



1



brendan o'connor @brendan642 · 2 Jul 2015

Replies to @cocoweixu

@cocoweixu great! btw re 1 giant line, i've found "print json.dumps(tweet, indent=4)" pretty printing to be useful

What are the top forums or discussion websites where leading researchers in the field of Natural Language Processing interact?

[Answer](#)[Request](#)

Follow 9 Comment Share Downvote

...

1 Answer



Jordan Boyd-Graber, answering questions on Quora because the stakes are so low



Answered Mar 10

It seems to be Twitter (and to a lesser extent, Facebook). Follow your favorite researchers and often technical questions come up.

A random sampling of people I follow on Twitter (as sorted by Twitter):

- [Alex Smola \(@smolix\) | Twitter](#)
- [Forough \(@fpoursabzi\) | Twitter](#)
- [Alice Zheng \(@RainyData\) | Twitter](#)
- [Thomas G. Dietterich](#)
- [Aaron Clauset \(@aaronclauset\) | Twitter](#)
- [UMD CLIP lab \(@umdclip\)](#)
- [Hugo Larochelle \(@hugo_larochelle\) | Twitter](#)
- [Russ Salakhutdinov](#)
- [Tom M Mitchell \(@tommitchell\)](#)
- [Karl Moritz Hermann](#)
- [Edward Grefenstette](#)
- [Bert Huang \(@berty38\) | Twitter](#)
- [Tim Vieira \(@xtimv\) | Twitter](#)
- [Yoav Artzi \(@yoavartzi\) | Twitter](#)
- [Omer Levy \(@omerlevy_\) | Twitter](#)
- [Wei Xu \(@cocoweixu\) | Twitter](#)
- [Anima Anandkumar](#)
- [Naomi Saphra \(@nsaphra\) | Twitter](#)
- [Dirk Hovy \(@dirk_hovy\) | Twitter](#)



Jason Eisner

computer science professor at Johns Hopkins

You can learn more about me and my research at <http://cs.jhu.edu/~jason>. On Quora, I typically answer technical questions about natural language processing and machine learning. Sometimes I also... [\(more\)](#)

Follow | 23.2k

Turn On Notifications Ask Question

Credentials & Highlights

More

Professor at Johns Hopkins University 2001-present

Studied at University of Pennsylvania

Lives in Baltimore

2.7m answer views
37.7k this month

Top Writer
2017 and 2016

Feeds

Answers 216

Questions 0

Activity

Posts 0

Blogs 0

Followers 23,283

Following 5

Topics 46

Edits 1,269

216 Answers

Most Recent / 30-Day Views

What are the topics in computer science?



Jason Eisner, computer science professor at Johns Hopkins

Answered Jul 24

You're off to a good start, but yes, there's plenty more! To get a sense of the breadth of CS, you can have a look through the ACM's [curriculum guidelines for undergraduate CS education](#) (last update... [\(more\)](#))

Upvote | 75

Downvote

...

What are the things I should know as a new CS PhD student?



Jason Eisner, computer science professor at Johns Hopkins

Answered Jun 15, 2015

[A2A] There's lots of advice on the web. Search for "[how to be a good grad student](#)" to get some of it.

[How to be a Successful Graduate Student](#), by Mark Dredze (my colleague) and Hanna Wallach, is a good guide with a long list of links at the end, including a link to [my own advice page](#).

2.4k Views · 24 Upvotes · Answer requested by Hao WU

Upvote | 24

Downvote

...

Knows About

Graduate School Education
40 answers

Academia
28 answers

Higher Education
21 answers

Machine Learning
19 answers

Natural Language Processing
18 answers

[View More](#)

Images



Wei Xu
@cocoweixu



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

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](#)

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- Go to <https://apps.twitter.com/> and log in with your Twitter user account.
- Click "Create New App"

11:55 AM - 2 Jul 2015

51 Retweets 105 Likes

6 51 105

Hashtags

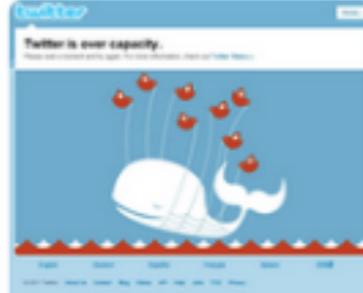


Wei Xu

@cocoweixu

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socialmedia-class.org/twittertutoria...
#datascience #nlproc @twitterapi

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



Twitter API tutorial

by Wei Xu (July 1, 2015) [Follow @cocoweixu](#)

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- Go to <https://apps.twitter.com/> and log in with your Twitter user account.
- Click "Create New App"

RETWEETS 45	LIKES 79	
-----------------------	--------------------	---

11:55 AM - 2 Jul 2015

←  45  79 ...



hashtags are powerful

Cashtags

 Twitter 
@twitter

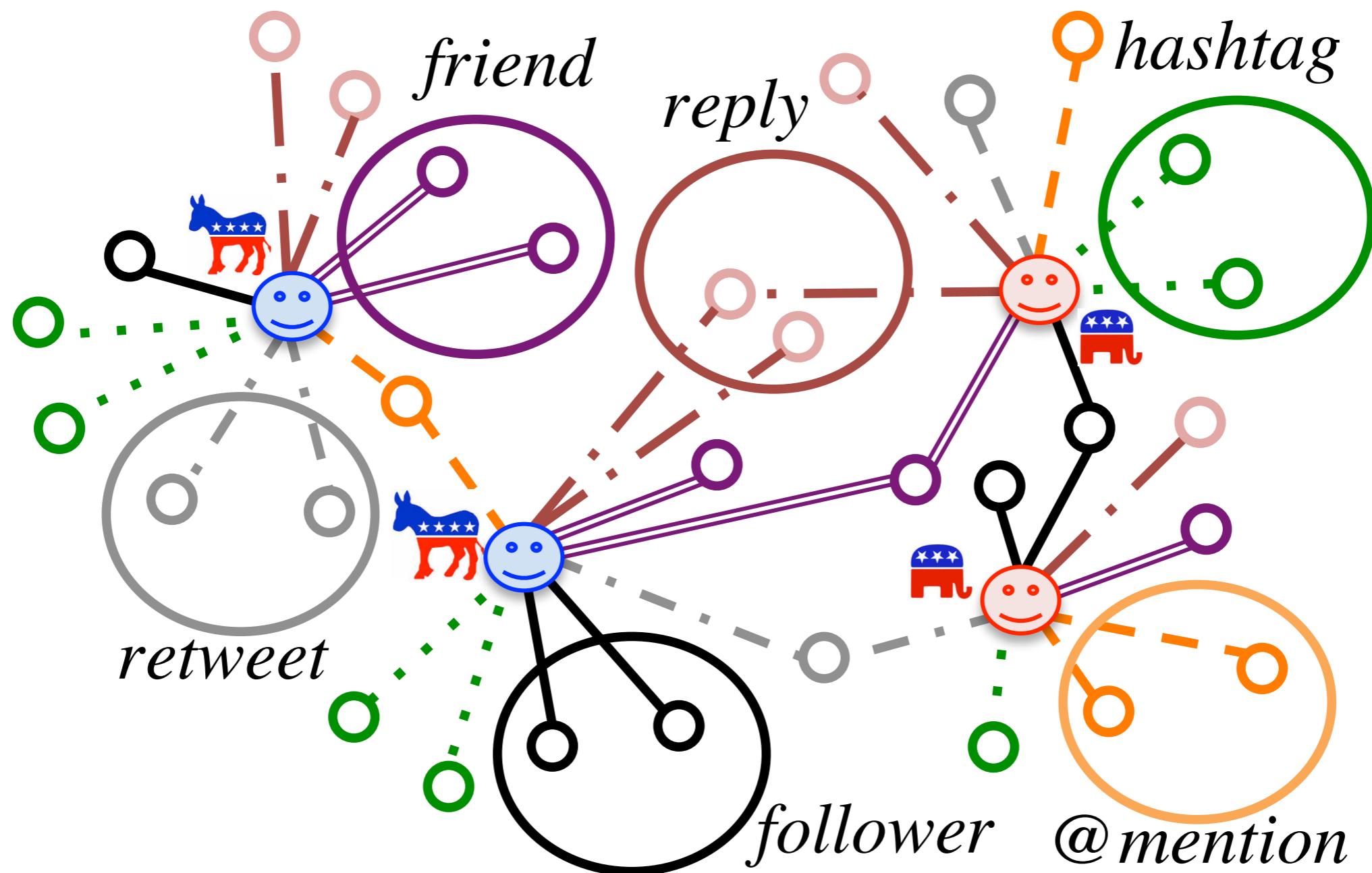


Now you can click on ticker symbols like \$GE on [twitter.com](#) to see search results about stocks and companies

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.

Twitter API

- Twitter is recognized for having one of the most open and powerful developer APIs of any major technology company.
- The first version of its public API was released in September 2006.

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

OAuth settings

Your application's OAuth settings. Keep the "Consumer secret" a secret. This key should never be human-readable.

Access level	Read-only
About the application permission model	
Consumer key	1234567890
Consumer secret	NZsJqxVPe4IP1XebbXtAXpLYrQZcg4RIfCjuXbzjAk4

Python Twitter Tools

→ C Python Software Foundation [US] <https://pypi.python.org/pypi/twitter> ⭐

 python™

» Package Index > twitter > 1.17.1

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twitter 1.17.1

An API and command-line toolset for Twitter (twitter.com)

[Downloads ↓](#)

[![Build Status](<https://travis-ci.org/sixohsix/twitter.svg>)](<https://travis-ci.org/sixohsix/twitter>) [![Coverage Status](<https://coveralls.io/repos/sixohsix/twitter/badge.png>?branch=master)](<https://coveralls.io/r/sixohsix/twitter?branch=master>)

The Minimalist Twitter API for Python is a Python API for Twitter, everyone's favorite Web 2.0 Facebook-style status updater for people on the go.

Not Logged In

[Login](#)
[Register](#)
[Lost Password](#)
[Use OpenID](#)
[Login with GitHub](#)

Status

[Nothing to see here](#)

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



Wei Xu
@cocoweixu

#CFP Workshop on Noisy User-generated Text at ACL - Beijing 31 July 2015. Papers due: 11 May 2015. [noisy-text.github.io](#)
#NLProc #WNUT15

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

Search

#nlproc

Top | Live | Accounts | Photos | Videos | More options ▾

Who to follow · Refresh · View all

It Can Wait @ItCanWait · 4h · Follow · Promoted

Tal Linzen @tallinzen · Followed by Anders Søgaard... · Follow

fastml extra @fastml_extra · Followed by Stanford NLP G... · Follow

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/...](http://opensource.com/business/15/7/) #nlproc

5 open source tools for taming text

Grant Ingersoll offers some tools and resources for sentiment analysis, topic identification, automatic

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 Twitter

Notifications

Mentions

United States Trends · Change

- #BBWLA
- #MissUSA
- Satoru Iwata
- #married2med
- #TUF21Finale
- #UDCopaOro
- Tami
- LHHATL
- Kaleena
- Earthbound

Notifications
All / People you follow

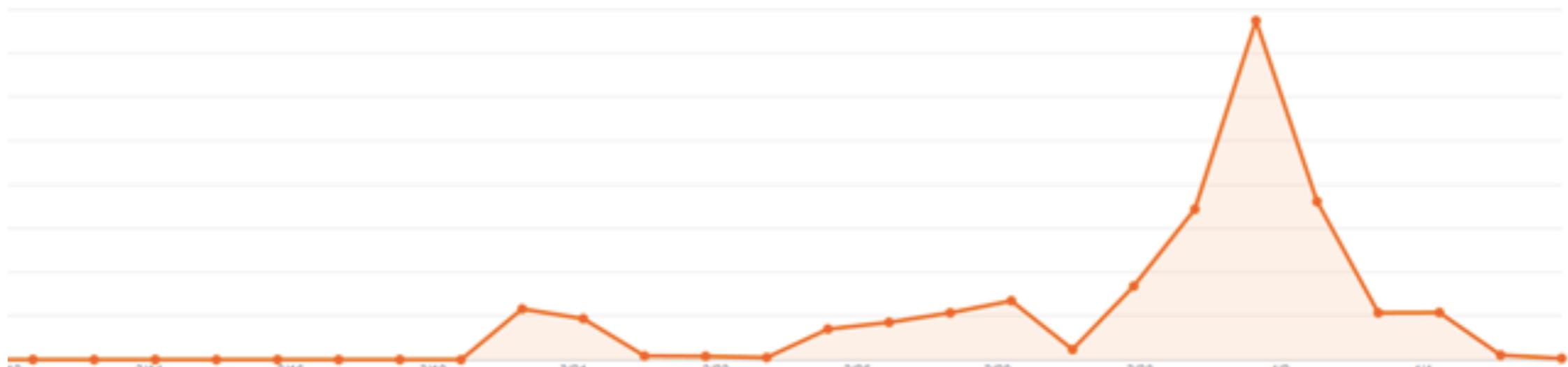
 **Michael Heilman and 5 others retweeted you** 4m
Jul 9: ACL 2015 #WNUT workshop - schedule & invited talks by @eltimster @soegaarducph @brendan642 & Joel Tetreault noisy-text.github.io #nlproc


 **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


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

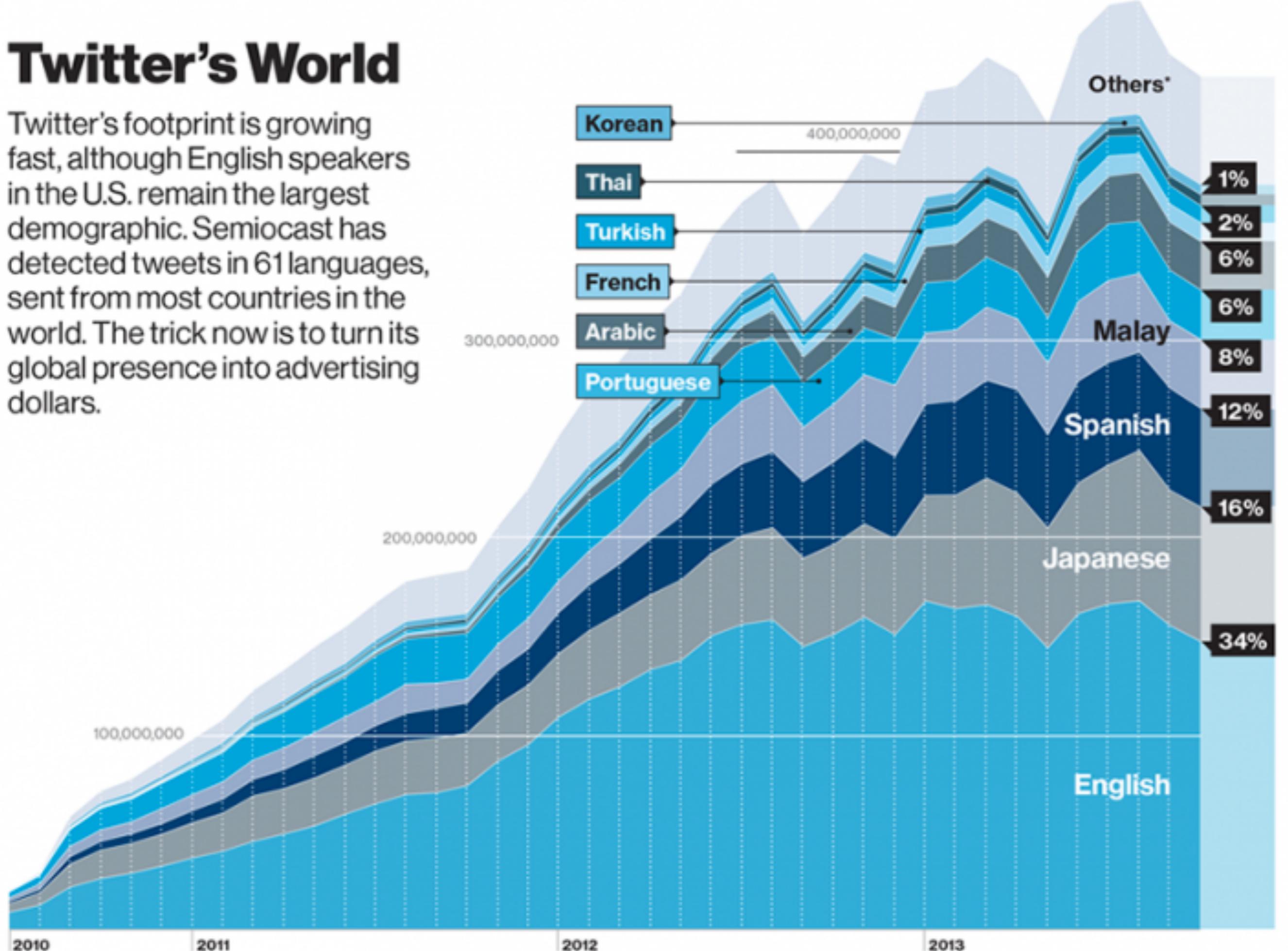


```
# Get all (it's always 10) trending topics in San Francisco (its WOEID is 2487956)
sfo_trends = twitter.trends.place(_id = 2487956)
```

```
{
  "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]
```

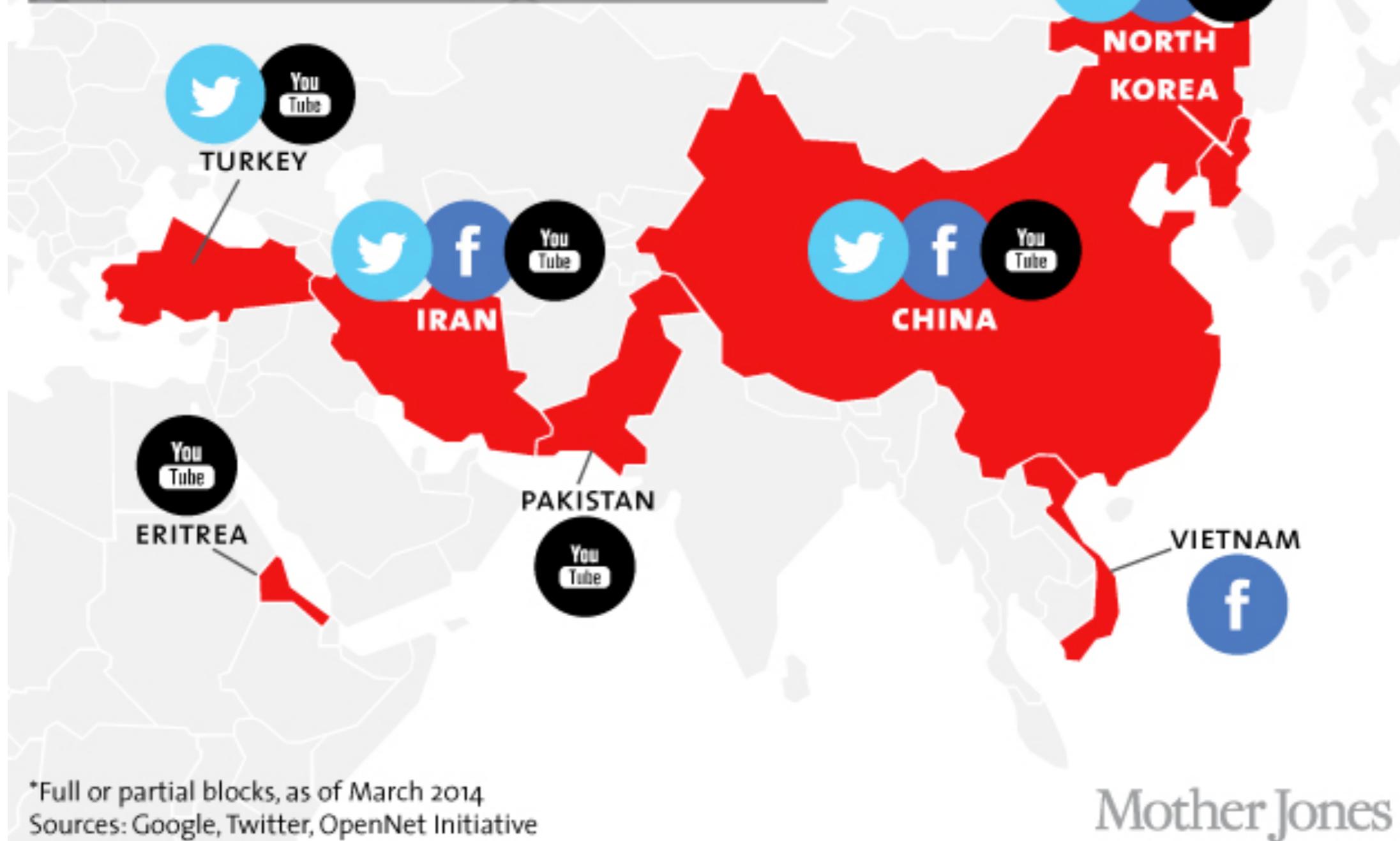
Twitter's World

Twitter's footprint is growing fast, although English speakers in the U.S. remain the largest demographic. Semiocast has detected tweets in 61 languages, sent from most countries in the world. The trick now is to turn its global presence into advertising dollars.



Social Media Under Fire

Countries that block Twitter, Facebook, or YouTube*



known as the “Chinese Twitter”
120 Million Posts / Day

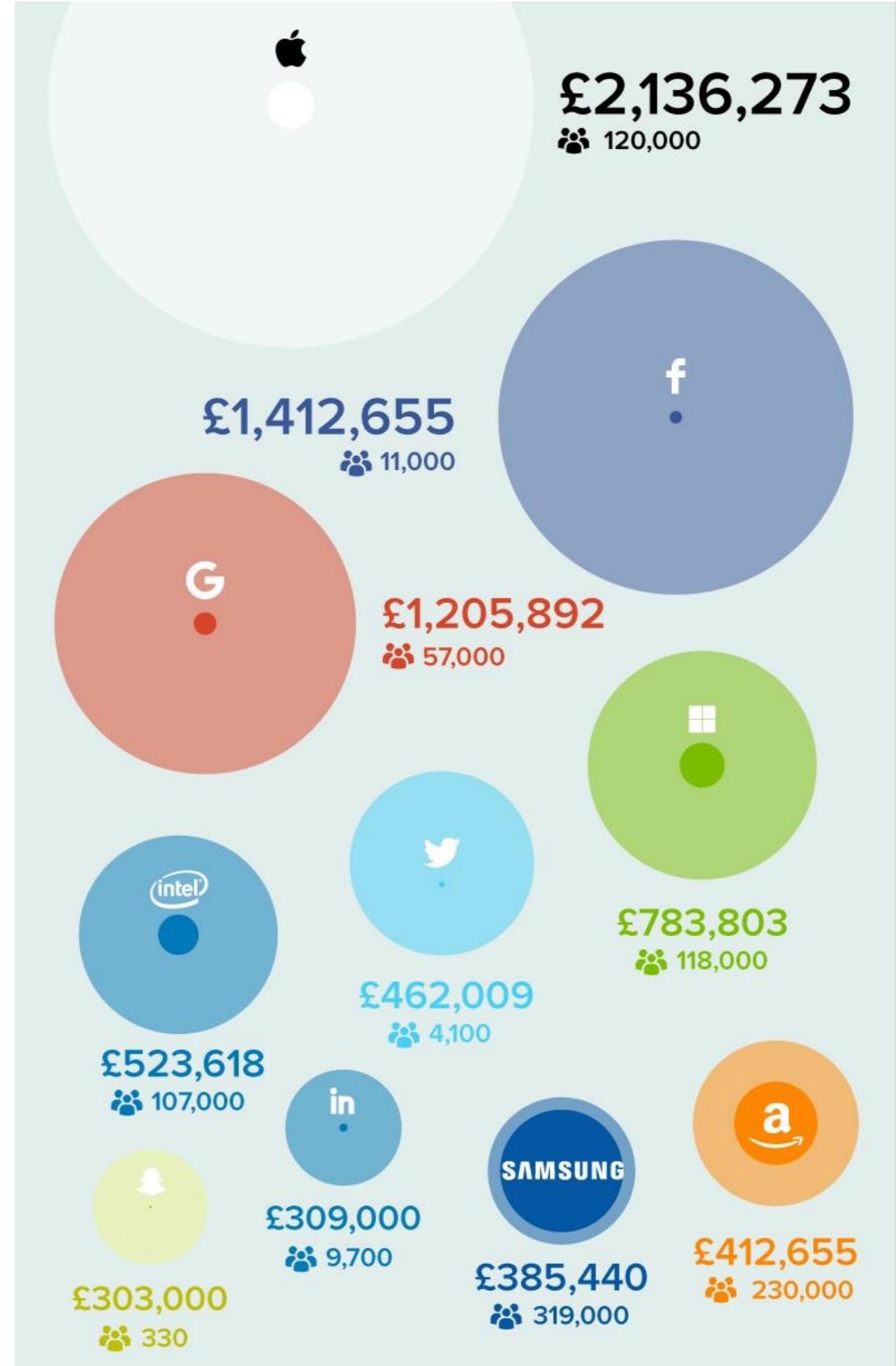
Twitter Demographics

- 24% of All Internet male users use Twitter, whereas 21% of All Internet Female users use Twitter.
- **79%** of Twitter accounts are based outside the United States
- There are over 67 million Twitter users in US.
- Total number of Twitter users in UK is 13 million.
- **37%** of Twitter users are between ages of 18 and 29, 25% users are 30-49 years old.
- **54%** of Twitter users earn more than \$50,000 a year at least.
- The **top three countries** by user count outside the U.S. are Brazil (27.7 million users), Japan (25.9 million), and Mexico (23.5 million).

Fun Facts about Twitter

- More than 100 million tweets contained GIFs in 2015.
- Saudi Arabia has the highest percent of internet users who are active on Twitter.
- Number of Twitter timeline views in 2014 is 200 billion.
- 83% of 193 UN member countries have Twitter presence.
- Twitter's revenue per employee is \$488,913.

RPE



Natural Language Processing Conferences

a.k.a.

- ▶ Natural Language Processing (NLP)
- ▶ Text Analysis
- ▶ Computational Linguistics

ACL

← → ⌂  Secure | <https://www.aclweb.org/portal/what-is-cl>

Menu

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Association for Computational Linguistics

Search th

What is the ACL and what is Computational Linguistics?

The Association for Computational Linguistics (ACL) is the premier international scientific and professional society for people working on computational problems involving human language, a field often referred to as either computational linguistics or natural language processing (NLP). The association was founded in 1962, originally named the Association for Machine Translation and Computational Linguistics (AMTCL), and became the ACL in 1968. Activities of the ACL include the holding of an annual meeting each summer and the sponsoring of the journal *Computational Linguistics*, published by MIT Press; this conference and journal are the leading publications of the field. For more information, see: <https://www.aclweb.org/>.

What is Computational Linguistics?

Computational linguistics is the scientific study of language from a computational perspective. Computational linguists are interested in providing computational models of various kinds of linguistic phenomena. These models may be "knowledge-based" ("hand-crafted") or "data-driven" ("statistical" or "empirical"). Work in computational linguistics is in some cases motivated from a scientific perspective in that one is trying to provide a computational explanation for a particular linguistic or psycholinguistic phenomenon; and in other cases the motivation may be more purely technological in that one wants to provide a working component of a speech or natural language system. Indeed, the work of computational linguists is incorporated into many working systems today, including speech recognition systems, text-to-speech synthesizers, automated voice response systems, web search engines, text editors, language instruction materials, to name just a few.

Wei Xu o socialmedia-class.org

NLP Publications

- ▶ top NLP-specific venues:
 - ACL, NAACL, EACL, EMNLP, COLING (conference)
 - TACL (journal+conference model)
 - CL (journal)
- ▶ other venues:
 - NLP: CoNLL, *Sem, WMT, LREC, IJNLP, Workshops ...
 - related CS fields: WWW, KDD, AAAI, WSDM, NIPS, ICWSM, CIKM, ICML ...
 - related non-CS fields: psychology, linguistics, ...

Conference Rotation

- ACL (and/or NAACL, EACL), EMNLP / COLING



NLP Publications

- ACL Anthology (<http://aclweb.org/anthology/>)
all NLP conference and journal papers (free!)

 **ACL Anthology**
A Digital Archive of Research Papers in Computational Linguistics

Search the Anthology via Google via Searchbench @ DFKI via AAN @ UMich via Saffron @ DERI

The ACL Anthology currently hosts over 34,000 papers on the study of computational linguistics and natural language processing. [Subscribe to the mailing list](#) to receive announcements and updates to the Anthology.

NEW The [beta version of the new ACL Anthology goes live](#). It will replace this current version of the Anthology as the default version starting 2015 (don't worry we will still maintain both for some duration for handover).

NEW June 2015: The [June issue of Computational Linguistics](#) journal is now available on the ACL Anthology.

ACL events

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LREC:[00](#) [02](#) [04](#) [06](#) [08](#) [10](#) [12](#) [14](#)
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ACL'14 at A Glance

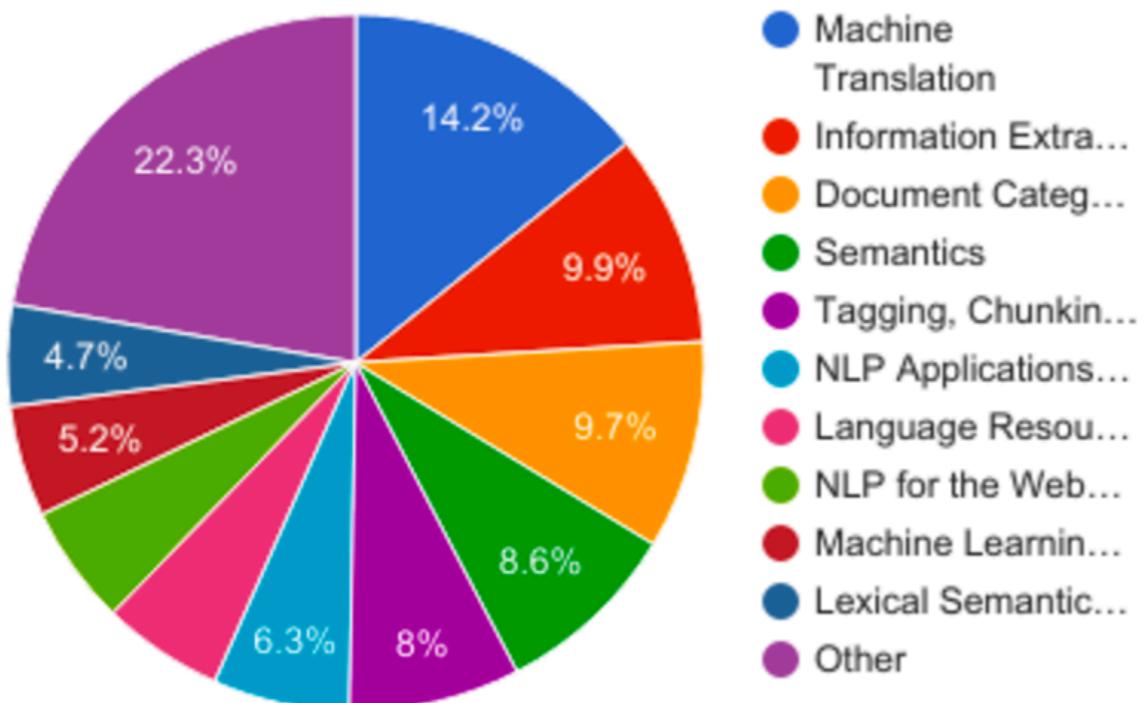
- ▶ The Annual Meeting of the Association for Computational Linguistics
- ▶ Duration:
 - tutorials (1 day)
 - main conference (3 days)
 - workshops (2 days)
- ▶ Attendance of 1300+ people
- ▶ Papers:
 - 1,123 submissions
 - 146 long papers and 129 short papers accepted
 - + 19 TACL papers
 - 159 oral and 145 poster presentations

ACL'17 at A Glance

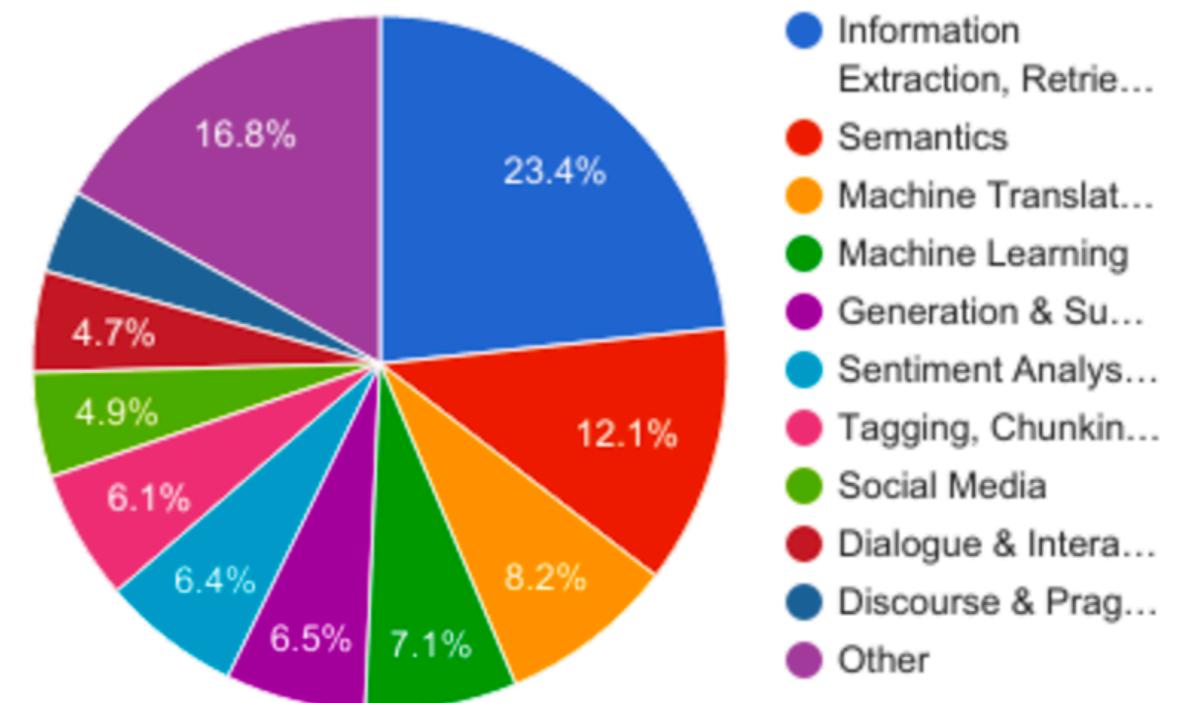
- ▶ The Annual Meeting of the Association for Computational Linguistics
- ▶ Duration:
 - tutorials (1 day)
 - main conference (3 days)
 - workshops (2 days)
- ▶ Attendance of 1800+ people
- ▶ Papers:
 - 1,318 submissions
 - 195 long papers and 107 short papers accepted
 - + 21 TACL papers
 - 151 oral and 151 poster presentations

ACL'14 vs. ACL'17

ACL 2014 Submissions



ACL 2017 Submissions



Some shifts: e.g. summarization and generation is now in top 5 areas, while in 2014 it didn't even make top 10

Research Areas

	2017 actual total submissions (after cleanup)	2017 actual # long submitted (after cleanup)	2017 actual # short submitted (after cleanup)
Information Extraction, Retrieval, Question Answering, Document Analysis and NLP Applications	308	192	116
Semantics	159	100	59
Machine Translation	108	60	48
Machine Learning	93	55	38
Generation and Summarization	86	52	34
Sentiment Analysis and Opinion Mining	85	54	31
Tagging, Chunking, Syntax and Parsing	80	40	40
Social Media	64	25	39
Dialogue and Interactive Systems	62	36	26
Discourse and Pragmatics	51	26	25
Phonology, Morphology and Word Segmentation	43	23	20
Resources and Evaluation	39	17	22
Multidisciplinary	32	12	20
Vision, Robotics and Grounding	31	19	12
Cognitive Modeling and Psycholinguistics	28	14	14
Multilinguality	28	15	13
Biomedical	12	6	6
Speech	9	5	4
Total	1318	751	567

How to Do Research

William Wang

UCSB Computer Science
10/06/2016

What is research?

- Investigate and understand the known unknowns and unknown unknowns in the scientific world.
- In our lab, we are specifically interested in:
 - designing accurate, robust, and scalable **machine learning** algorithms;
 - advancing **natural language processing** models;
 - combining **learning and reasoning** for better AI.

How's research different from taking courses?

- Taking courses: instructor tells you **exactly** what to do.
- Research:
 - define an **open** research problem with your advisor;
 - you (**students**) **take the initiatives**;
 - discuss and refine the technical approaches;
 - you (students) implement the approach and perform experiments to verify the idea.

How to make good progress in research activities

- **Clearly define the problem / task** that you want to solve;
- Understand the **literature**: what other people have done, and what you can learn from them;
- Work out the algorithm first, find a suitable dataset, and put theories into practice: **write some code**;
- Start with **smaller subset of data** for debugging, and move on to larger datasets.
- **Document the results** carefully in spreadsheet / docs.

How to measure the effectiveness of ideas?

- Use **mathematical** tools to clearly define the problem and your solutions;
- Look at the theoretical properties of your **algorithms**;
- Define good **metric**(s), and perform experiments on **multiple datasets**;
- Report results and compare with state-of-the-arts **baselines**.

Why is publication important?

- Publication is the most important formal method for **scholarly communications**.
- Presenting your research and attending leading conferences will create **impacts**, get **inspirations**, and facilitate the **exchange of thoughts** and good ideas.
- Peer-review is a good way to get **feedback** from top researchers in your field.
- And it is a relatively **objective** way to claim the effectiveness of your research.

What is in a good research (paper)?

- Is the problem **new**?
- Is your approach **new**?
- How good are the results **comparing to prior work**?
- Can you contribute any new **open-source** datasets/code?
- Is this paper well-structured and **well-written**?

Research is hard

- They are open problems that no one has a perfect solution!
- Implementing ideas and debugging code could be challenging.
- Performing good experiments are not easy.
- Writing papers against deadlines..

Research is rewarding

- You helped to advance science!
- When your first top conference full paper is accepted... (acceptance rates typically 10-30%);
- Other people attend your talk, read/cite your papers, and use your code/approaches;
- You are now the world's expert in this area.