

Automatic Detection of Rumours in Social Media: Methods and Challenges

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Veracity: the 4th V of Big Data

PHEME focuses on a **fourth** crucial, but hitherto largely unstudied, **challenge**: veracity

- We coined the term *phemes*
 - **memes** are thematic motifs that spread through social media in ways analogous to genetic traits
 - **phemes** add truthfulness and deception to the mix
 - named after ancient Greek PHEME, “*embodiment of fame and notoriety, her favour being notability, her wrath being scandalous rumours*”

What is a Rumour?

- Our definition

- “a circulating story of questionable veracity, which is apparently credible but hard to verify, and produces sufficient skepticism and/or anxiety”

Social Media is Rife with Phemes

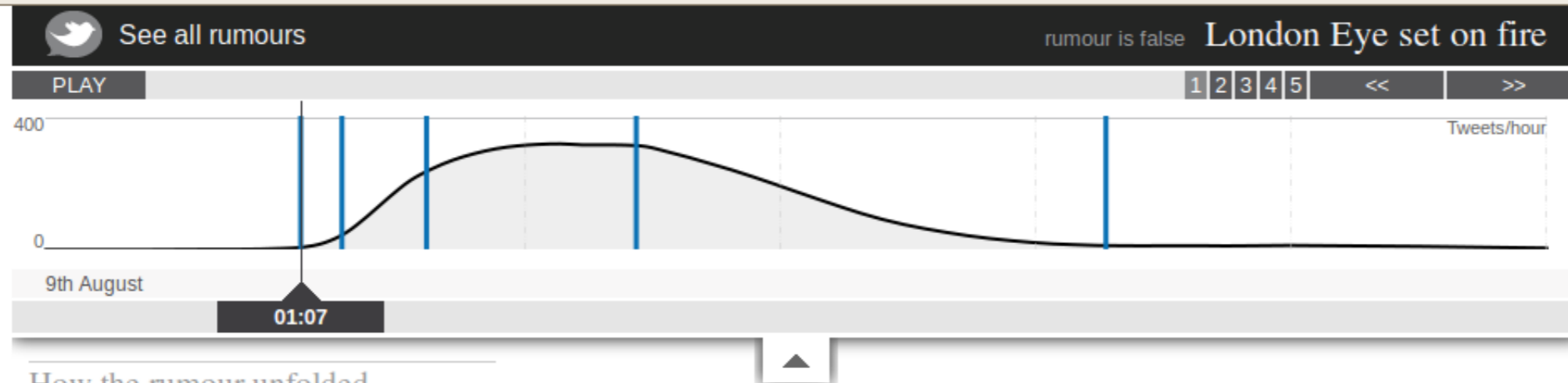
File Edit View History Bookmarks Tools Help

How riot rumours spread on Tw...

www.guardian.co.uk/uk/interactive/2011/dec/07/london-riots-twitter



guardian visualisation london riots



How the rumour unfolded

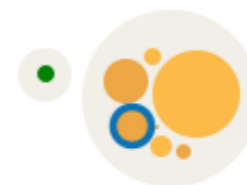
Shortly after 1am on Tuesday, August 9, @zadio posts a link to an image of the London Eye apparently ablaze with the heartfelt message: 'Oh my God! This can't be happening!' The tweet is quickly picked up.



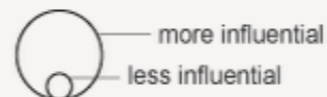
Oh my god! This can't be happening at London Eye! #Londonriots #Londonriot #Prayforlondon <http://twitpic.com/6372vo>

@zadio, 18 followers

Tue 9 Aug 01:07



Influence of the tweet



Relation to the rumour

support recent 2h old opposition recent 2h old query recent 2h old comment recent 2h old

Social Media is Rife with Phemes (2)

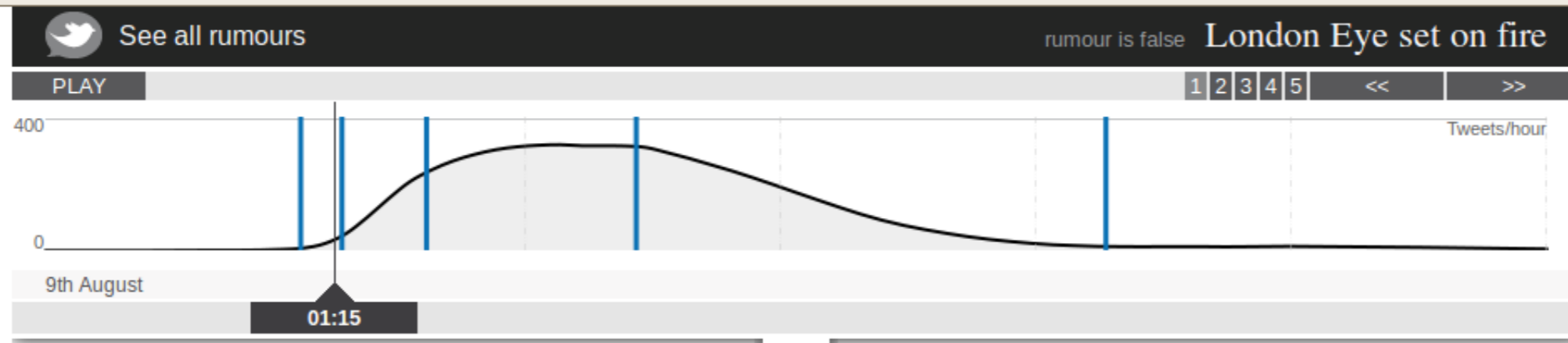
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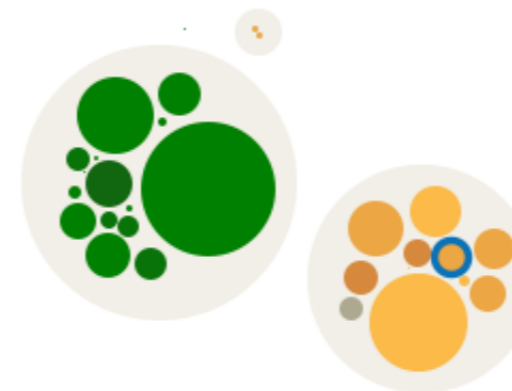
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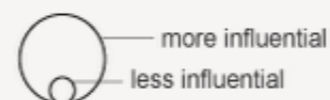
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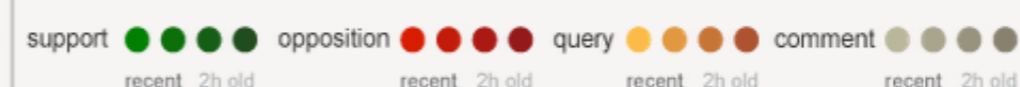
Tue 9 Aug 01:07



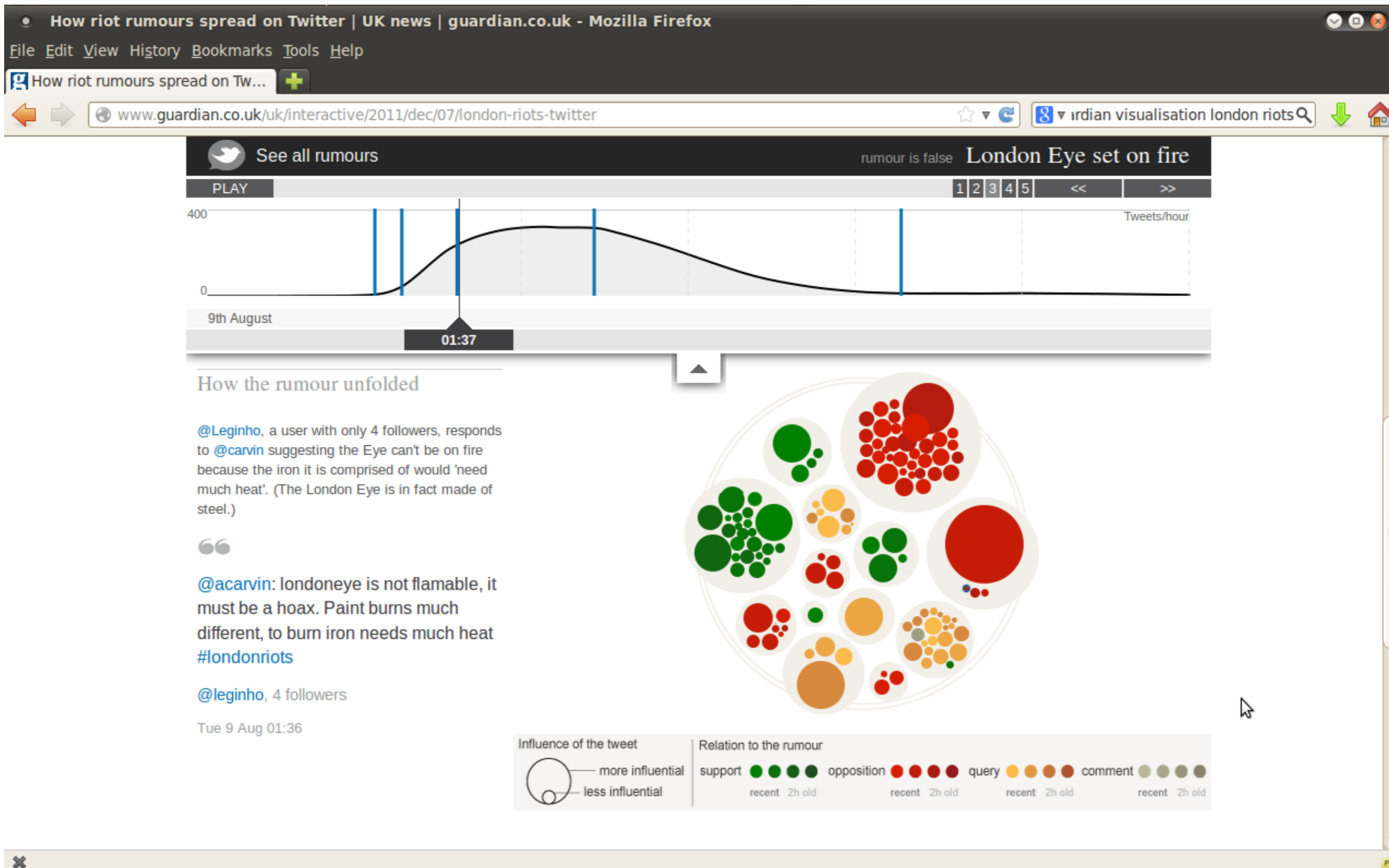
Influence of the tweet



Relation to the rumour



Social Media is Rife with Phemes (3)



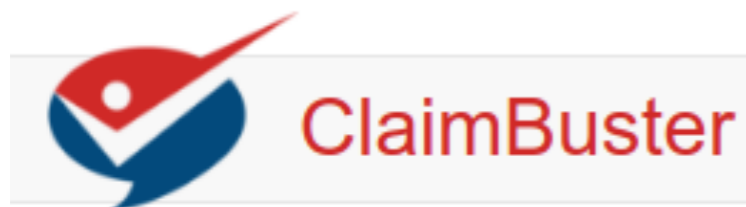
- Journalists do it mostly manually
- Rumour analysis is challenging
 - Some rumours could take days, weeks or even months to die out
 - Ill-meaning humans can currently outsmart computers (and humans) and appear genuine
 - Role of conversational threads in rumour analysis
 - Tweet-rot and deletions
 - Real-time analysis of temporally dynamic phemes

What: High Level Goal

- Create a computational framework for **automatic** discovery and verification of rumours, **at scale** and **fast**
- Draw on:
 - NLP: what's said
 - web science: a priori knowledge from Linked Data
 - social science: who spread it, why and how
 - information visualisation: visual analytics

Content verification

- A number of projects focussed on detecting inaccurate reports, which has recently been relabelled as “fake news”.
- Most projects deal with what is known as “fact-checking”, comparing sources to validate reports, with an assumption that other sources exist.

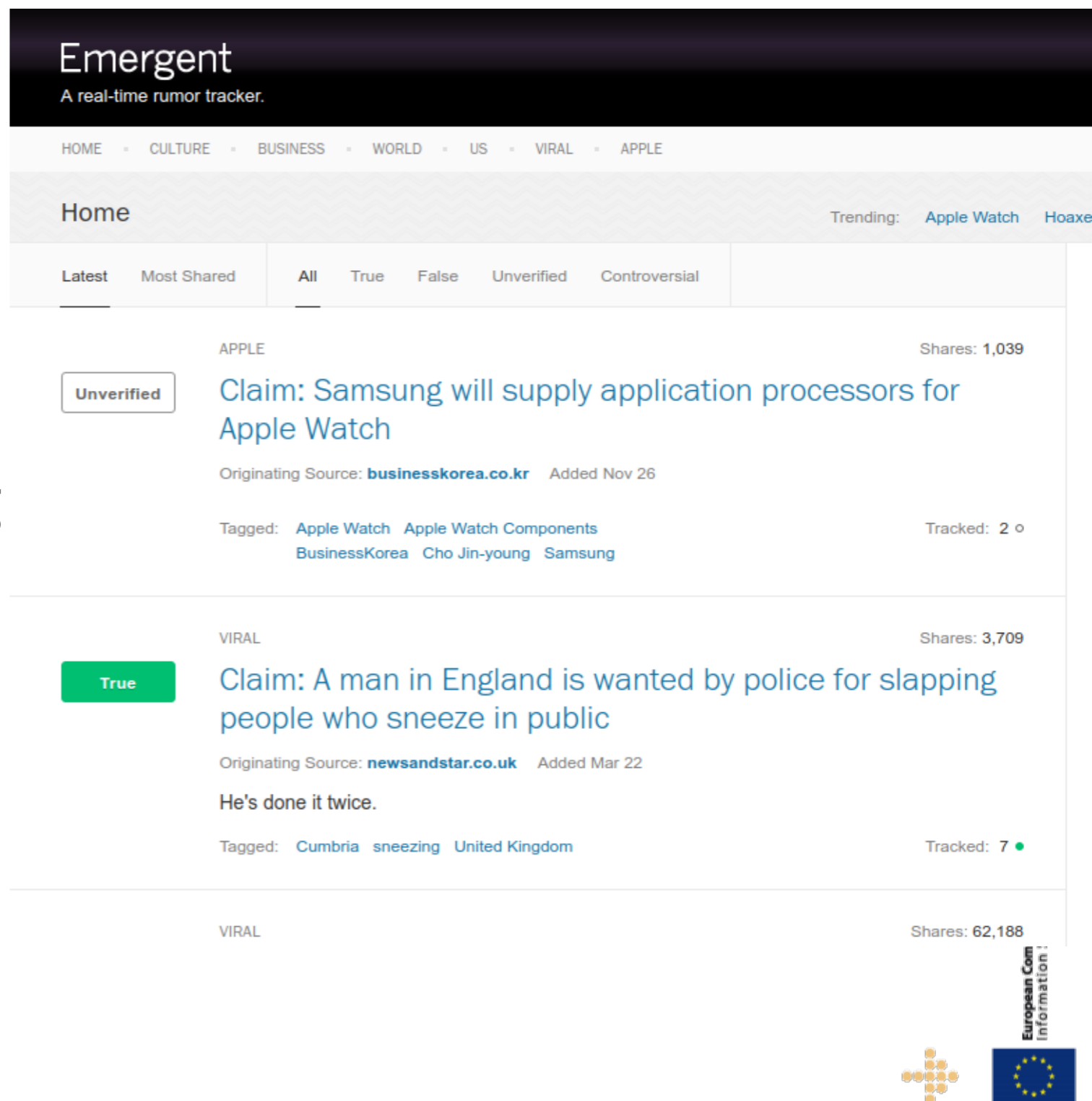


Working with rumours

- Rumours spawn and circulate as plausible pieces of information that are unverifiable when they emerge.
- One needs to further explore information to find sources that may not have yet been identified and often wait for new evidence to be released.
- A rumour detection system has to:
 - Identify pieces of information that are unverified and require corroboration.
 - Track what different sources are saying about the rumour.
 - The system progressively updates likely veracity of a rumour, ideally identifying supporting evidence.

Work by others on rumours

- Emergent.info - the most similar project to PHEME - tracking unverified reports for debunking/confirmation
- The project has however been discontinued
- Owing to the project being totally manual and lacking automation, maintenance was not viable



Emergent
A real-time rumor tracker.

HOME • CULTURE • BUSINESS • WORLD • US • VIRAL • APPLE

Home Trending: Apple Watch Hoaxe

Latest Most Shared All True False Unverified Controversial

Unverified

APPLE Shares: 1,039

Claim: Samsung will supply application processors for Apple Watch

Originating Source: businesskorea.co.kr Added Nov 26

Tagged: Apple Watch Apple Watch Components BusinessKorea Cho Jin-young Samsung

Tracked: 2 ○

True

VIRAL Shares: 3,709

Claim: A man in England is wanted by police for slapping people who sneeze in public

Originating Source: newsandstar.co.uk Added Mar 22

He's done it twice.

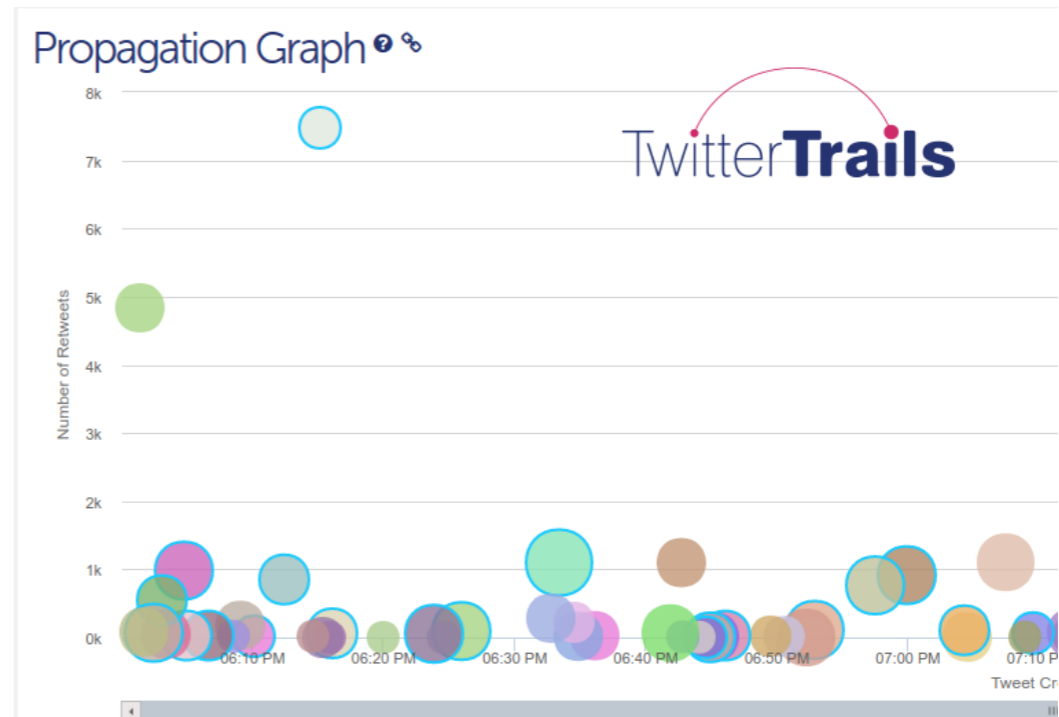
Tagged: Cumbria sneezing United Kingdom

Tracked: 7 ●

VIRAL Shares: 62,188

European Commission Information

-
- The left side of the slide features the RumorLens logo, which consists of a stylized camera lens mounted on a stack of three server units. Below the logo, the text "RUMORLENS" is written in a large, bold, black, sans-serif font.
- The right side of the slide contains a diagram illustrating the system architecture. A vertical bar on the left is divided into three sections: "Start" (top, light blue), "Run" (middle, light green), and "End" (bottom, light orange). To the right of this bar, a series of curved lines represent the flow of data or rumors. These lines are labeled "Rumor Exp 1", "Rumor Exp 2", "Rumor Exp 3", "Rumor Exp 4", "Correlation Exp 1", "Correlation Exp 2", and "Correlation Exp 3". The lines are color-coded to match the sections of the vertical bar: blue for "Start", green for "Run", and orange for "End".



Events:

- Ferguson unrest
- Ottawa shooting
- Sydney seige
- Charlie Hebdo shooting
- German Wings crash

Specific rumours:

- Putin missing
- Prince concert
- Michael Essien
- Gurlit collection

Collect Tweet Datasets



Twitter Collector as a Service



Twitter collector - GATE Cloud

[Change password](#)

[Log out](#)

Twitter API Access



Stream Configuration - Immigrants Brexit



Results Delivery



Collector Status



8,931,089

tweets collected in total.

Stop collecting

Roll-over to next chunk

8,931,089

tweets have been processed.

1,908

tweets per minute.

320,035

tweets missed due to Twitter rate limiting.

Log messages

Wed May 10 22:05:22 UTC 2017	Deleted immigrants_brexit_UK_election-2017-05-09-031.gz
Wed May 10 22:05:22 UTC 2017	Collected data has grown to 2.05GB, deleting oldest chunks
Wed May 10 22:03:05 UTC 2017	Uploaded immigrants_brexit_UK_election-2017-05-10-034.gz to data bundle
Wed May 10 22:03:04 UTC 2017	Uploaded immigrants_brexit_UK_election-2017-05-10-034.gz to S3 bucket twitter-data-eu-west-2-gate-ac-uk
Wed May 10 21:35:22 UTC 2017	Deleted immigrants_brexit_UK_election-2017-05-09-030.gz
Wed May 10 21:35:22 UTC 2017	Collected data has grown to 2.05GB, deleting oldest chunks
Wed May 10 21:31:02 UTC 2017	Uploaded immigrants_brexit_UK_election-2017-05-10-033.gz to data bundle

Explore Data

Results

Docs & YouTube videos:

<https://cloud.gate.ac.uk/info/help/twitter-collector.html>

PHEME <http://www.pHEME.eu>




Live Stats and Fine Tuning


^ Explore Data

The following reports are automatically updated in real time based on your data.


⊗ Reset Reports




See top hashtags.




See a count of tweet frequency by hour.




See a bar chart of top topics according to our lists of terms.



See most mentioned users.



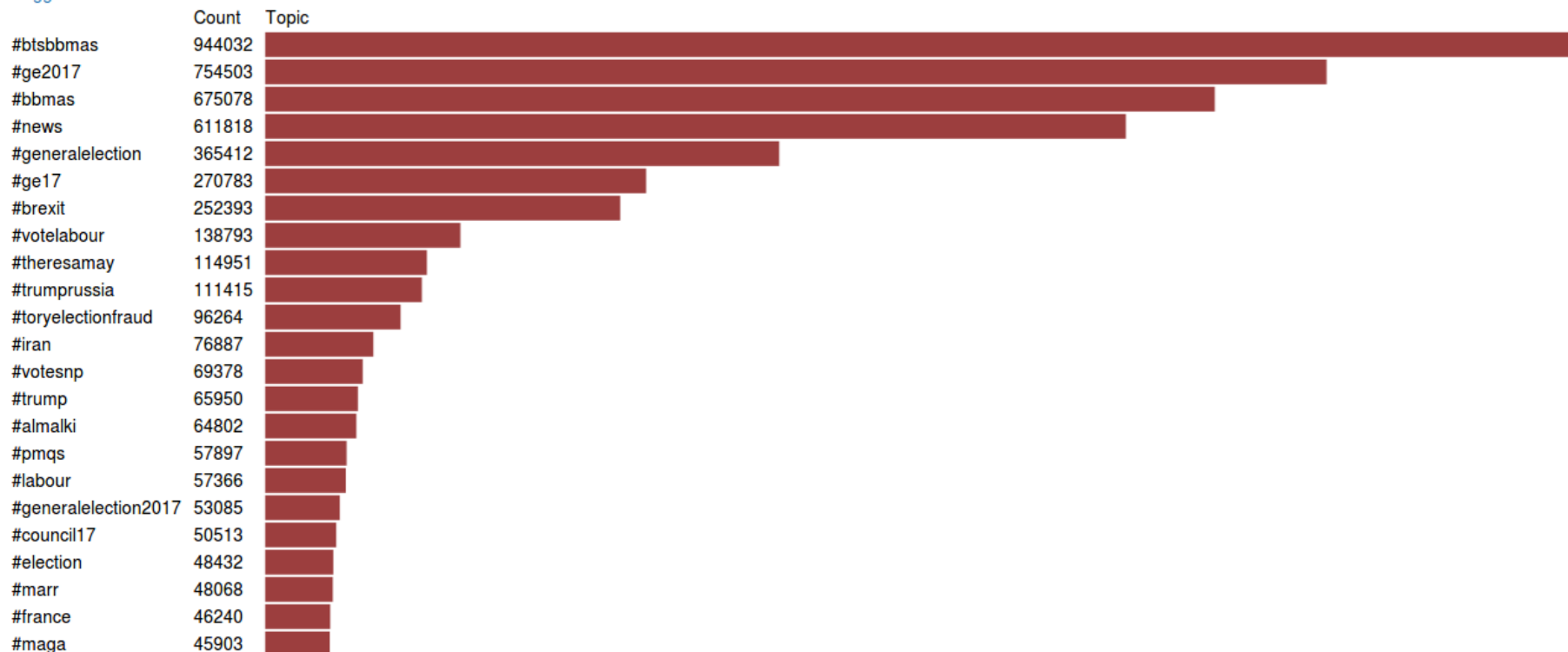
See frequency for each tracked term.



See top words of each kind (such as noun, adjective and so on, English only).

Show Hashtags

Toggle bar chart/cloud Save as SVG Get JSON



Tweets collected in
Amazon buckets for
Download

Processing on GATE
Cloud


■ 24 services, multiple languages



Home **Services** Dashboard


Show only items tagged: **Chunker (1)** **Custom (1)** **Dutch (1)** **English (13)** **Environment (2)** **French (2)** **German (4)** **Measurements (2)** **Morphology (1)** **Named Entity (15)** **OpenNLP (3)** **Opinion Mining (4)** **Part-of-Speech (1)** **Politics (1)** **Server (2)**
SoBigData (1) **Spanish (1)** **Summarization (2)** **Term Recognition (2)** **Twitter (11)** **Welsh (1)**

English Named Entity Recognizer

 Identify names of *persons, locations, organizations*, as well as *money amounts, time and date expressions* in English texts automatically.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

German Named Entity Recognizer

 A named entity recognition service for documents in German. Based on ANNIE, it identifies names of *persons, locations, and organizations*.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

French Named Entity Recognizer

 A named entity recognition service for documents in French. Based on ANNIE, it identifies names of *persons, locations, and organizations*.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

French Named Entity Recognizer for Tweets

 Analyse French tweets for names of *persons, locations and organizations*. Also performs normalization of abbreviations and common Twitter slang.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

English Named Entity Recognizer for Tweets

 Analyse tweets for names of *persons, locations, organizations* and other entities. Also performs normalization of abbreviations and common shorthands ("brb", "gr8", "2day", etc.).


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

Language Identification for Tweets

 Service to identify the languages of tweets.a.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

Part-of-Speech Tagger for Tweets

 A service that tags tweets with part-of-speech information, e.g. nouns, verbs.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

German Named Entity Recognizer for Tweets

 Analyse German tweets for names of *persons, locations and organizations*. Also performs normalization of abbreviations and common Twitter slang.


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

Twitter Collector

 Collect tweets, view tweet statistics, and store results in your dashboard for further analysis.


GBP0.05 / CPU hour

English Tweet Tokenizer

 Identifies words and punctuation in tweets


1,200 free requests / day
Larger batches GBP0.80 / CPU hour

CYMRIE Welsh Named Entity Recognizer

 The CYMRIE named entity recognition service for Welsh text. Identifies names of *persons, locations, organizations*, as well as *money amounts, time and date expressions*.

1,200 free requests / day
Larger batches GBP0.80 / CPU hour

English Part-of-Speech and Morphology Analyzer

 Annotates *tokens and sentences* in English text, adding part-of-speech and morphological root and affix to each token.

1,200 free requests / day
Larger batches GBP0.80 / CPU hour



Rumour Annotation



Data collection and sampling

- Twitter public stream
- Retweet threshold to establish salience
- SWI identified rumourous source tweets and grouped them into stories

Event name	Rumour stories	Annotated threads	Rumour threads	Non-rumour threads
Sydney Siege	61	1321	535	786
Ottawa Shooting	51	901	475	426
Charlie Hebdo	61	2169	474	1695
Germanwings	19	1022	332	690
Ferguson	42	1183	291	892
Prince to play in Toronto	6	241	237	4
Gurlitt	3	386	190	196
Putin missing	6	266	143	123
Essien has Ebola	1	18	18	0
TOTAL	250	7507	2695	4812

en-charliehebdo-553558982476828674

[\[go back to rumours by accuracy\]](#) [\[go back to rumours by acceptability\]](#)

Links to Other Media

[news-media] [for] <http://jpupdates.com/2015/01/09/breaking-gunman-takes-hostage-kosher-gocery-store-paris/>

Social Media Conversation



@AvitalLeibovich [FR: 2, **verified**, **journalist**]

On Israeli TV, an Israeli woman speaks of her nephew, a mother with 6 month old baby, held hostage in the supermarket in Paris. [#JeSuisJuif](#)

Annotation: certainty: certain, support: supporting, evidentiality: witnessed,



@talziv [FR: 1, **verified**, **journalist**]

[@AvitalLeibovich](#) link?

Annotation: certainty: uncertain, evidentiality: unverifiable-source-quoted, responsetype-vs-source: appeal-for-more-information,



@AvitalLeibovich [FR: 2, **verified**, **journalist**]

[@talziv](#) [@Channel2News](#)

Annotation: certainty: underspecified, responsetype-vs-source: comment, responsetype-vs-previous: agreed, evidentiality: url-given,



@talziv [FR: 1, **verified**, **journalist**]

[@AvitalLeibovich](#) [@Channel2News](#) actually, mako.co.il/news

Annotation: responsetype-vs-source: comment, responsetype-vs-previous: comment,



@jessicaelgot [FR: 1, **verified**, **journalist**]

[@AvitalLeibovich](#) do you have a link?

Annotation: certainty: uncertain, evidentiality: no-evidence, responsetype-vs-source: appeal-for-more-information,

Rumour Analysis












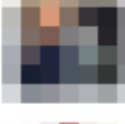






- 1) Rumour detection:** identify pieces of information that need to be verified.
- 2) Rumour stance classification:** classify public stance towards the rumour.
- 3) Veracity classification:** determine if a rumour is true, false, or remains unverified.

- Classification problem
 - Tweet level
 - Classes: rumour or non-rumour
- Why
 - Identify tweets reporting unverified information.
 - Necessary for subsequent stance and veracity classification.
- “Michael Brown was involved in a robbery before being shot by police” -> **needs context**

Rumour detection (2)

Can we then leverage context accumulated throughout the event?

✓ X ?			@ BREAKING: Hostages are being forced to hold an ISIS flag at a Lindt cafe in Sydney's Martin Place, as police man the doors outside #7NEWS Sun Dec 14 23:08:15 +0000 2014 - see tweet on Twitter
✓ X ?			@ BREAKING: Gunman takes hostages in cafe in Martin Place, Sydney dailym.ai/134wluW Sun Dec 14 23:10:22 +0000 2014 - see tweet on Twitter
✓ X ?			@ UPDATE: An ISIS flag is being displayed in the window of a café under siege in Sydney's Martin Place. #9News Sun Dec 14 23:12:09 +0000 2014 - see tweet on Twitter
✓ X ?			@ #BREAKING : Hostages are being held and a siege is taking place at Sydney's Lindt Chocolat Cafe in Martin Place. Sun Dec 14 23:12:32 +0000 2014 - see tweet on Twitter
✓ X ?			@ #BREAKING A police operation is underway in the heart of Sydney's CBD with one block of Martin Place blocked off. Sun Dec 14 23:13:12 +0000 2014 - see tweet on Twitter
✓ X ?			@ BREAKING: A Sydney cafe at Martin Place is being held up - hostages inside have their hands against the windows, ISIS flag visible.. #7News Sun Dec 14 23:14:29 +0000 2014 - see tweet on Twitter
✓ X ?			@ BREAKING: Live coverage of hostage situation unfolding in Sydney's Martin Place bit.ly/1wQXa3G pic.twitter.com/iTwradHTb3 Sun Dec 14 23:16:34 +0000 2014 - see tweet on Twitter
✓ X ?			@ Terrifying photo of hostages in Martin Place in Sydney, being held by men waving an ISIS flag pic.twitter.com/6ozBRQVNIG Sun Dec 14 23:17:34 +0000 2014 - see tweet on Twitter

Rumour detection (3)

- Conditional Random Fields.
- Comparison vs:
 - Baseline by Zhao et al. (2015) at WWW.
 - Maximum Entropy.
 - SVM, Random Forest, NB.
- Features:
 - Content and social

Rumour detection (4)

- Experiment methodology:
 - Leave-one-event-out: train on $n-1$ event, and test on the n -th event. Cross-validation
 - P/R/F1 evaluation.

A. Zubiaga, M. Liakata, R. Procter . Exploiting Context for Rumour Detection in Social Media. International Conference on Social Informatics, 109-123. 2017.

Rumour detection: Results

Classifier	P	R	F1
SVM	0.337	0.483	0.397
Random Forest	0.275	0.099	0.145
Naive Bayes	0.310	0.723	0.434
Maximum Entropy	0.338	0.442	0.383
CRF	0.667	0.556	0.607

State-of-the-art Baseline

Classifier	P	R	F1
(Zhao et al., 2015)	0.410	0.065	0.113

A. Zubiaga, M. Liakata, R. Procter . Exploiting Context for Rumour Detection in Social Media. International Conference on Social Informatics, 109-123. 2017.

Rumour Stance classification

- Classification Problem
 - Tweet level
 - Classes: support, deny, question, comment
- Why
 - Show journalists the unfolding online debates on a given pHEME
 - Aid veracity classification

Stance classification

[depth=0] **u1:** These are not timid colours; soldiers back guarding Tomb of Unknown Soldier after today's shooting #StandforCanada –PICTURE– **[support]**

[depth=1] **u2:** @u1 Apparently a hoax. Best to take Tweet down. **[deny]**

[depth=1] **u3:** @u1 This photo was taken this morning, before the shooting. **[deny]**

[depth=1] **u4:** @u1 I don't believe there are soldiers guarding this area right now. **[deny]**

[depth=2] **u5:** @u4 wondered as well. I've reached out to someone who would know just to confirm that. Hopefully get response soon. **[comment]**

[depth=3] **u4:** @u5 ok, thanks. **[comment]**

Rumour Stance & Veracity

- Manual Analysis [Mendoza et al. 2010]
- True rumours: 95% “support”, 4% “questioning” and only 0.4% were “denies”
 - True rumours are largely supported by other Twitter users
- False rumours: 38% “denies” and 17% “questioning”
 - Stance is an important factor for verification step

Rumour Stance Data

Dataset	Rumours	Supporting	Denying	Questioning	Commenting	Large
Ottawa shooting	58	161	76	64	481	✓
Ferguson riots	46	192	83	94	685	✓
Prince in Toronto	12	19	7	11	59	×
Charlie Hebdo	74	236	56	51	710	✓
Ebola Essien	2	6	6	1	21	×
Germanwings crash	68	177	12	28	169	✓
Putin missing	9	17	7	5	33	×
Sydney siege	71	89	4	99	713	✓

SemEval-2017 Task 8

RumourEval: Determining rumour veracity and support for rumours

RumourEval: Determining rumour veracity and support for rumours

LSTM won RumourEval

Team	Score
DFKI DKT	0.635
ECNU	0.778
IITP	0.641
IKM	0.701
Mama Edha	0.749
NileTMRG	0.709
Turing	0.784
Uwaterloo	0.780

Features: Stance Classification

- Syntactic: #negations, POS
- Lexical: e.g. bag of words, key words
- Lexicon: word embeddings, brown clusters
- Indicator: e.g. “this is nonsense”, “is a hoax”
- User metadata: e.g. verified, #followers/followees
- Semantic: e.g. emoticons, sentiment, NEs
- Message metadata: e.g. length of the post, URL
- Content formatting: e.g. capital words ratio
- Punctuation: e.g. ?, ..., !

A.Aker, L. Derczynski, K. Bontcheva. Simple Open Stance Classification for Rumour Analysis. Recent Advances in Natural Language Processing, 2017.

USFD on RumourEval Data

- Applying traditional ML
- Focus on “problem specific” features
 - Capturing *Surprise*, *Doubt*, *Certainty* and *Support* towards rumourous tweets
 - Similarity to initial tweet
- Random Forest (best performing traditional ML) with features reported by related work yields to 76.54 accuracy
- Adding “problem specific” features yields 79.02 accuracy (LSTM 78.4).

A.Aker, L. Derczynski, K. Bontcheva. Simple Open Stance Classification for Rumour Analysis. Recent Advances in Natural Language Processing, 2017.

Stance Classification: Findings

- Supporting tweets are more likely to include links.
 - i.e. provide evidence
- Looking at the **temporal dimension**, S/D/Q tend to occur in early stages of a rumour, and then mostly comments later
- We've looked at **persistence**, finding that supporting users tend to post more tweets, i.e., further insisting

<https://gate.ac.uk/wiki/pheme-stance.html>

Veracity classification

- Classification Problem
 - Rumour level
 - Classes: true, false or unverified

- Why
 - Help journalists and the public determine if report is accurate.
 - Flagging false rumours to warn users.

- Features similar to stance classification
- **NB:** those features need to **be computed for the entire rumour** instead of individual posts
 - E.g. adding feature values over all posts within the rumour and performing normalisation.
- Stance of individual posts is an important feature

A.Aker, L. Derczynski, K. Bontcheva. Simple Open Stance Classification for Rumour Analysis. Recent Advances in Natural Language Processing, 2017.

Veracity classification

- Evaluation: determine, after each tweet, ability to classify veracity of rumour.

Classifier	Without Stance	With stance over time
J48	64.61	69.84
Random Forest	<u>68.20</u>	<u>70.76</u>
K-NN	63.69	69.84

- Fake News Challenge adopted PHEME's methodology, i.e., a 4-way typology akin to {support, deny, query, comment}

FAKE NEWS CHALLENGE STAGE 1 (FNC-I): STANCE DETECTION

Input

A headline and a body text - either from the same news article or from two different articles.

Output

Classify the stance of the body text relative to the claim made in the headline into one of four categories:

1. **Agrees:** The body text agrees with the headline.
2. **Disagrees:** The body text disagrees with the headline.
3. **Discusses:** The body text discuss the same topic as the headline, but does not take a position
4. **Unrelated:** The body text discusses a different topic than the headline

? Brexit vote may have been hacked. If Russia hacked Brexit, safe to assume they hacked vote totals in other elections.?

OVERVIEW

Topic: **UK triggers Article 50**

Number of images: 0

Number of URLs: 4

Verified authors: No

Controversiality score: **Low**

Veracity: **False** (100% confidence)

ACTIVITY

Size: 132 tweets

Average activity: 0.16 tweets/second

Oldest tweet: 5:35 AM - 12 Apr 2017

Last activity: 5:48 AM - 12 Apr 2017

EXAMPLE TWEET



@DustinGiebel

"Brexit vote site may have been hacked, MPs say in report" I know some people they should look at.?
<https://t.co/EWp4HeEDyg>

3:22 AM - 12 Apr 2017 [open in twitter](#)

#WillLondonFall FALL?!?? I AIN'T A SEASON - LONDON. #brexit #NYTimes #UKParliament #sixwordstory

OVERVIEW

Topic: **UK triggers Article 50**

Number of images: 0

Number of URLs: 1

Verified authors: No

Controversiality score: **Low**

Veracity: **False** (100% confidence)

ACTIVITY

Size: 122 tweets

Average activity: 2.30 tweets/second

Oldest tweet: 9:19 AM - 12 Apr 2017

Last activity: 9:20 AM - 12 Apr 2017

EXAMPLE TWEET



@michelepaschal1

RT @SixWrd: #WillLondonFall FALL?!?? I AIN'T A SEASON - LONDON. #brexit #NYTimes #UKParliament #sixwordstory <https://t.co/R7bOGPBxr1> [https://t.co/R7bOGPBxr1](#)

7:19 AM - 12 Apr 2017 [open in twitter](#)

NATO to reschedule meeting to accommodate Tillerson

OVERVIEW

Topic: **Nato**

Number of images: 1

Number of URLs: 4

Verified authors: Yes

Controversiality score: **Low**

Veracity: **True** (100% confidence)

ACTIVITY

Size: 71 tweets

Average activity: 0.04 tweets/second

Oldest tweet: 4:44 AM - 23 Mar 2017

Last activity: 5:11 AM - 23 Mar 2017

MOST SHARED IMAGE



EXAMPLE TWEET



@thehill

NATO to reschedule meeting to accommodate Tillerson <https://t.co/DGrYB6t5nz> <https://t.co/xuqa5LUlr7>

2:49 AM - 23 Mar 2017 [open in twitter](#)

By the time Germany was admitted into NATO the world had literally changed. Germany was no longer a military threat to France, UK, or the US because a

OVERVIEW

Topic: **Nato**

Number of images: 0

Number of URLs: 0

Verified authors: Yes

Controversiality score: **High**

Veracity: uncertain

ACTIVITY

Size: 70 tweets

Average activity: 0.00 tweets/second

Oldest tweet: 6:24 PM - 19 Mar 2017

Last activity: 6:45 PM - 20 Mar 2017

EXAMPLE TWEET



@Bazuka125

There's a difference between "they should pay fair share to NATO" and "They should pay us"

4:24 PM - 19 Mar 2017



Tweet Mapping

- For geo-tagged tweets in cluster, map their origin

? Brexit vote may have been hacked. If Russia hacked Brexit, safe to assume they hacked vote totals in other elections.?

Discussions

Linked URLs

Images

Places

TOPIC

UK triggers Article 50

OVERVIEW

Number of images: 0

Number of URLs: 4

Verified authors: No

Controversiality
score: **Low**

Veracity: **False**
(100% confidence)

ACTIVITY

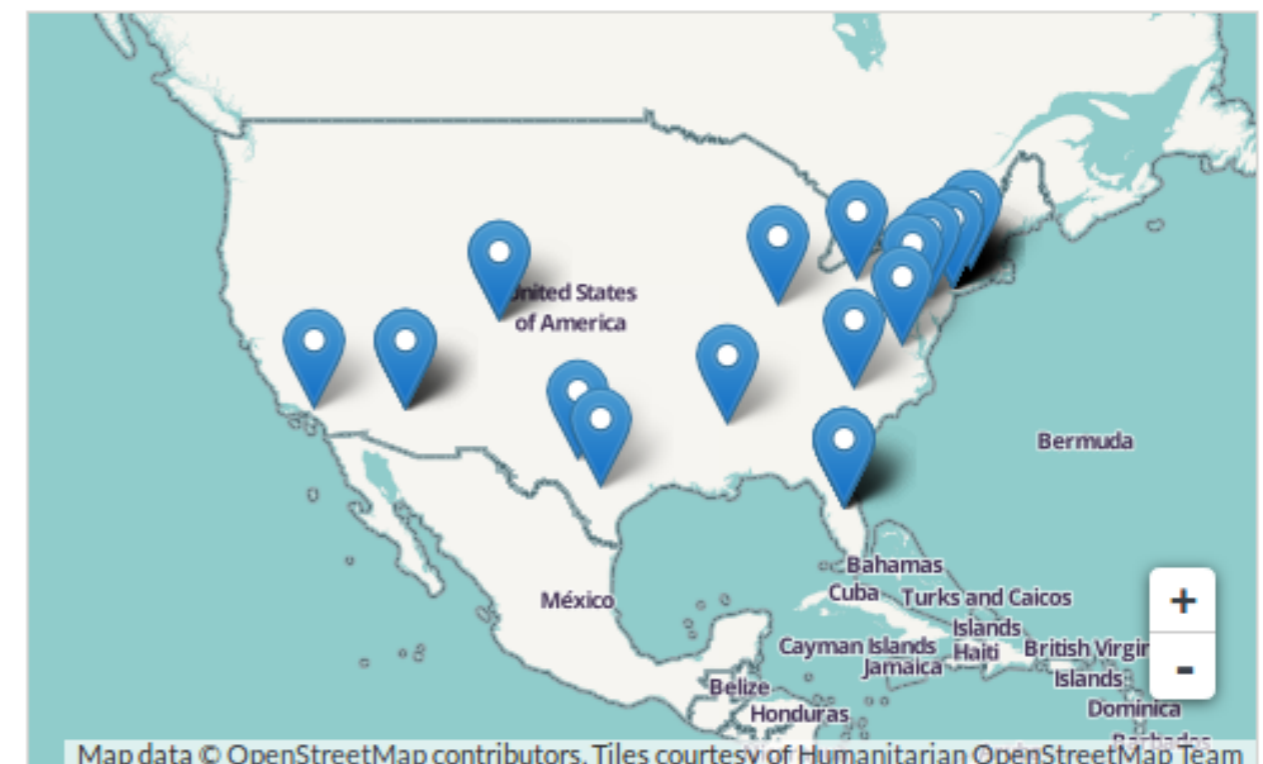
Size: 132 tweets

Average activity:
0.16 tweets/second

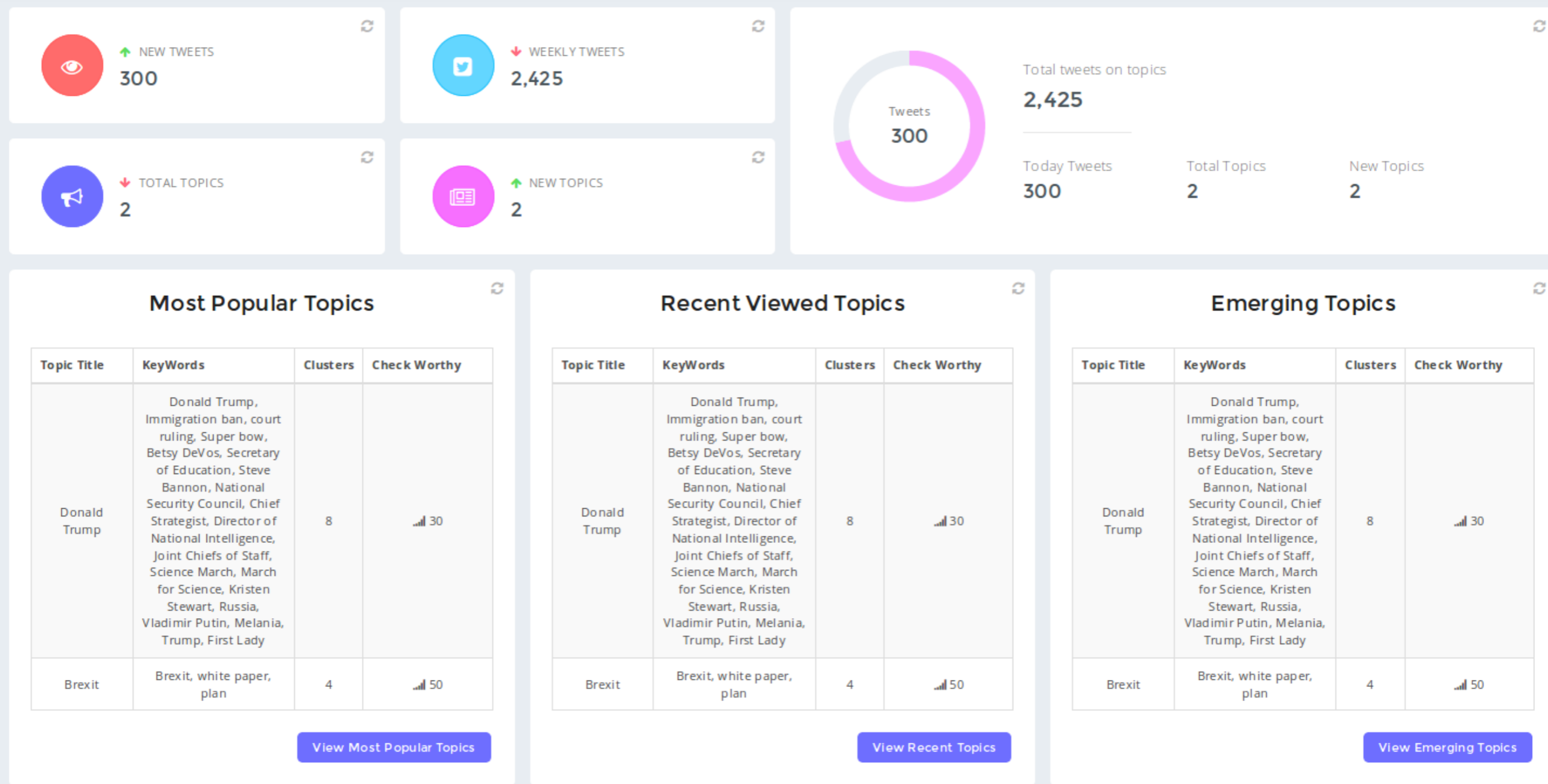
Oldest tweet: 5:35
AM - 12 Apr 2017

Last activity: 5:48
AM - 12 Apr 2017

PLACES



Hercule: Fact Checking Dashboard



Hercule: Fact Checking UI



Hercule



Search Here...



+ New Topic



Home / Results Panel / Donald Trump / Immigration Ban

Immigration Ban

Size: 55 | Checkworthy: 70

Total topics
8

Total tweets
21,561,21

MAIN MENU

Dashboard

Results Panel

Topic Management



Sadi Kleida

Sadi Kleida Shared via twitter
4 minutes ago

RT @ChristieC733: Statesman Vs Subversives - Sessions Must Target, Prosecute Soros, Treasonous Left
#ArrestSoros #ImmigrationBan ✓https... [read more](#)



edward carlson

edward carlson Shared via twitter
5 minutes ago

RT @LVNancy: The question isn't whether #POTUS has the right to impose an #immigrationBan It is why
Democrats are such hypocrites!! #TRUMP... [read more](#)



Belkys

Belkys Shared via twitter
6 minutes ago

RT @LibertysHeroes: Most Voters Approve of @DJTrump45's Temporary #ImmigrationBan. #tcot #MAGA

Concepts



Organization:
Democratic Party



Organization:
European Union



Person: Elizabeth
Cheney



Organization:
British people



Location: United



Location: Muslim

Fact Check World News

Is Donald Trump's executive order a Muslim ban?



[Check them out](#) ing for
president days after a terrorist
attack in San Bernardino, Calif.,

Related World News

Letters: Trump's new travel restrictions



[Check them out](#) rt Trump's

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Dashboard

Results Panel

Topic Management



- Capturing temporal, streaming dynamics
- Improving further:
 - Rumour detection – F1 of 60.7% still too low to be useful in practice
 - Rumour stance – overall accuracy, but especially on the deny class, needs further improvement
 - Veracity – needs significant improvement, for journalists to find it reliable in practical settings
- Provide journalists with the reasons behind a given classification decision

Acknowledgements



Project partially supported by the European Union/EU under the Information and Communication Technologies (ICT) theme of the 7th Framework Programme for R&D (FP7), grant PHEME (611233)”



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