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NATIONAL LABORATORY

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Social Data Research at a National Laboratory

Eric Bell


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IDEA
TEAM
INCOME
Product
INCOME
Product
money
IDEA


tumblr.
Come for what you love.
Stay for what you discover.
Get Started
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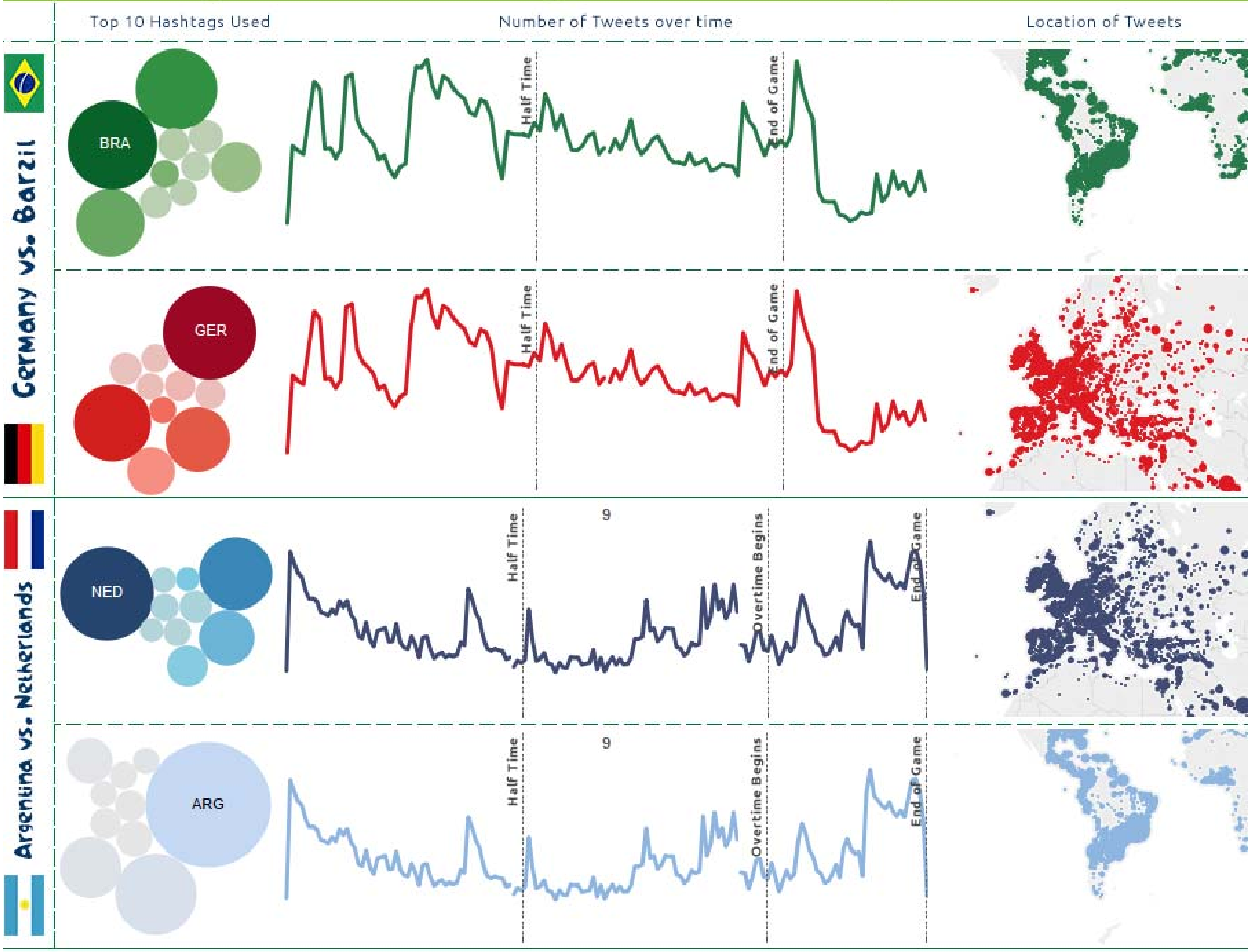
+
Eric Bell @chsbellboy · now
Happy Purrthday: bit.ly/25L6dnM (A first cat photo tweet for me) Find out why at #BigBoulder

2014 FIFA World Cup

Watch the Final Matches, July 12-13th

Twitter Activity for the Finals teams during their Semi-Final matches | Total Tweets: 49.8 million

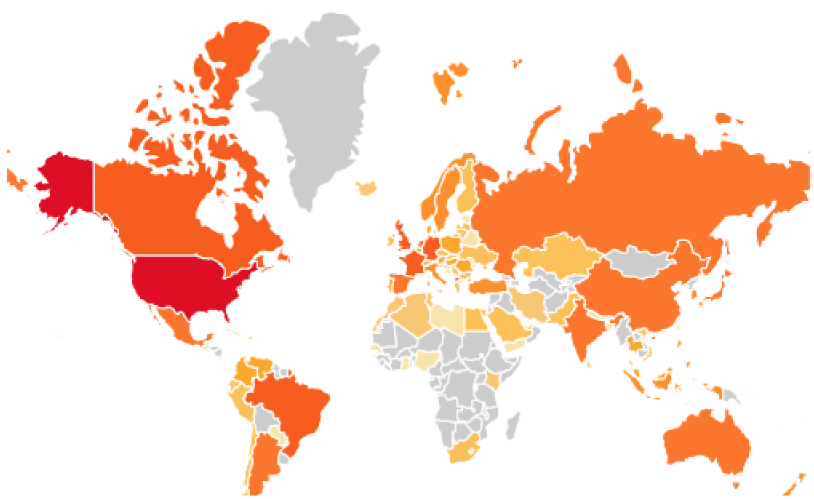


Lancet is not responsible for the accuracy of the data sources and is only displaying a subset of Tweets sent during the Semi-Final games.

WHERE THIS BITLINK WAS SHARED

Twitter 2,622 clicks 5 tweets	Facebook 618 clicks	Tumblr 75 clicks
LinkedIn 24 clicks	Orkut 20 clicks	Email 9 clicks
Other Sites 4,942 clicks	Unknown 10,431 clicks	

GEOGRAPHIC DISTRIBUTION OF CLICKS



Top Countries (clicks / % of total)

United States	6,984	37%
Macedonia, The For...	1,306	7%
France	824	4%
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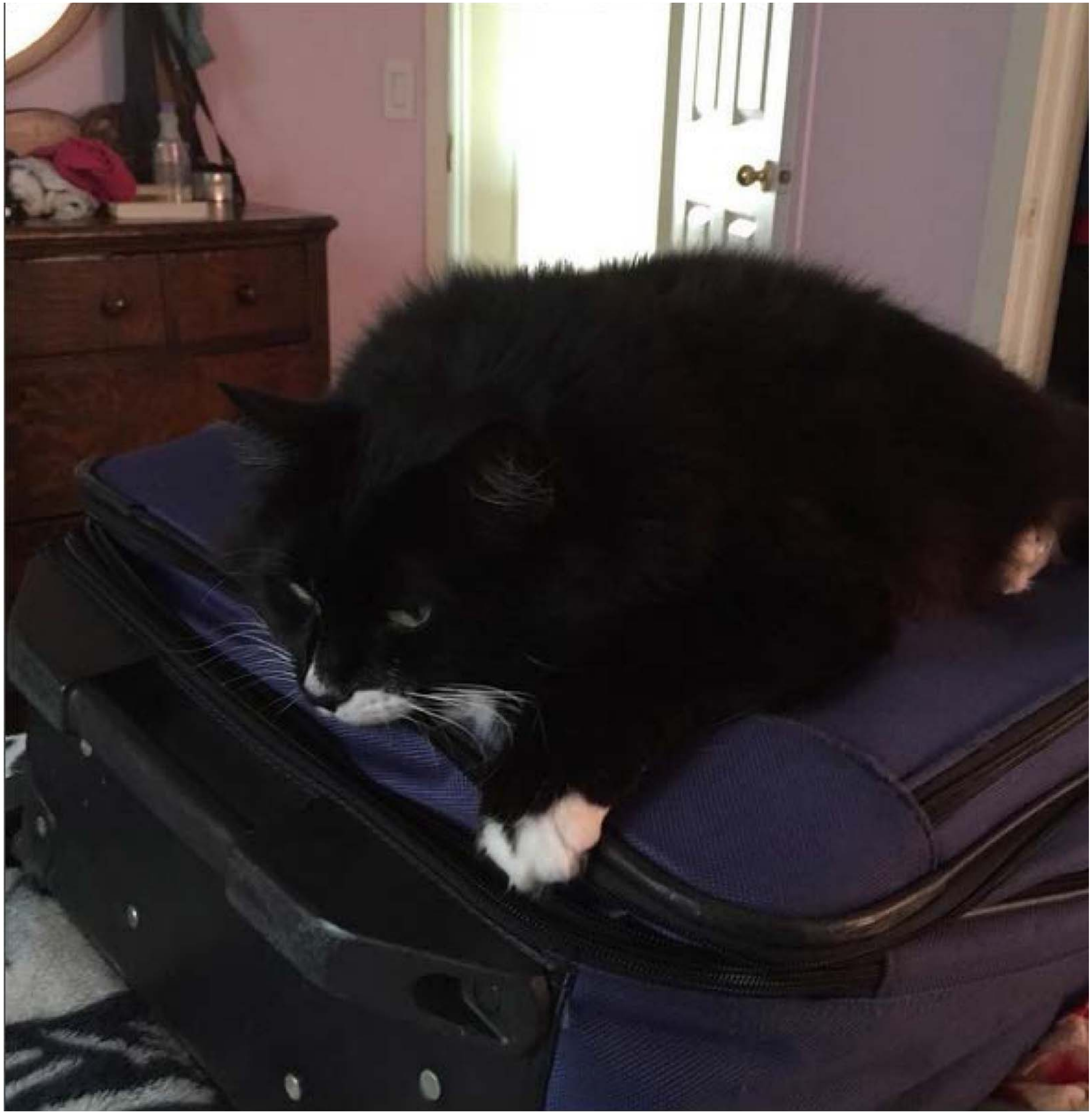
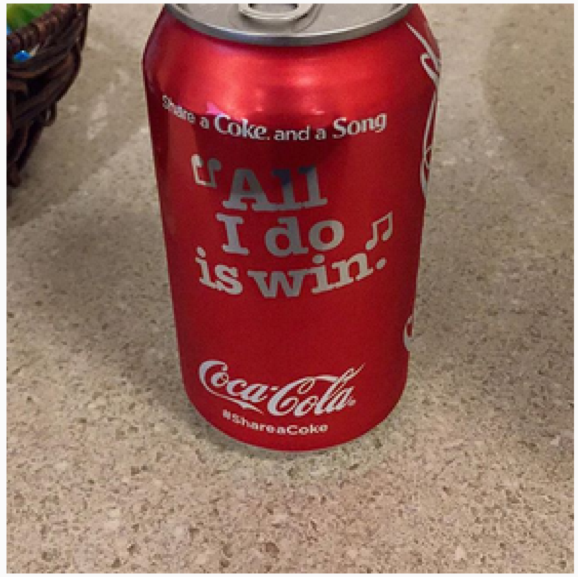
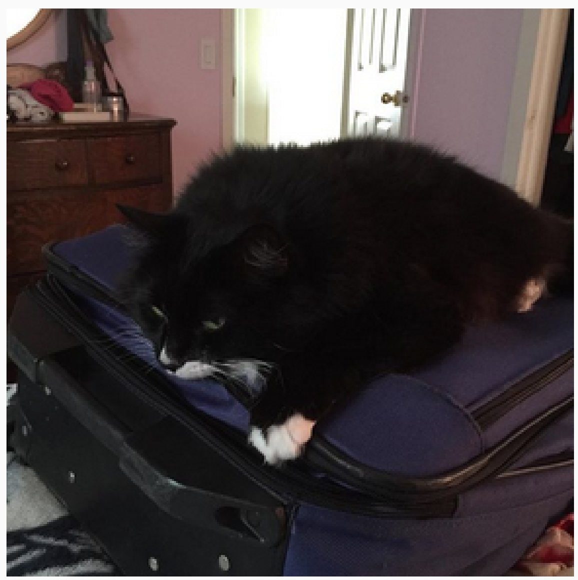
+90 more		



eric.bell.3914 Follow






Twitter
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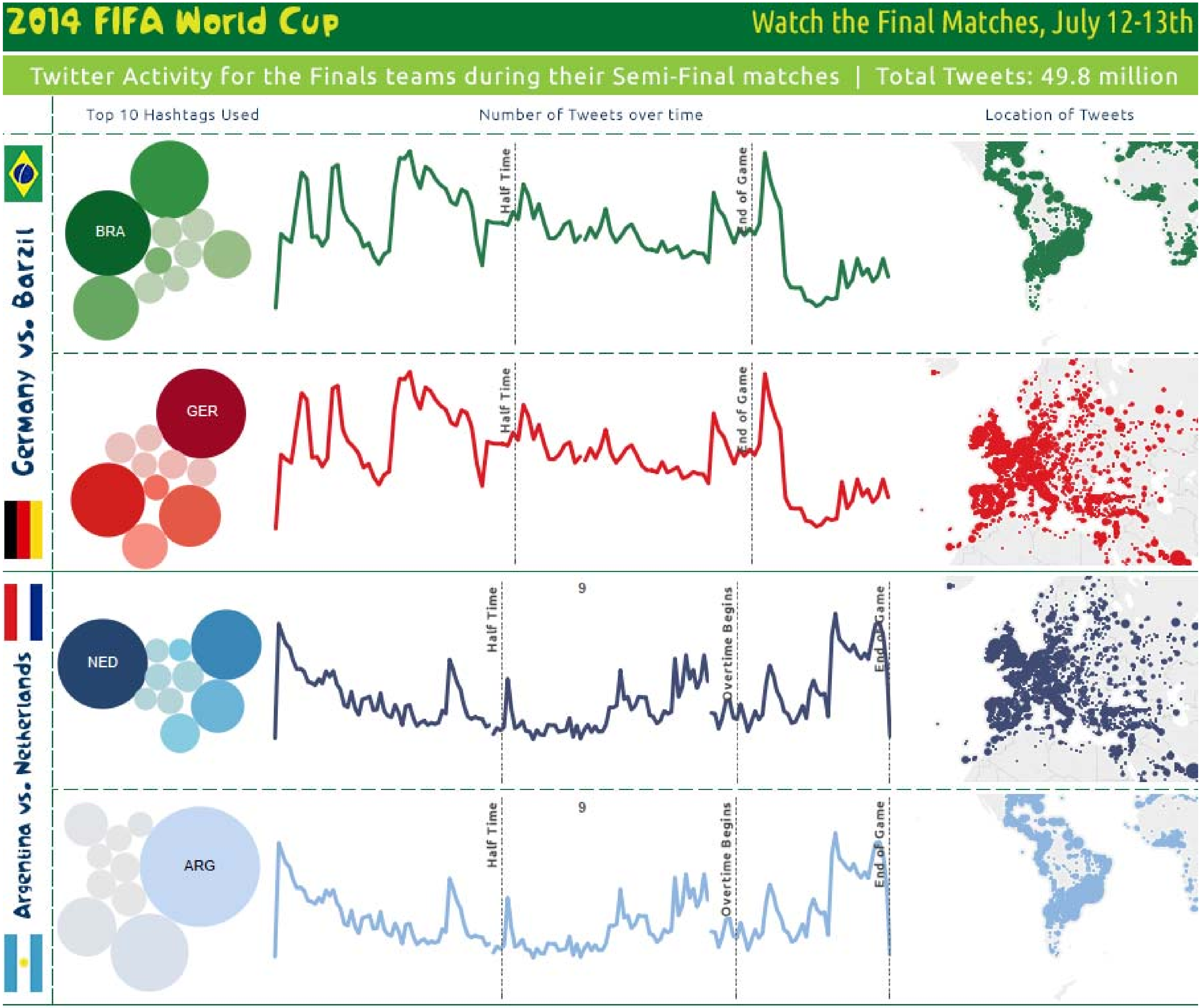
TRIBUTION OF CLICKS
Top Countries (clicks / % of total)
United Kingdom
United States
Germany
Australia
France
Hungary
Canada
Czech Republic
New Zealand
Belgium
+17 more


"Think, think, think."



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Twitter Analysis

- Example Twitter Analysis Problems (Vetted Use Cases)
  - Studying cross-linguistic transfer- the influence of non-English language on various levels of linguistic performance in English.
  - Using twitter data linked across hashtags, authors, geography, or time to learn synonyms for newly emerging words used in social media.
  - Concept drift/relatedness. Using word embeddings, we’re building representations of topics or concepts. However, these topics/concepts being discussed change over time. We’re exploring the representation necessary for following a fixed topic of conversation over time as the discussion and vocabulary evolves.
  - Studying the share of voice for mentions and references to national laboratories
  - We’re interested in understanding the degree to which language sophistication varies on a topic or over time.

Motivation

Positive

- Connect
- Communicate
- Spread information
- Share interests

- Disaster responses
- Crisis events
- Situational awareness

Negative

- Social bots
- Spammers
- Trolls

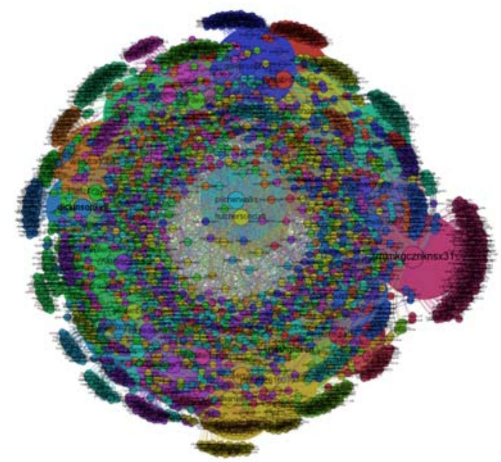
- Misinformation
- Deceptive content
- Propaganda
- Manipulative campaigns

Detection of suspicious accounts = more replicable dataset

Related Work

- Social bot prediction (Ferrara et al., 2014)
- Suspended account analysis (Thomas et al., 2011)
- Non-personal and spam user detection (Guo and Chen, 2014; Lin and Huang, 2013)

- Troll detection (Mihaylov et al., 2015):
  - Accused trolls, small data (< 1K trolls)



- Analysis of 20K pro-Kremlin Twitter accounts
  - tweet similar statements during/around breaking news

Who are the trolls?

look like real users (avatars)

similar followers and friends

similar tweeting behavior

Dataset Creation

Twitter Suspension Policy

- Spam: invitation spam, selling, phishing
- Account security at risk: compromised
- Abusive behavior: violent threats, harassment, hateful conduct, multiple account abuse, impersonation, self-harm

RU-UA Crisis Twitter Dataset:

- Crisis-relevant keywords in RU/UA
- Rounds of querying API: March, June, and Dec 2015
- Balanced set of 188K accounts, 20 tweets per account
- **Active vs. Non-active: 85% suspended and 15% deleted**

Features

Profile	days since account creation, # followers, friends, favorites, tweets, friend-to-follow ratio, name, bio, screen name length in chars/words, number of tweets per hour
Visual	profile background, link, text, sidebar color, background tile, sidebar border color, default profile image
Syntactic	tweet length in words/chars, RT, uppercase, elongated, repeated mixed punctuation, mention, hashtag, link rate, prop. of tweets with links, RTs, mentions, hashtags, punctuation, emoticons
Network	mentions, hashtags, LSA on mentions/hashtags
Text	tweet ngrams (1–3grams, binary vs. frequency), LSA on tweets, LDA topics (50–1K), word2vec embeddings (30–2K)
Affect	number of emoticons, prop. of six emotions, mean scores, prop. of tweets with sentiments (Volkova et al., 2015)

Classification Results

Features	D-S-ND	DS-ND	D-S
Profile	0.78	0.85	0.86
Style + Syntax	0.72	0.81	0.86
Language			
Tweets	**0.82**	**0.87**	0.83
Tweets + LSA	0.79	0.84	0.85
Topics	0.77	0.81	0.83
Embeddings	0.72	0.76	0.94
Network			
Hashtags	0.67	0.76	0.84
Mentions	**0.69**	**0.78**	**0.85**
Hashtags + LSA	0.63	0.73	0.84
Mentions + LSA	0.64	0.72	0.85
Affect			
Sentiment + Emotion	0.62	0.72	0.83

Key Findings

Tasks: D – S > DS – ND > D – S – ND

Text: Tweet ngrams and embeddings are the most predictive

Network: Mentions are more predictive than hashtags

Frequency vs. Binary:

- **Tweet ngrams:** It is not only important what the users say but how much they say it
- **Mentions and hashtags:** It is not important how much the users use some hashtags or mentions, but whether they use them or not

Analysis: Verbal and Nonverbal Behavior Differences

Verbal Behavior

Deleted and suspended users generate:

- Shorter tweets
- Less elongated capitalized words and repeated punctuation
- Lower hashtag, mention and URL per word ratios
- Less RTs, tweets with hashtags, URL and mentions
- Less tweets with punctuations and emoticons

Nonverbal Behavior

Deleted and suspended users have:

- More friends
- Less followers and tweets
- Lower friend-to-follower ratio
- Shorter bios
- Longer user names

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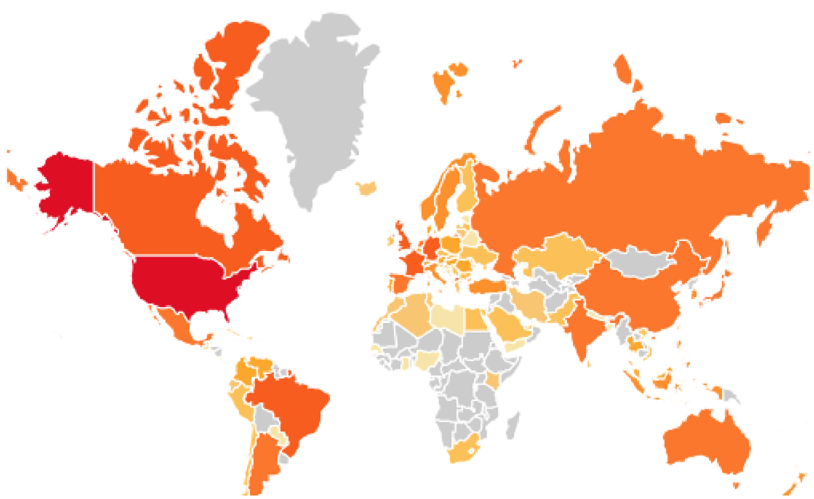

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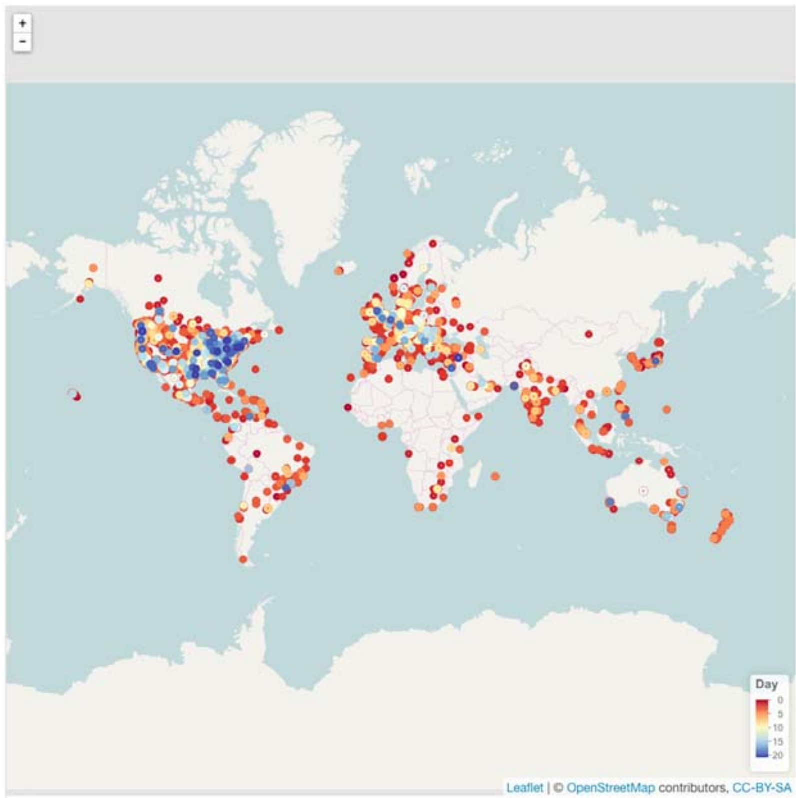
+90 more

Bitly Research Overview

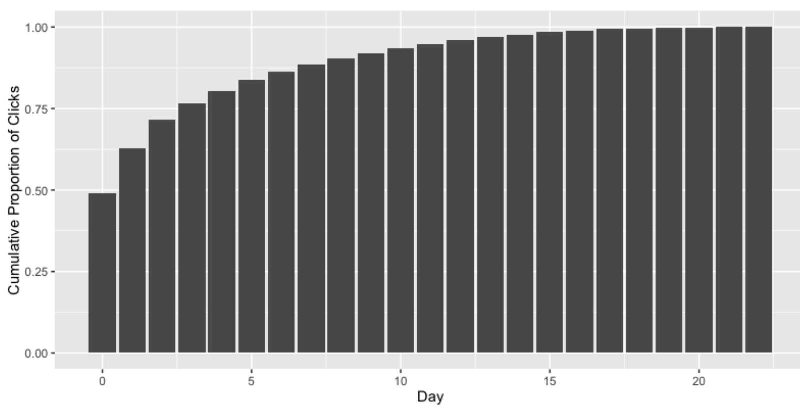
- How does the design of the UI on various social media platforms manifest different styles of interaction propagation?
- Classic definitions of virality are based on large frequencies or potential reach, we're instead looking to understand a model that lets us find events that are hyperlocally viral. This involves correlation of multiple data types
- Characterize URL types
- What do links look like as they move through time and spread geographically?

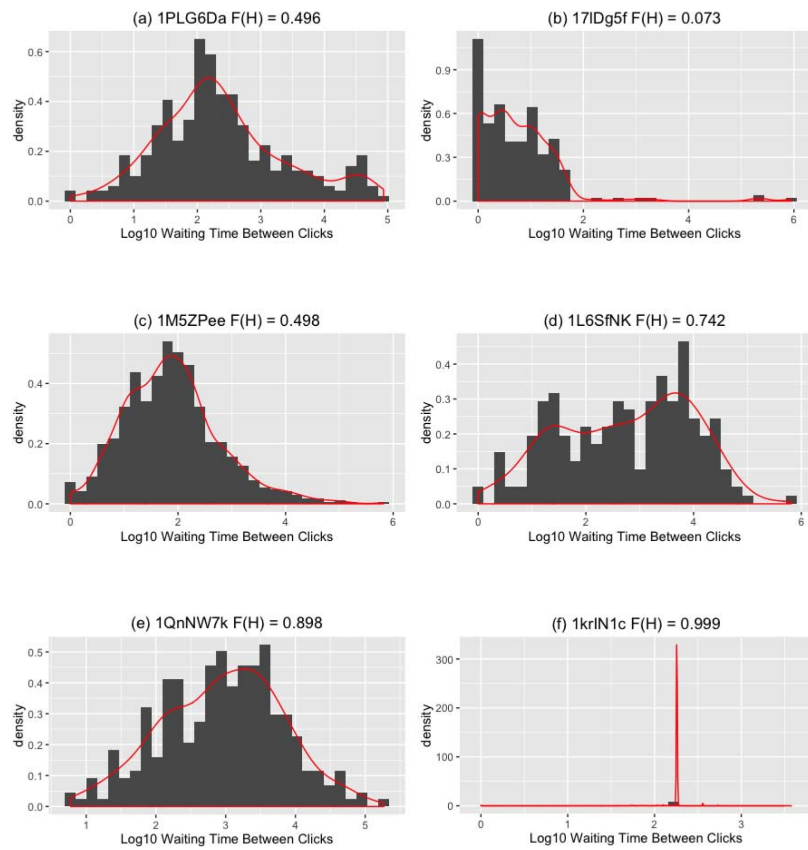
How do you think about Bitly clicks?



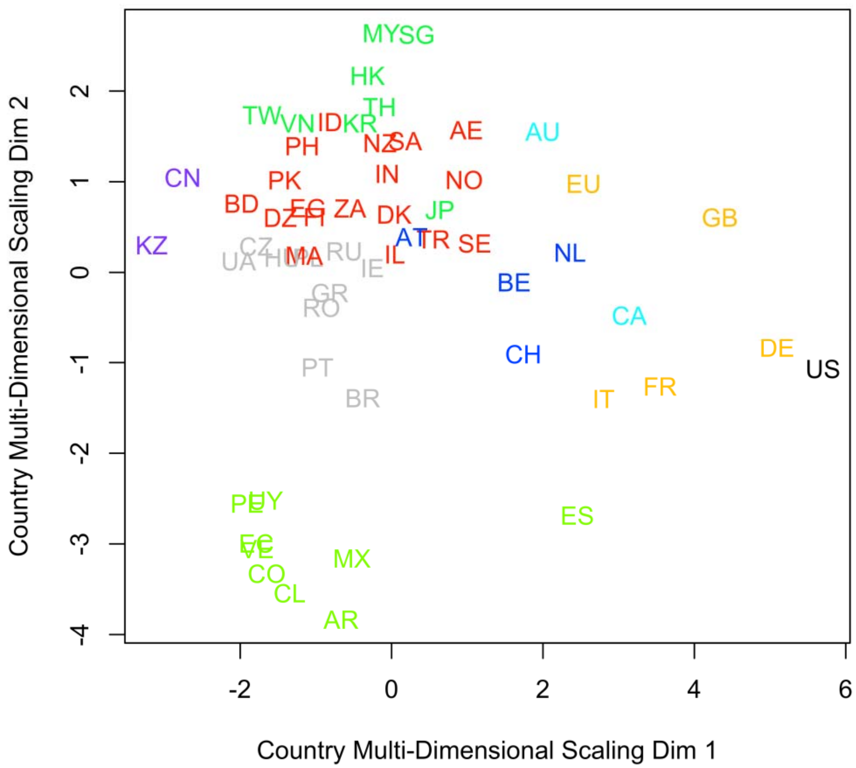
initial_time	2015-11-09 14:06:23
initial_country_code	IE
initial_geo_city	Mayo
initial_share_hash	1MRWmU9
N	9,323
pdirect	0.3327255

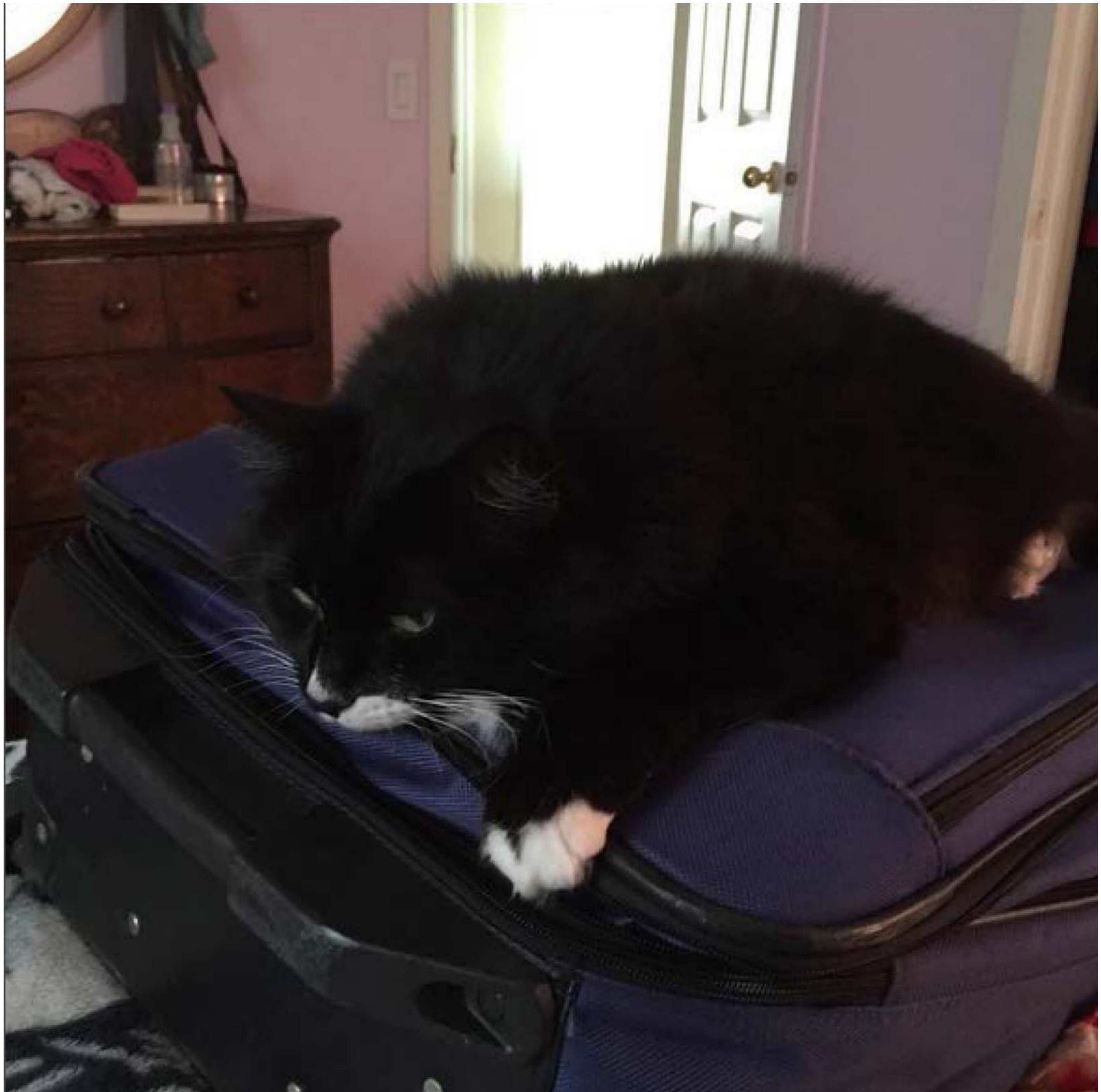
What does it mean to be viral?

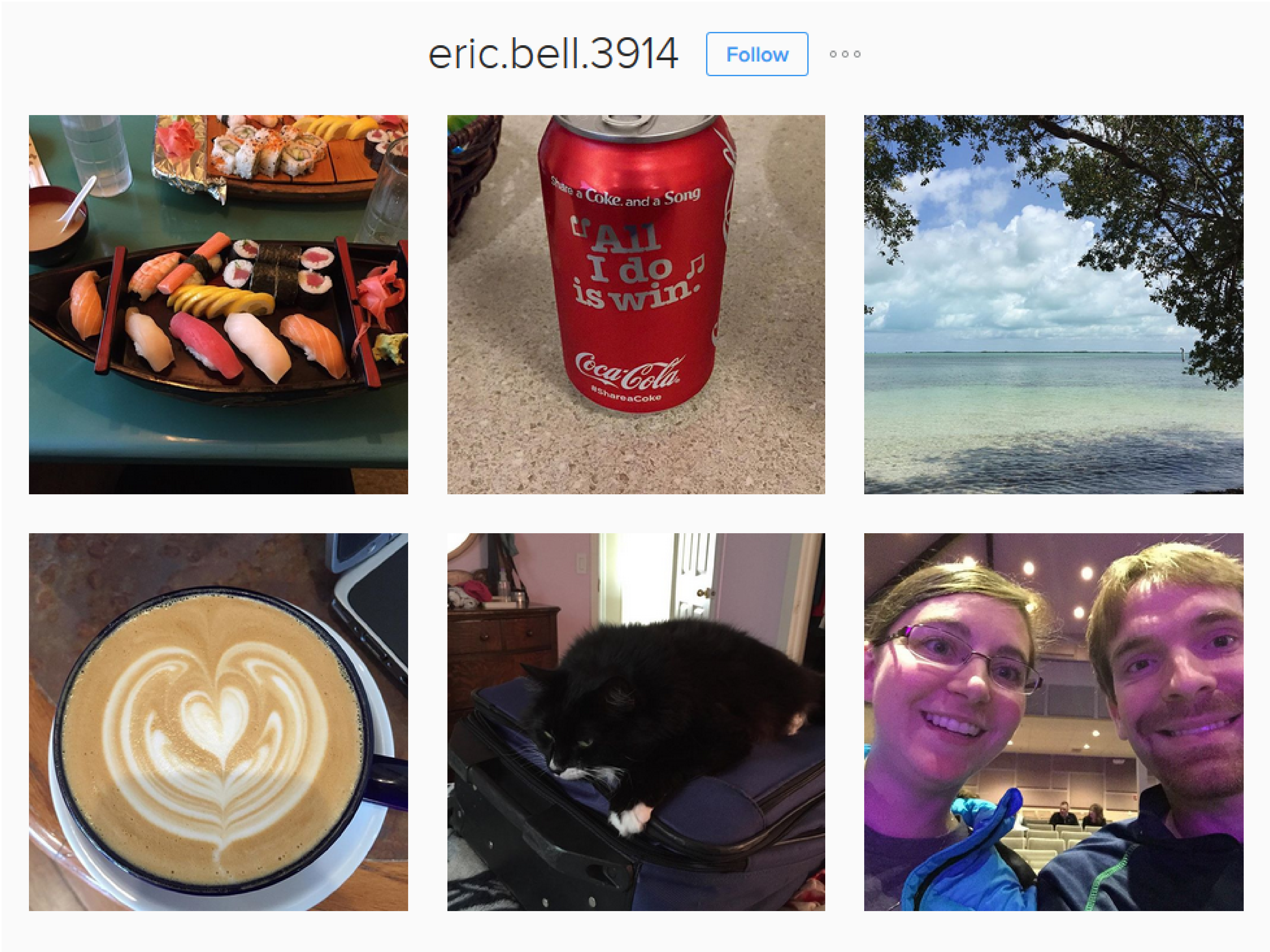




Bitly Behavior By Country



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Follow
Share a Coke and a Song
All I do is win.
Coca-Cola
#ShareaCoke

Image Research Overview

- Image classification and multi-modal embeddings. Using convolutional neural networks, we're building representations of objects and themes within images linked within social media data.
- Using language and visual embeddings, we're exploring models for sense-making across data types for understanding how different data modalities are used to communicate ideas within a social context


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Unknown
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Top Countries (clicks / % of total)
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Hungary
Canada
Czech Republic
New Zealand
Belgium

Second Quarter Highlights

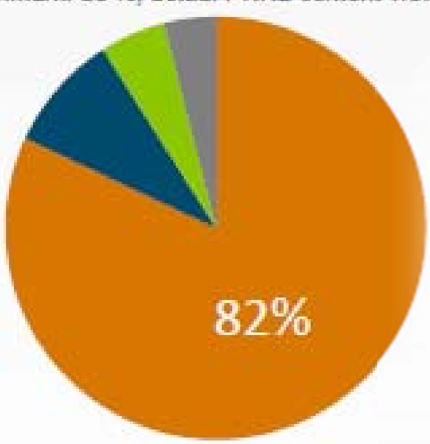
- **Google+:** More than 24,000 new followers; content viewed 1.63 million times
- **LinkedIn:** An average of 64.6 engagements by unique users per day
- **Facebook:** Second among national labs in daily audience engagement
- **Twitter:** Highest audience engagement among national labs

Second Quarter Growth

- Google+: 324,532 (+10.7%)
- LinkedIn: 17,638 (+5.5%)
- Facebook: 6,333 (+6.2%)
- Twitter: 5,518 (+10.7%)

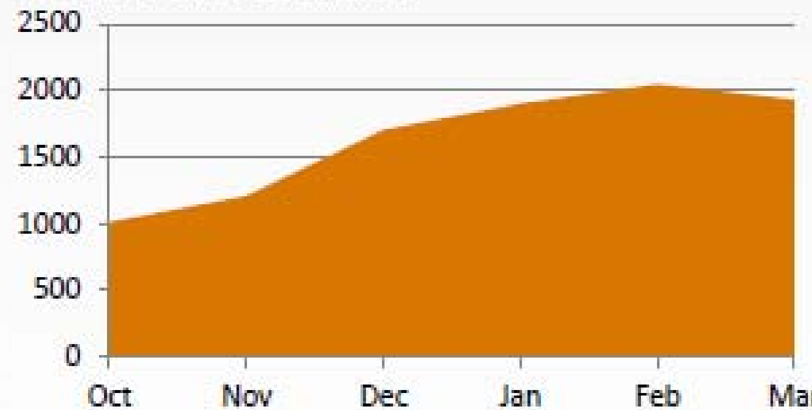
Google+: FYTD Audience Share of Voice

benchmark: as %, actual PNNL content views during period



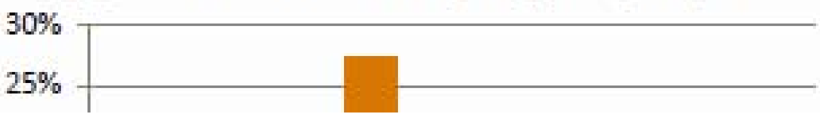
LinkedIn: FYTD Audience Engagement

by month, number of times unique users engaged with PNNL content (clicked, liked, shared or commented)



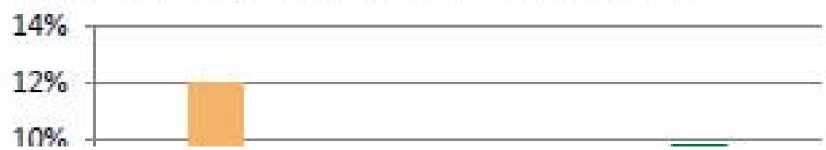
Twitter: FYTD Audience Engagement

*benchmark: unique users engaging in content [unique users engaging / total followers at end of the reporting period] * 100.)*



Facebook: FYTD Audience Engagement

benchmark: daily audience engagement per 1000 page likes




You
Tube
BLOGS


ACCEPT
REJECT


NEWSPAPER
NAM REM HARUNT ETUR MIN PEDIS VEL MAGNATI SIMUS
$00,0
ET QUIAM VELLA VOLECAE NIS ESTEM QUIAE NULPARIT, QUASPIS MO CUM IPSANT ET QUE 03
world
03
EXPLABORERIAM SUMQUIAM VOLEST VOLORRO IS UT HARZDSCZX VX


Silver Bullet
not Just Ahead