Social Media Analytics

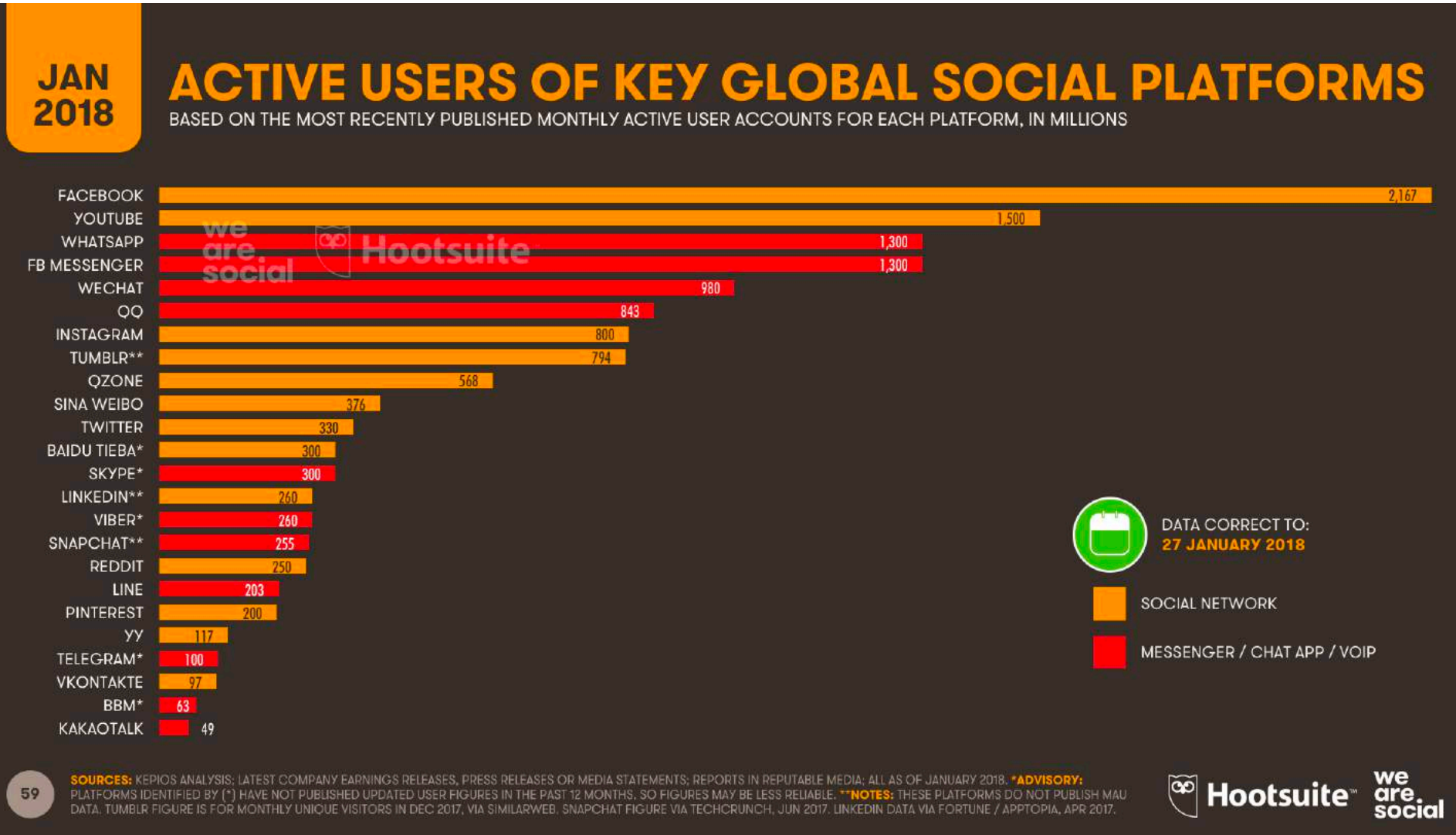
Social Media and its impact

- Social networking, blogging, and online forums have turned the Web into a vast repository of comments on many topics, generating a potential source of information for:
  - social science research
  - market and politics forecasts
  - syndromic surveillance
  - information warfare
  - new opportunities for media communication

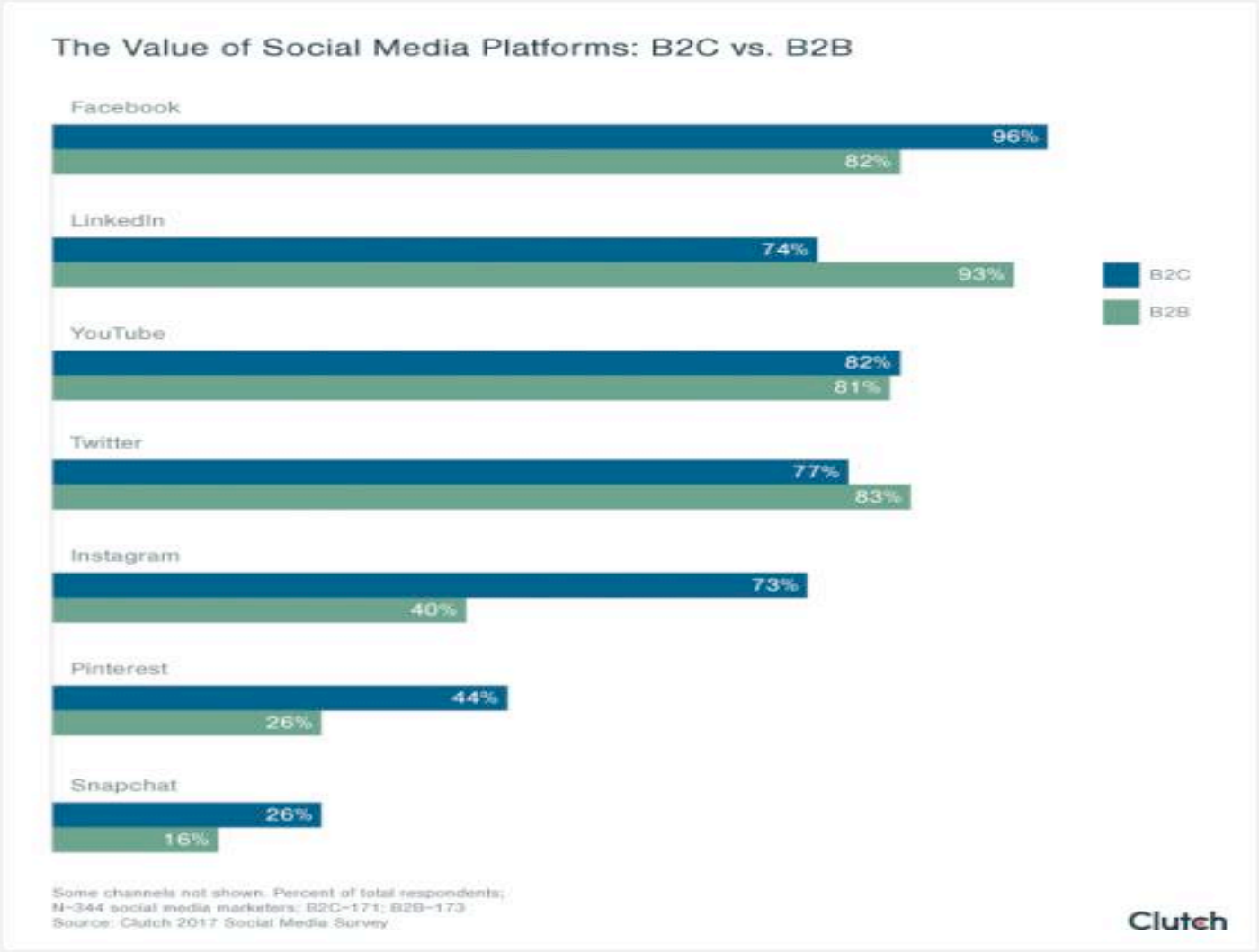
Social media revolution

- Changing the way individuals and organizations engage, interact and collaborate
- New opportunities for real time analysis and predictive analytics creating insight from more and more data
- Appealing for business, public bodies and scientists (both ICT and social scientists)

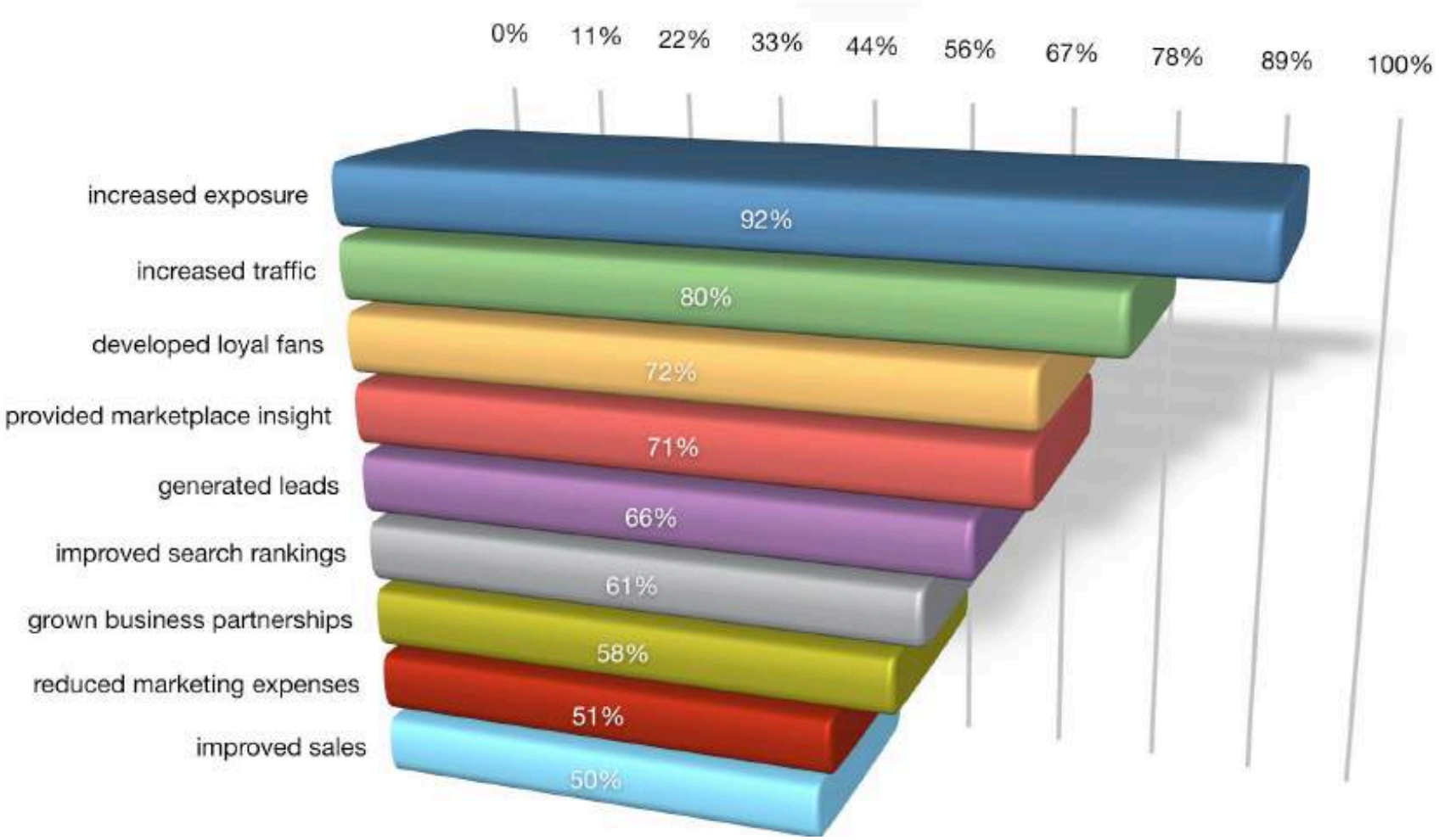
How big is “social media”?



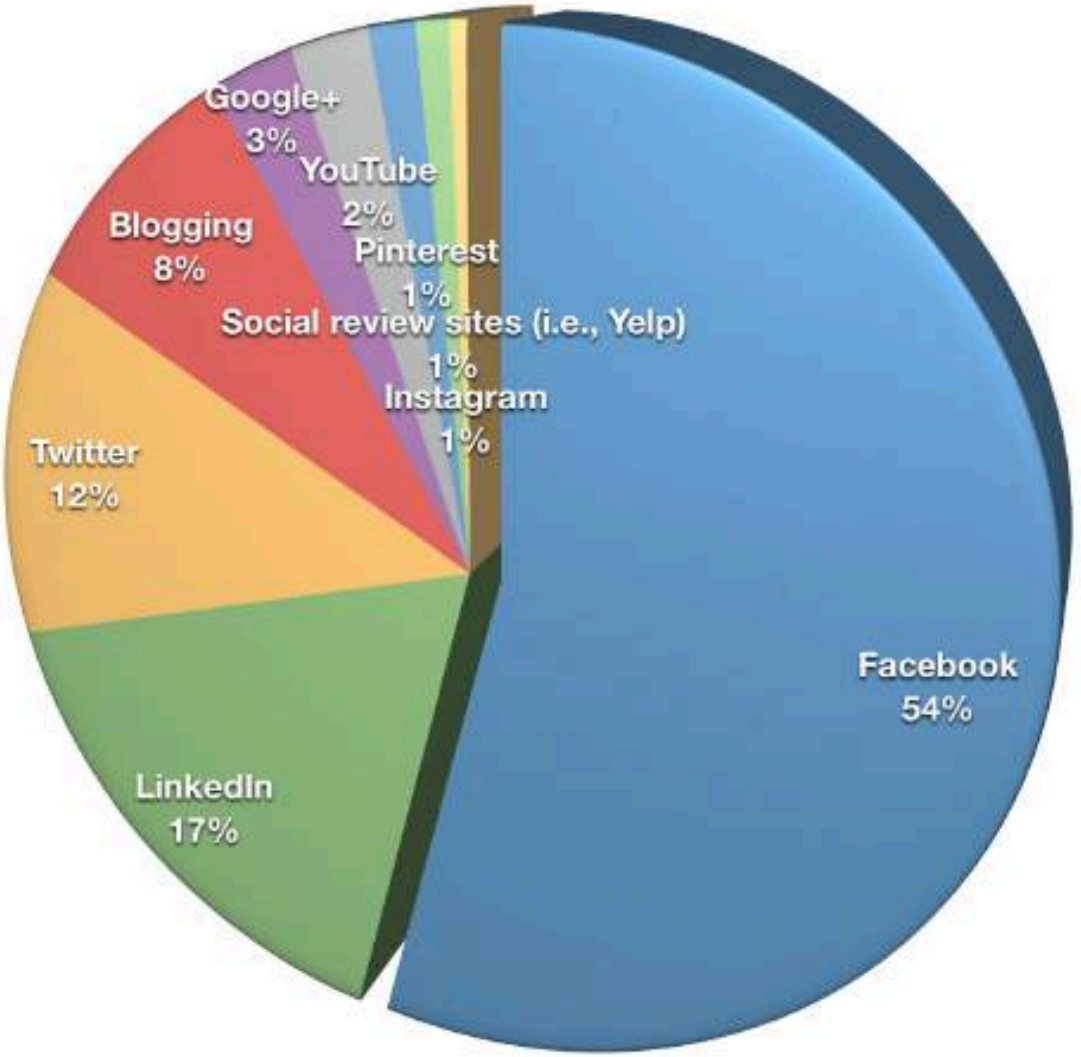
Marketers (B2C and B2B) use social media more than 6 hours weekly



Benefits of social marketing



The most important platform for marketers is..



Impact on common users

- **“Only 14% of people trust advertisers yet 78% of consumers trust peer recommendations.”**

  Erik Qualman’s book “Socialnomics”, 2009

Impact of Social Media

Impact of Social media

- Why are social networks and social analytics important for media, business and public bodies?
- **“If you wish to persuade me, you must think my thoughts, feel my feelings, and speak my words.” (Tullius Marcus Cicero)**
- Social media are the new data source to better engage audience/ customers /citizens

Impact of Social Media on Products

- General Motors cancels '*Hideous*' Buick SUV after "*Would-Be Customers*" on Twitter!
- ONE week after announcing a new Buick SUV Christopher Barger, GM's spokesman for social media said: "*The decision was based on customers' input - face-to-face, blogs and tweets. No matter how they expressed it "they just didn't like it*."

http://www.bloomberg.com/apps/news?pid=newsarchive&sid=aHsoNjdHUQLY

Impact of Social Media on Products

- Del Monte created a new "hot-selling" dog food snack in 6 weeks
- Used a social community to *source for creative ideas (crowdsourcing)* and create a new product
- Demonstrates the potential power of social media marketing to influence product sales

http://www.youtube.com/watch?v=yP_3bpCPZaQ

Impact of Social Media on Organisations

Nestlé vs Greenpeace Palm Oil from Destroyed Rainforest

- Nestlé, maker of Kit Kat, uses palm oil from companies that are trashing Indonesian rainforests, threatening the livelihoods of local people and pushing orang-utans towards extinction.
- Nestlé persuaded YouTube to remove Greenpeace's video
- Storm ensued on Nestlé Facebook page
- TWO months later, Nestlé announced a "zero deforestation" policy in partnership with The Forest Trust (TFT)

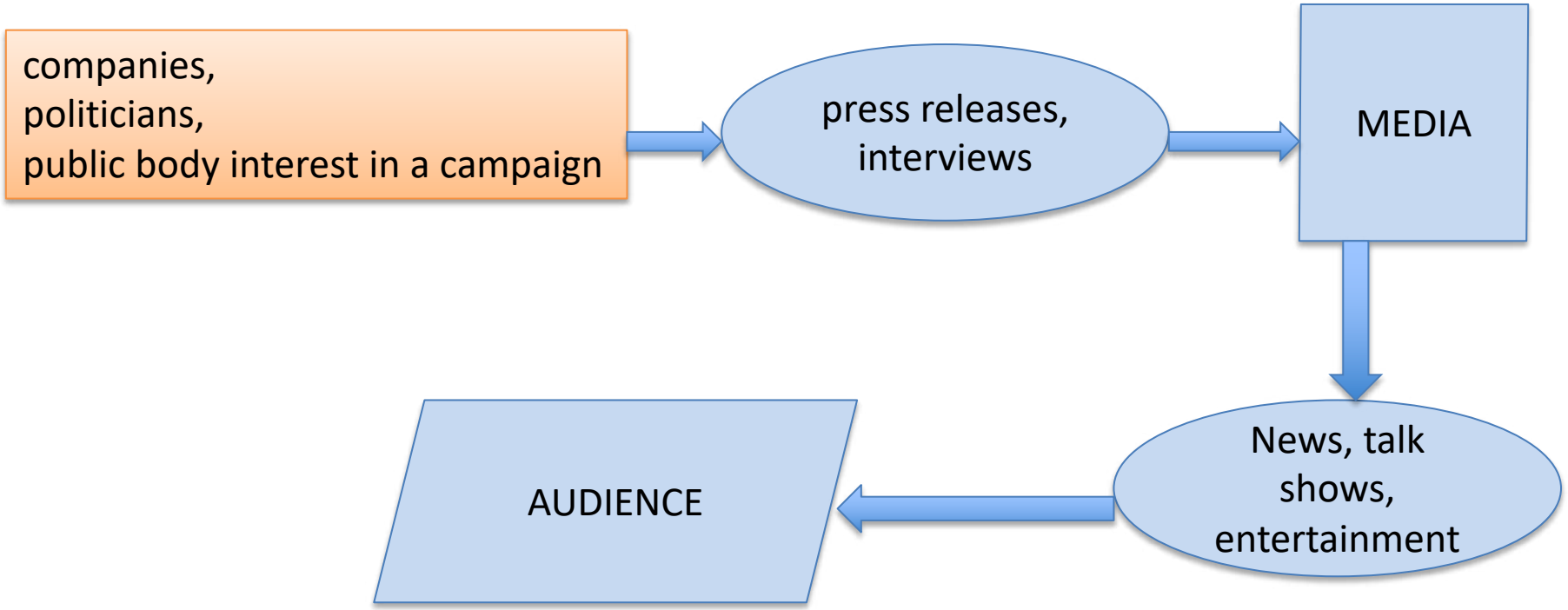
"*Social media: as you can see we're learning as we go. Thanks for the comments*."

Impact of Social Media on Government

25th Jan 2011 Egypt Blocked Twitter and Facebook!

Egyptian protesters have openly thanked social media's role in the revolution against the country's ruling government.

Social Networks also impact on media and communication



Traditional method to reach audience

The social media revolution

The ICT revolution and new media

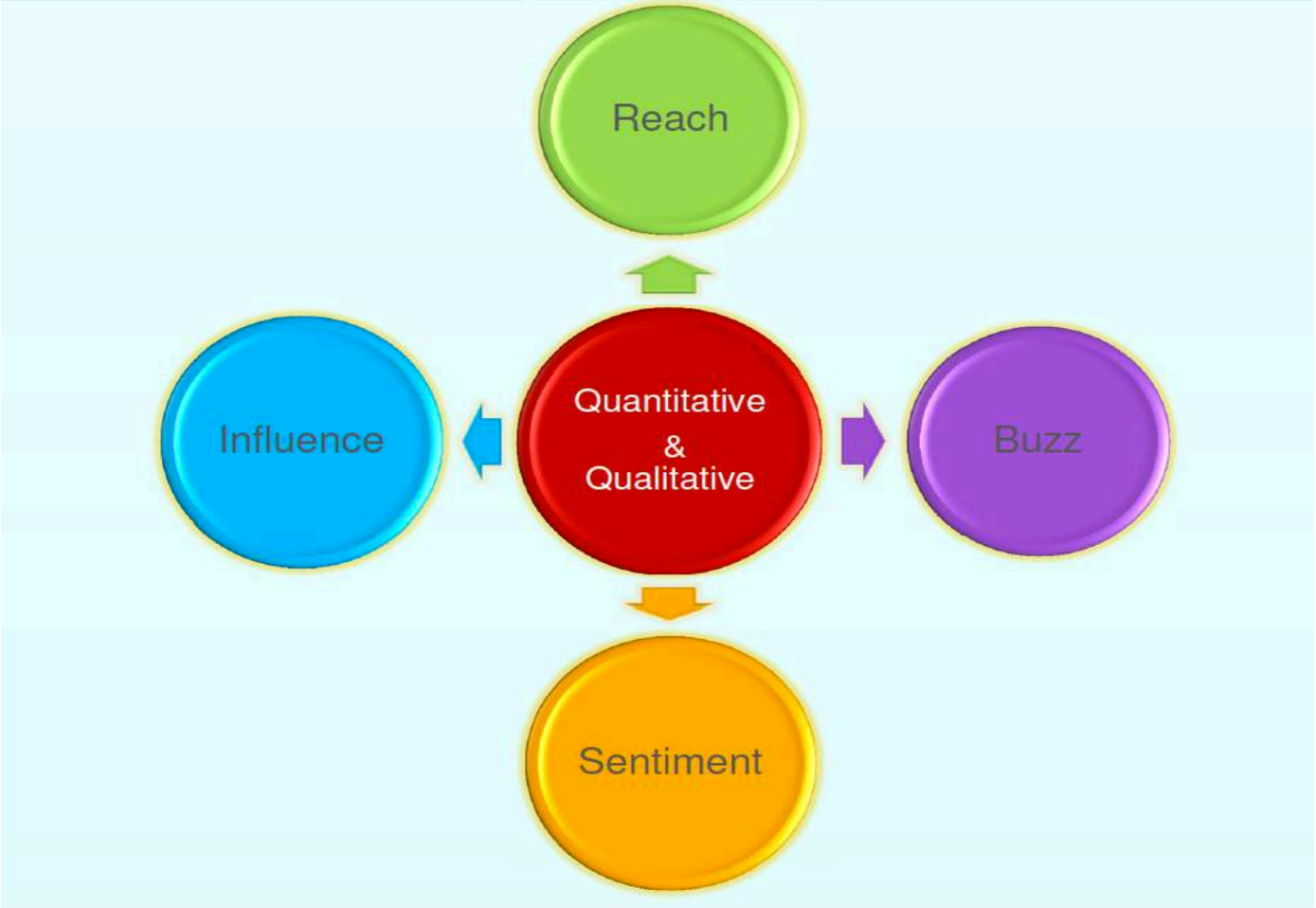
- news media, websites, social media and Twitter can be used by audiences, but also by stakeholders and the media
- Audience members can publish their opinions in the new media but are also **influenced themselves** by opinions of others in the new media

Social Networks Measures

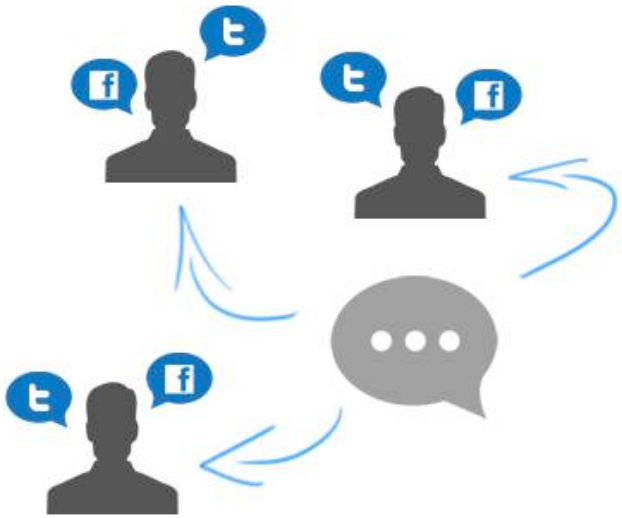
- **Surface Measures**: Based on some properties of specific nodes
- **Graph-based measures**: Based on the graph-structure of the network

Measuring properties of individual nodes (users, web pages..)

Key measurement goals



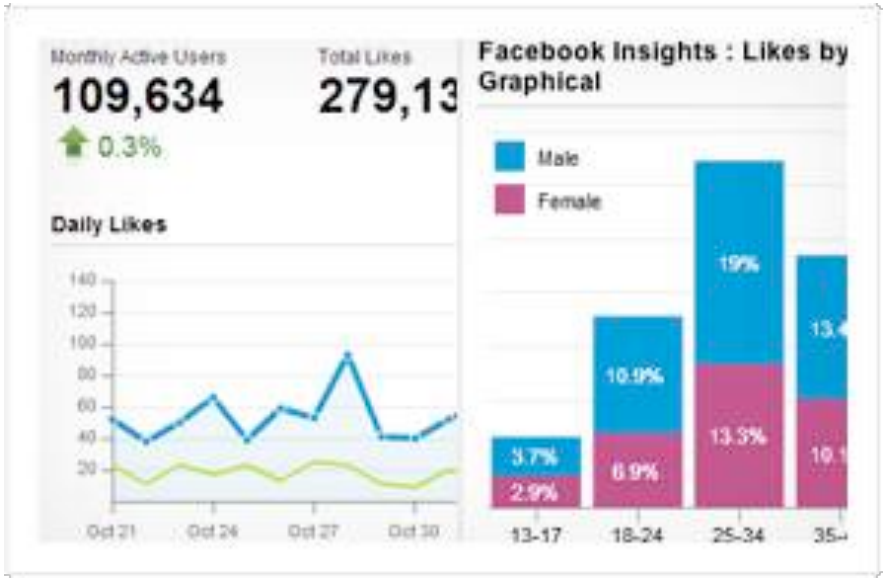
1. Reach



1. **Reach**
2. Buzz
3. Influence
4. Sentiment

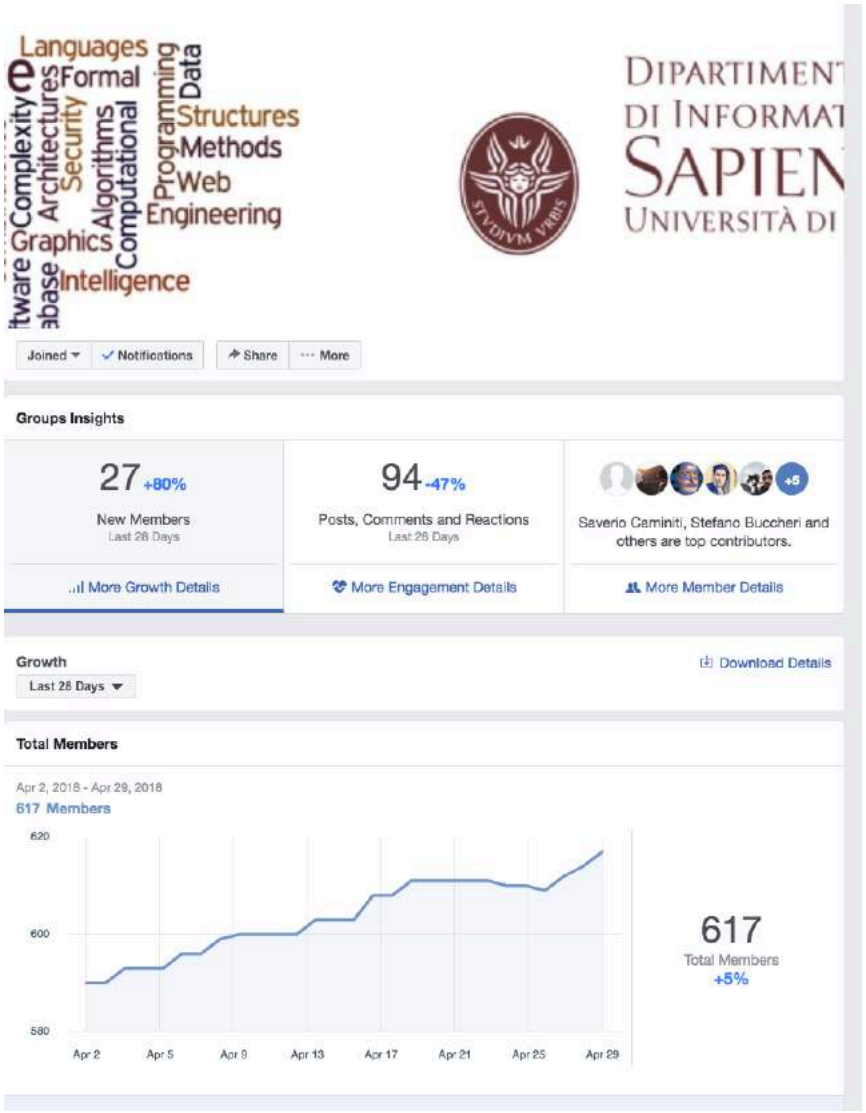
- Reach
  - Size of your audience
  - How many saw your message
    - E.g. Twitter followers
    - Facebook posts (“seen by..”

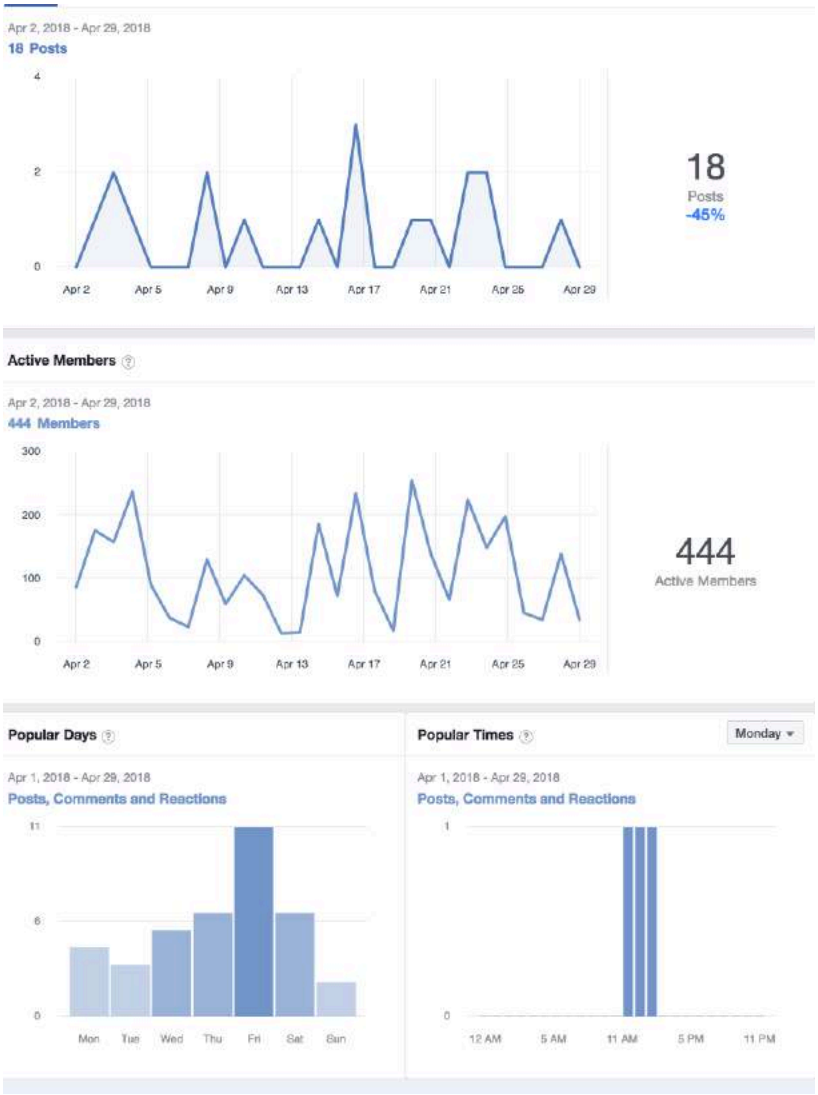
Reach: Facebook Insights



Monitor and measure your fans, likes, comments and page activity

Reach: Group Insight





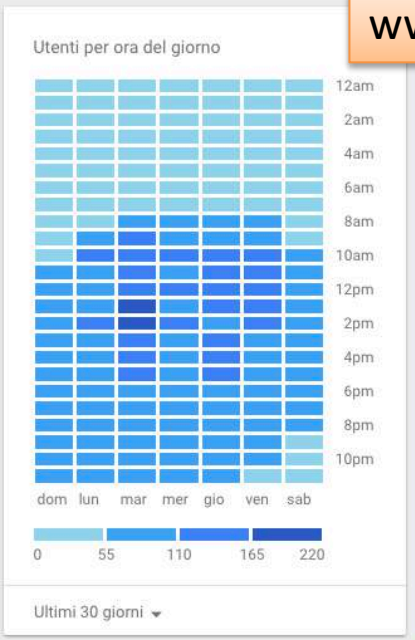
Reach: Google Analytics

http://www.google.com/analytics/

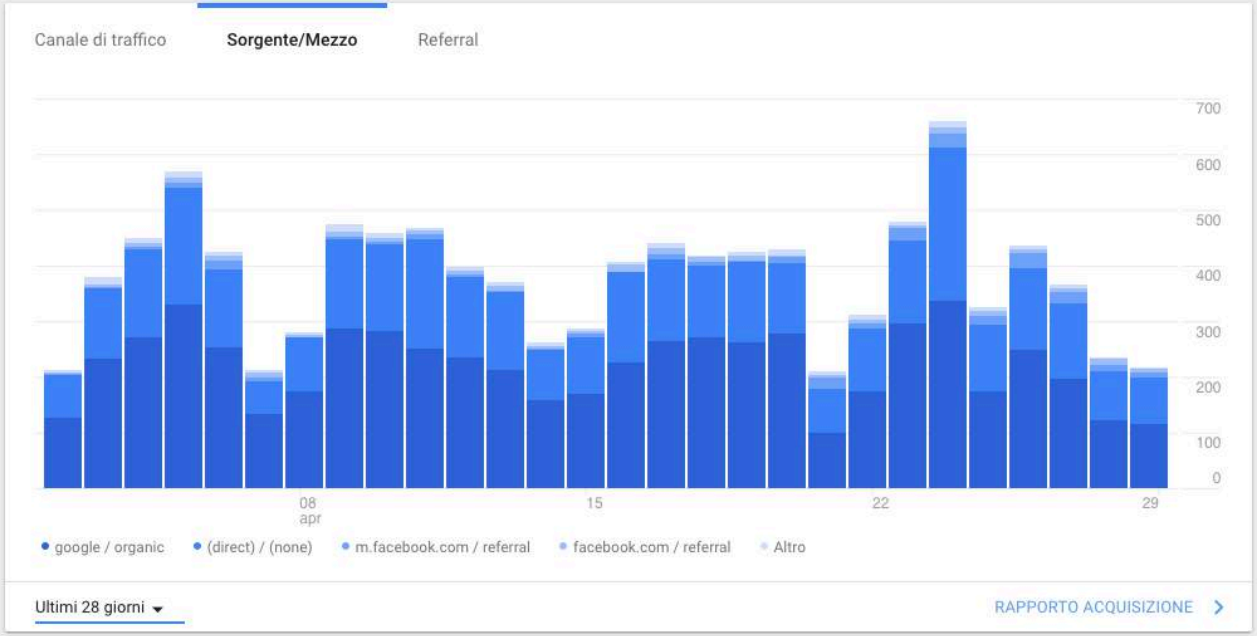
With Google Analytics tool, you can monitor accesses on your web page.
Drill down into site traffic data including source, and region.
View sparklines for page views, bounce rates and more.

Home page di Google Analytics

Quando ti visitano gli utenti?



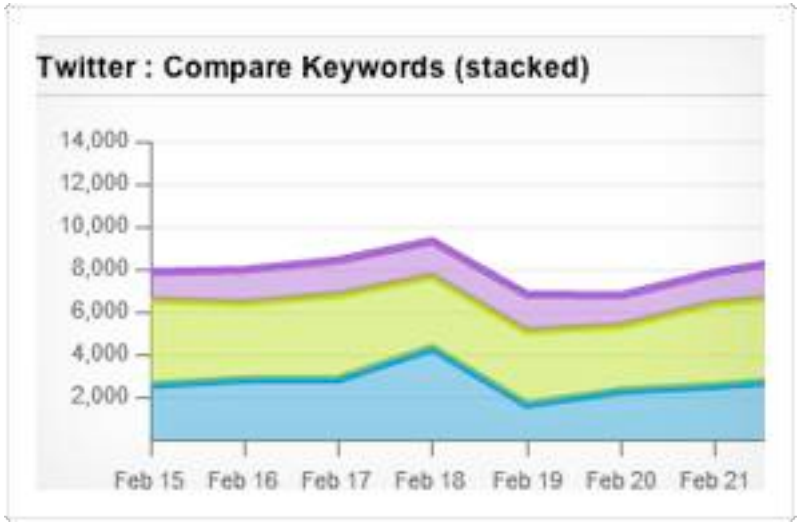
Come acquisisci nuovi utenti?



Dove si trovano i tuoi utenti?

Reach: Twitter Profile statistics

- Track the number of followers, mentions, lists..
- Do more by comparing keywords over time and Twitter sentiment.

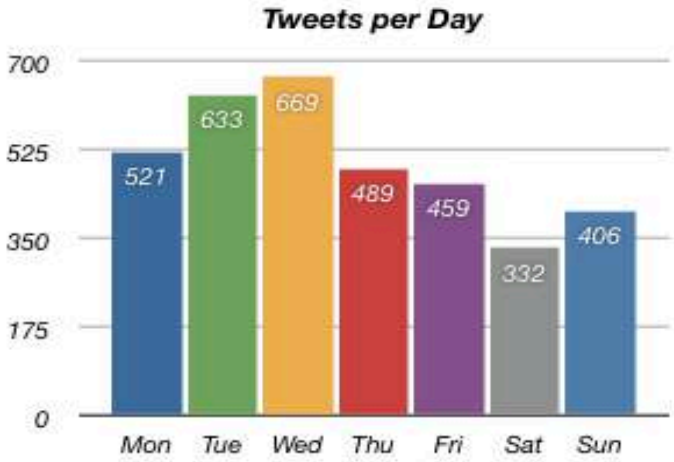


http://www.tweetstats.com//

TweetStats

In ur Tweets, Graphin' Your Stats!

Home Trends Donate



Graph your Twitter Stats including

- Tweets per hour
- Tweets per month
- Tweet timeline
- Reply statistics

In use by nearly 1,000,000 Twitter-folk!

Enter your Twitter username

Graph My Tweets!

Looking for simple Social Media Monitoring?

Simply Measured

Brought to you by @dacort!

Refresh your stats - stats get updated when you come back after 8 hours and enter your username.

Measures of Social Reach

- Social reach: #total followers across all social platforms
- Growth: month-over-month social reach growth
- Engagement=

$$\frac{\#\text{ Likes} + \#\text{ Shares} + \#\text{ Retweets} + \#\text{ blog comments}}{\#\text{ of published posts or pieces of content}}$$

2. Buzz

1. Reach
2. **Buzz**
3. Influence
4. Sentiment

- **Social Buzz** is the "amplification" of a topic/message through social media: what are people saying about you, where are they saying it, how are they saying it
  - 2 types:
  - Conversation Focus (@RP, reply) vs. Content Focus (#hashtags ➔ topics)
- Mining **motivations**, in addition to data, as a way to understand an audience (either customers, voters, patients, or addressee of a campaign), is an entirely new approach to social analysis (e.g. opinions on #topic).

Buzz Metrics

- Buzz metrics tool around the online social media elements related to the two U.S. Presidential candidates in 2012.

- Based on three measures:
  - **bookmarking,**
  - **social networking,**
  - **social knowledge**

Buzz Metric: Bookmarking

- **Bookmarking**: “Social bookmarking” relates to social media websites such as Digg, Del.icio.us, and Reddit. Users submit links to these websites that are of interest to them and other users vote on particular submissions of interest in order to increase their popularity.
- **Metric**: How many votes per submission?

Buzz: Bookmarking

digg | Top Stories | Popular | Upcoming

TRENDING NEWS

Luisana Lopilato Is Defending Husband Michael Bublé After He Elbowed Her In An Instagram Video

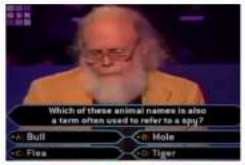
She Died Of The Coronavirus Alone. All Her Children Wanted Was "To Tell Her That We Love Her One Last Time."

How Hard Could COVID-19 Hit Your County? Check These Maps.

These Pictures Show Huge Crowds Protesting Against Coronavirus Lockdowns At State Capitols

The Social Media Shame Machine Is In Overdrive Right Now

TOP BUZZ



A Contestant Won "Who Wants To Be A Millionaire?" By Answering These 15 Questions — How Far Can You Get?

These Movies Came Out At The Same Time And Are About The Same Thing — Which One Is Better?

TV Couple Moments That Were So Bad, They Ruined The Relationship Altogether

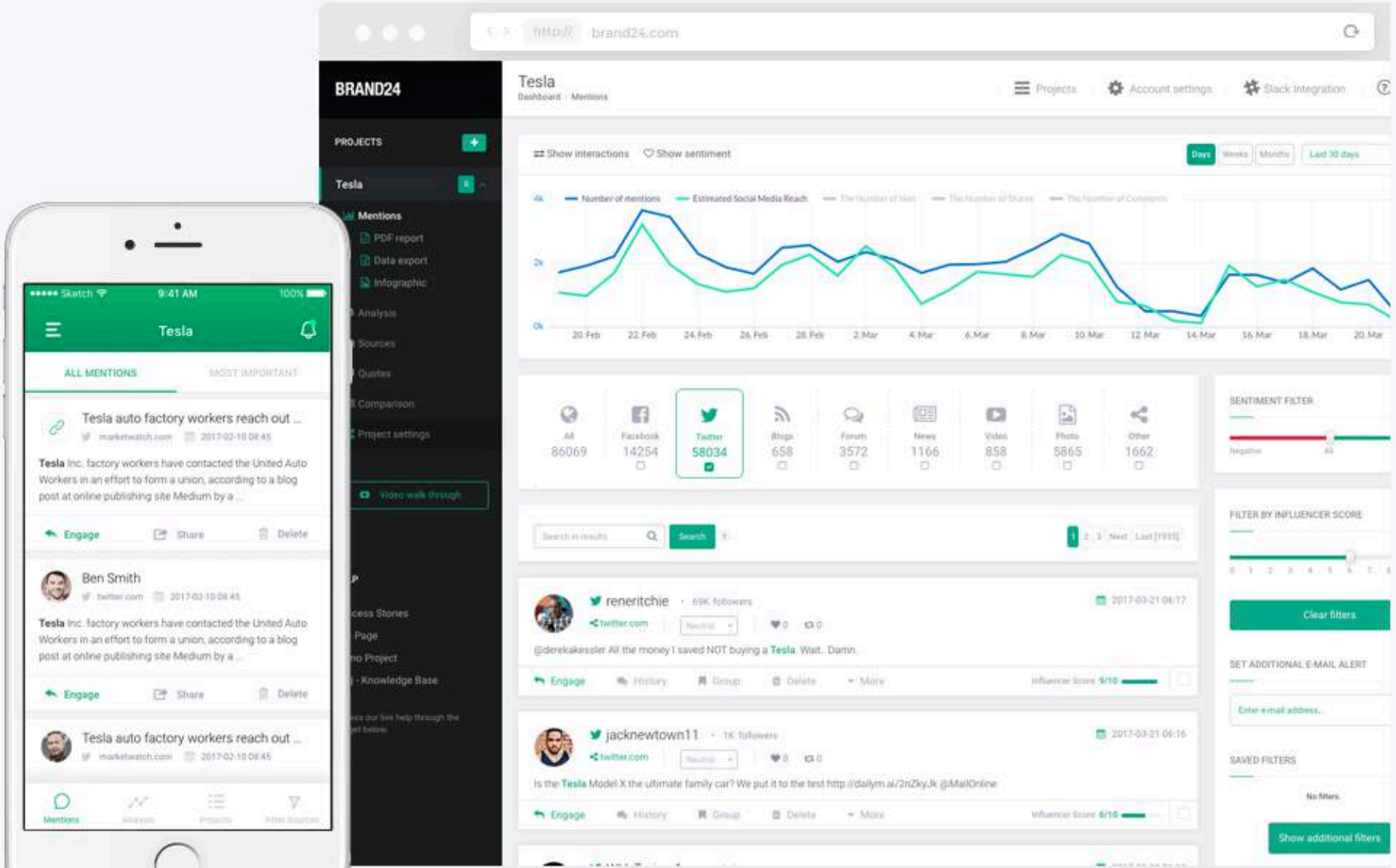
The Actor Who Played Angela On "Boy Meets World" Said She Experienced Racism And Received An Apology From A Costar Who Called Her "Aunt Jemima"

Luisana Lopilato Is Defending Husband Michael Bublé After He Elbowed Her In An Instagram Video

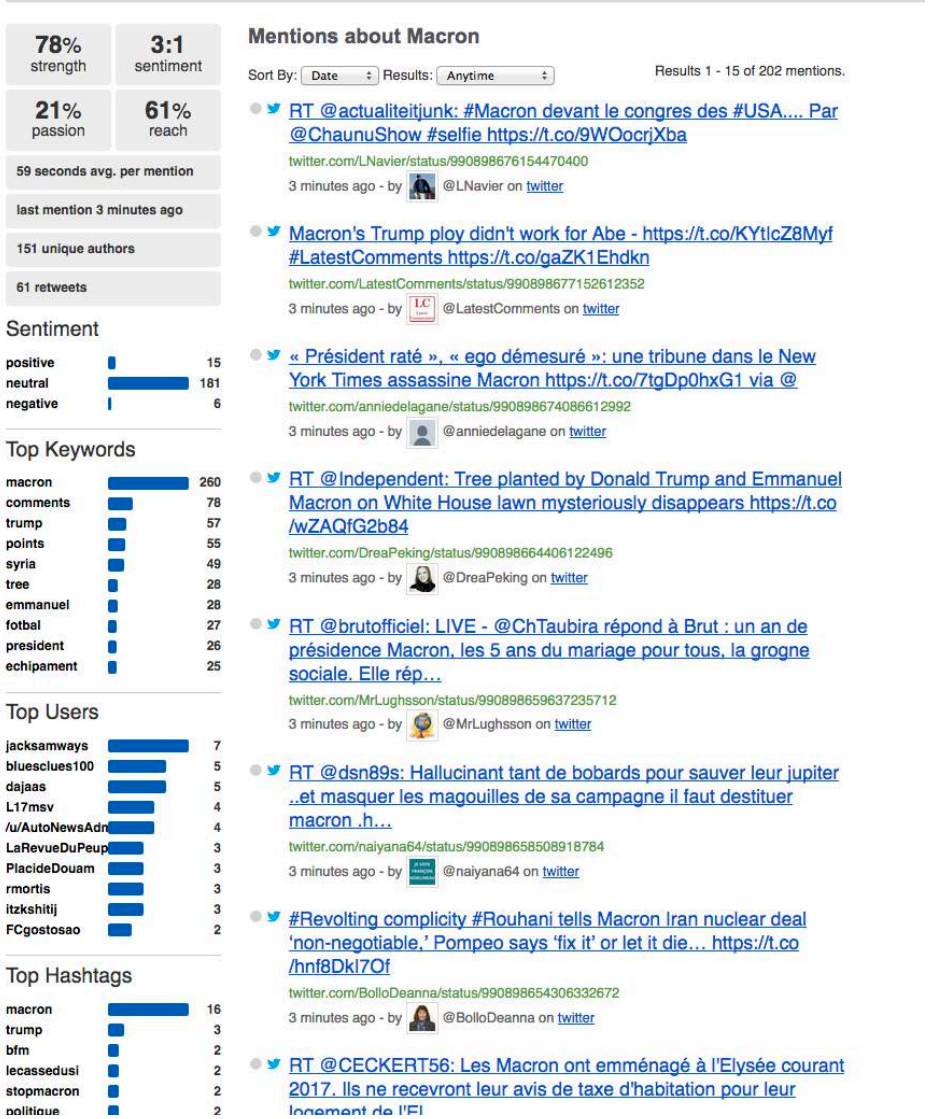
Buzz Metric: Social Networking

- **Social Networking**: Social Networking refers to communities such as MySpace, Facebook, and Friendster.
- **Example of measure:** #mentions on a particular page or in a social network (Talkwalker and many others)

Social Networking Example: #Mentions



Social mention: search (Macron)



78% strength
3:1 sentiment
21% passion
61% reach
59 seconds avg. per mention
last mention 3 minutes ago
151 unique authors
61 retweets

Sentiment

positive	15
neutral	181
negative	6

Top Keywords

macron	260
comments	78
trump	57
points	55
syria	49
tree	28
emmanuel	28
fotbal	27
president	26
echipament	25

Top Users

jacksamways	7
bluesclues100	5
dajaas	5
L17msv	4
/u/AutoNewsAdn	4
LaRevueDuPeup	3
PlacideDouam	3
rmortis	3
itzkshitij	3
FCgostosao	2

Top Hashtags

macron	16
trump	3
bfm	2
lecassedusi	2
stopmacron	2
politique	2

Mentions about Macron

Sort By: Date Results: Anytime Results 1 - 15 of 202 mentions.

RT @actualiteitjunk: #Macron devant le congres des #USA.... Par @ChaunuShow #selfie https://t.co/9WOocrjXba
twitter.com/LNavier/status/990898676154470400
3 minutes ago - by @LNavier on twitter

Macron's Trump ploy didn't work for Abe - https://t.co/KYtlcZ8Myf #LatestComments https://t.co/gaZK1Ehdkn
twitter.com/LatestComments/status/990898677152612352
3 minutes ago - by @LatestComments on twitter

« Président raté », « ego démesuré »: une tribune dans le New York Times assassine Macron https://t.co/7tgDp0hxG1 via @
twitter.com/anniedelagane/status/990898674086612992
3 minutes ago - by @anniedelagane on twitter

RT @Independent: Tree planted by Donald Trump and Emmanuel Macron on White House lawn mysteriously disappears https://t.co/wZAQfG2b84
twitter.com/DreaPeking/status/990898664406122496
3 minutes ago - by @DreaPeking on twitter

RT @brutofficiel: LIVE - @ChTaubira répond à Brut : un an de présidence Macron, les 5 ans du mariage pour tous, la grogne sociale. Elle rép…
twitter.com/MrLughsson/status/990898659637235712
3 minutes ago - by @MrLughsson on twitter

RT @dsn89s: Hallucinant tant de bobards pour sauver leur jupiter ..et masquer les magouilles de sa campagne il faut destituer macron .h…
twitter.com/naiyana64/status/990898658508918784
3 minutes ago - by @naiyana64 on twitter

#Revolting complicity #Rouhani tells Macron Iran nuclear deal 'non-negotiable,' Pompeo says 'fix it' or let it die… https://t.co/hnf8Dkl7Of
twitter.com/BolloDeanna/status/990898654306332672
3 minutes ago - by @BolloDeanna on twitter

RT @CECKERT56: Les Macron ont emménagé à l'Elysée courant 2017. Ils ne recevront leur avis de taxe d'habitation pour leur logement de l'El

Buzz Metrics: Social Knowledge

- **Social Knowledge**: Social Knowledge refers to informational based websites such as “Yahoo! Answers” and “Wikipedia”. Buzz is calculated differently on each of these websites.

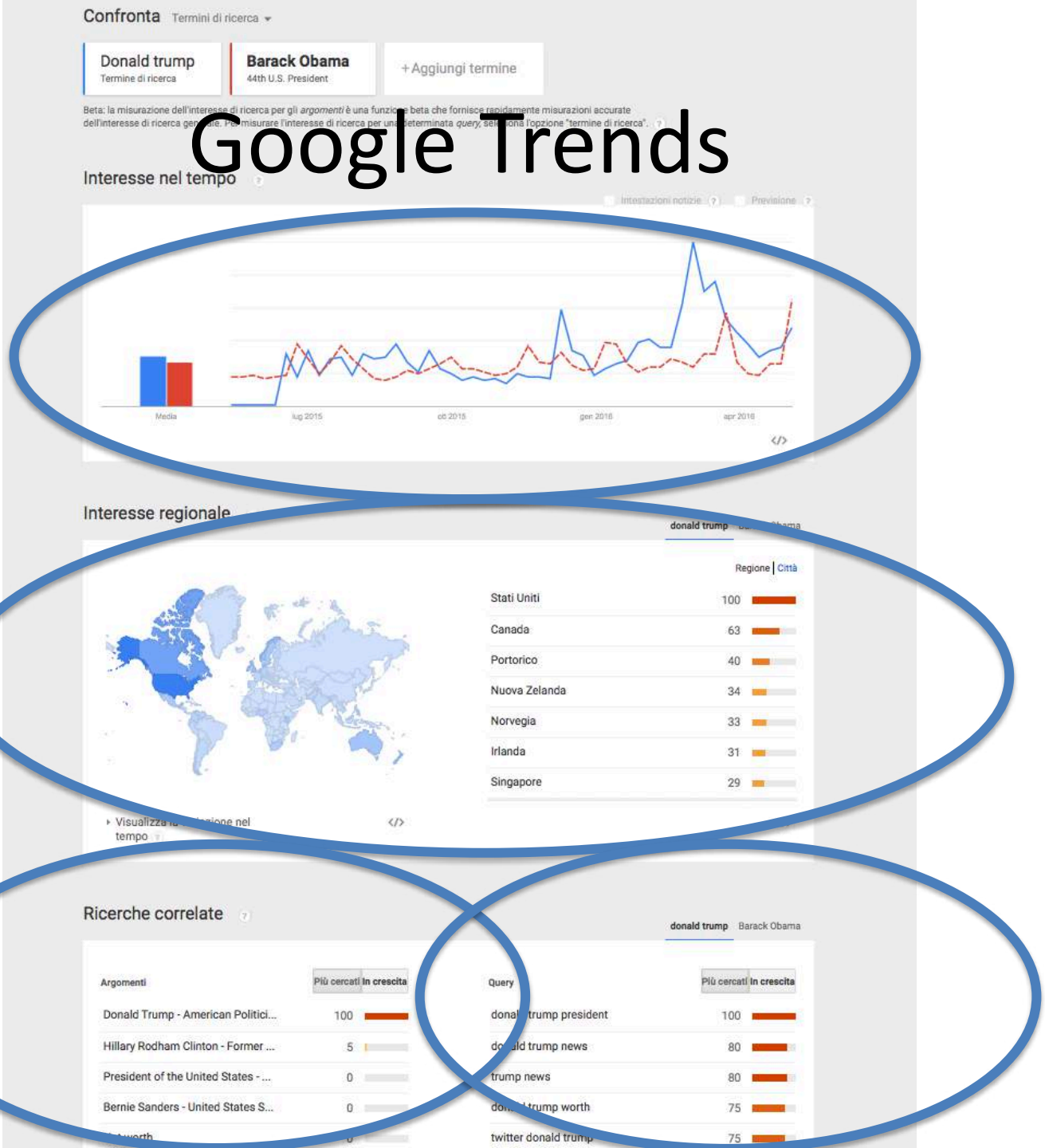
Social Knowledge

Yahoo! Answers

Buzz Metrics: more complex methods

- Finding Trending topics: what (most) people is talking about on the web. Can be detected by analyzing “patterns of attentions” e.g. temporal sequences of words in messages or in users’ queries that show a “bursty” behaviour

Google Trends



Search for Hashtag Popularity, Trends and Correlations

Macron

Search Track

Showing: #Macron

Download Plugin

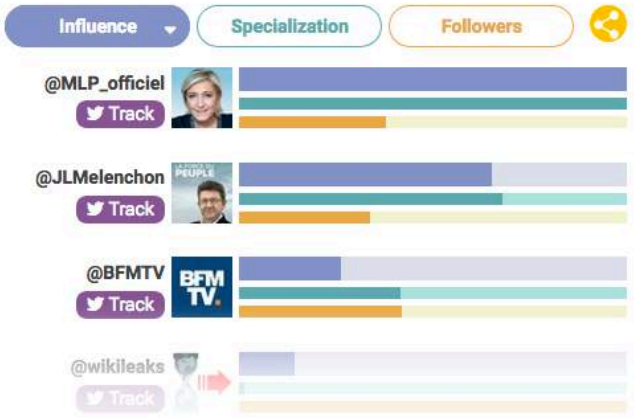
70	66.3	9%	0%	
Popularity	Recent Popularity	Month Trend	Week Trend	FULL ANALYSIS

Related Hashtags

CORRELATION POPULARITY

Top Influencers

ALL-TIME RECENT



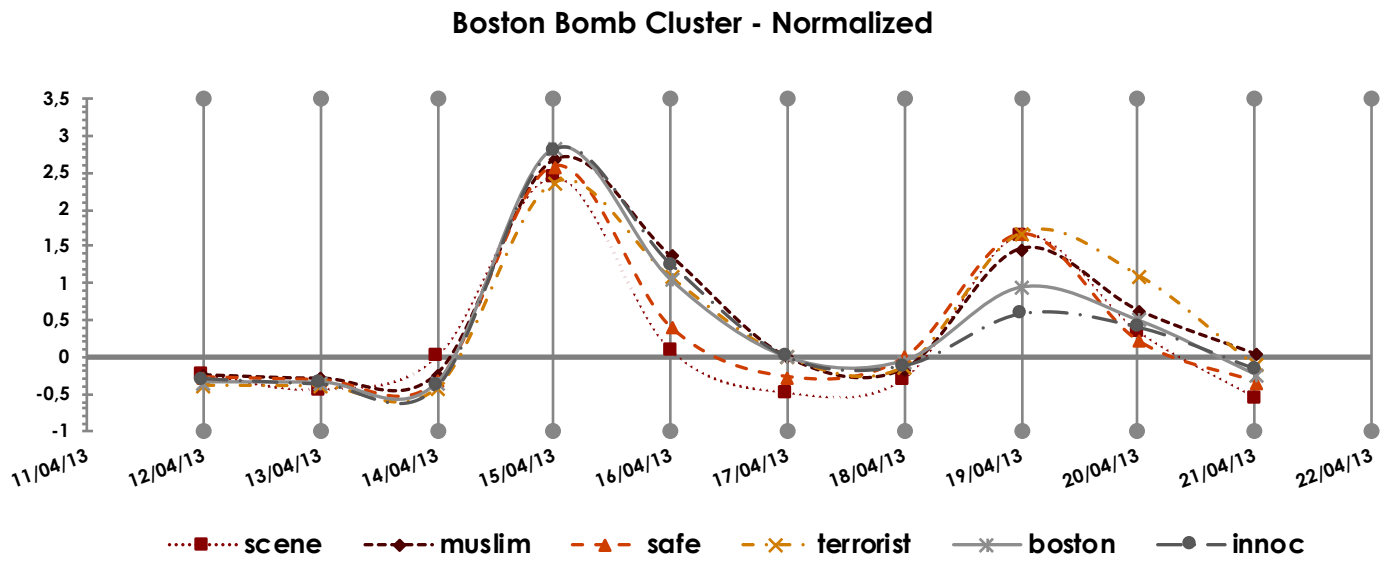
See Top Influencers Tweet

More complex buzz-detection methods: Temporal Data Mining

- "discovering temporal patterns in text information collected over time" (Mei and Zhai, 2005).
- When applied to large and lengthy micro-blog stream main problem is **complexity**.
  - Need efficient way of representing continuous signals
  - Need methods to prune non-relevant signals/identify "relevant" patterns
  - Need algorithms to efficiently detect similarity among signals
- Evaluation is also an issue: millions of often "obscure" patterns, lack of golden datasets and benchmarks

SAX*: real-time buzz detection based on a temporal notion of "meaning"

- Words with similar temporal behavior are similar
- "similar" = same time-frame, similar shape
- What kind of similarity is captured in this way? **synonyms** (#covid #covid19 #covidadas #covides) **OR** **contextually related** (Boston, bomb, marathon)



SAX*: temporal clustering based on Symbolic Aggregate Approximation

- 4 steps:
  1. Convert signals into sequences of symbols using Symbolic Aggregate Approximation
  2. Learn patterns of collective attention (regular expression) to filter “relevant”(= anomalous) strings
  3. Cluster strings in sliding temporal windows
  4. Split synchronous and yet unrelated clusters based on node connectivity

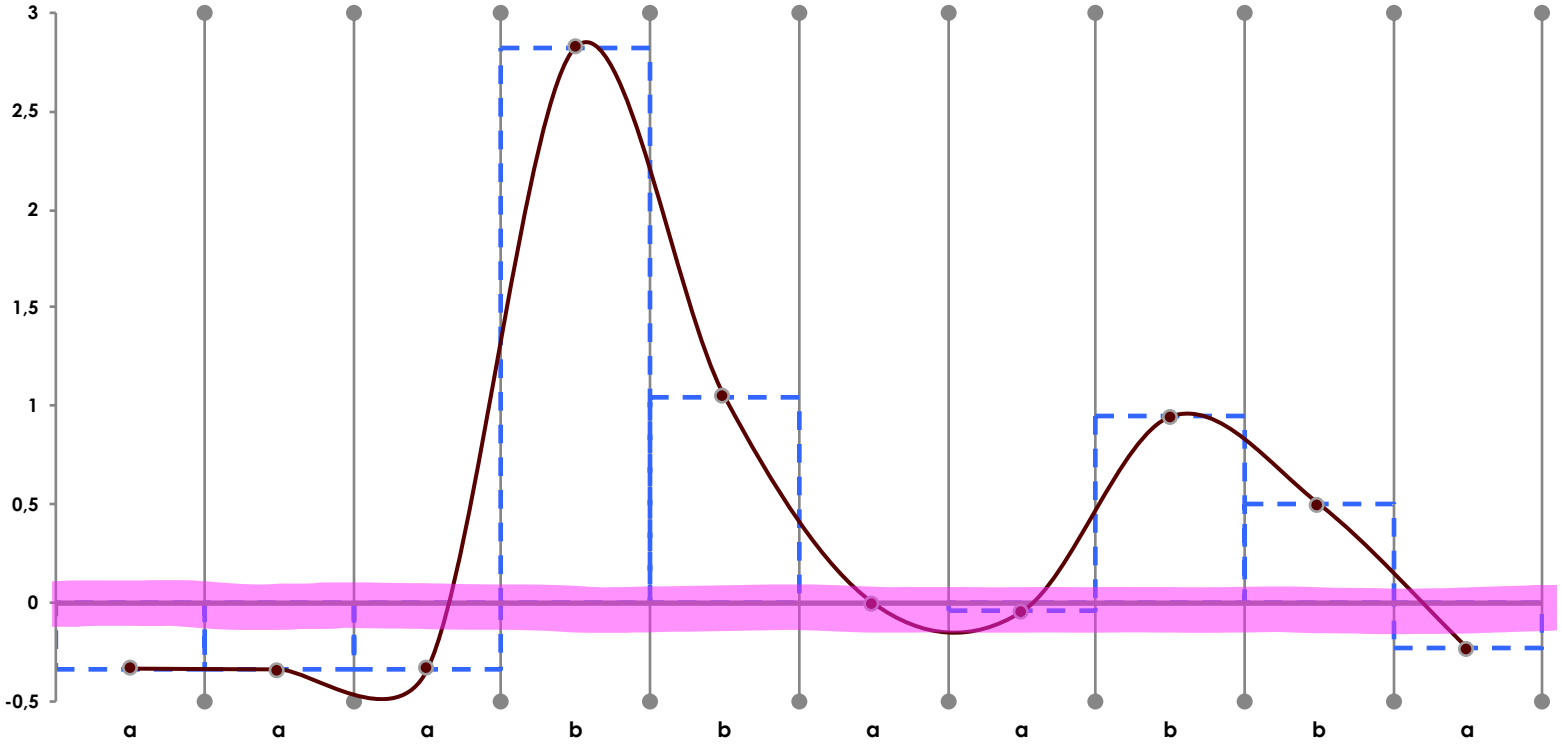
1. Symbolic Aggregate Approximation

- **Parameters**: W (dimension of temporal window) Δ(discretization step) Σ(alphabet of symbols)
- Signal is first Z-normalized
- In each (sliding) window W, signal is partitioned **vertically** in W/Δ slices, and the average value *is* computed in each slot Δj
- Signal is partitioned **horizontally** in |Σ| slices of equal area, let βj be the breackpoints
- A symbol is associated to every Δj according to:

  $s_i = j,\ j \in \Sigma,\ iff\ \beta_{j-1} < s_i < \beta_j$

Example (two symbols, breackpoint is 0)

1. Convert signals into sequences of symbols using Symbolic Aggregate Approximation



W=10, Δ=1, Σ= a,b
string is aaabbaabba

2.Learning Patterns

- Apply SAX to manually selected (about 30) words related to known event from Wikipedia Events descriptions (Arab Spring, Olympics, Tsunami, Occupy wall Street..)
- Generate compatible regular expressions using RPNI algorithm (Oncina and Garcia 1992)
- The following regex is learned(one-two peaks/plateaux):

***a*+*b*?*bb*?*a*+?*a*+*b*?*bba**? (2 symbols)**

(a+[bc]?[bc][bc]?a+)? (a+[bc]?[bc][bc]a*)? (3 symbols)

- Turns out to be compatible with shapes graphically shown in previous works on clustering patterns of collective attention (Lehmann et al. 2012; Xie et al. 2013; Weng et Lee 2011; Yang and Leskovec 2011)

2. Learn patterns of collective attention (regular expression) to filter "relevant"(= anomalous) strings

3. Pattern clustering

3. Cluster strings in sliding temporal windows

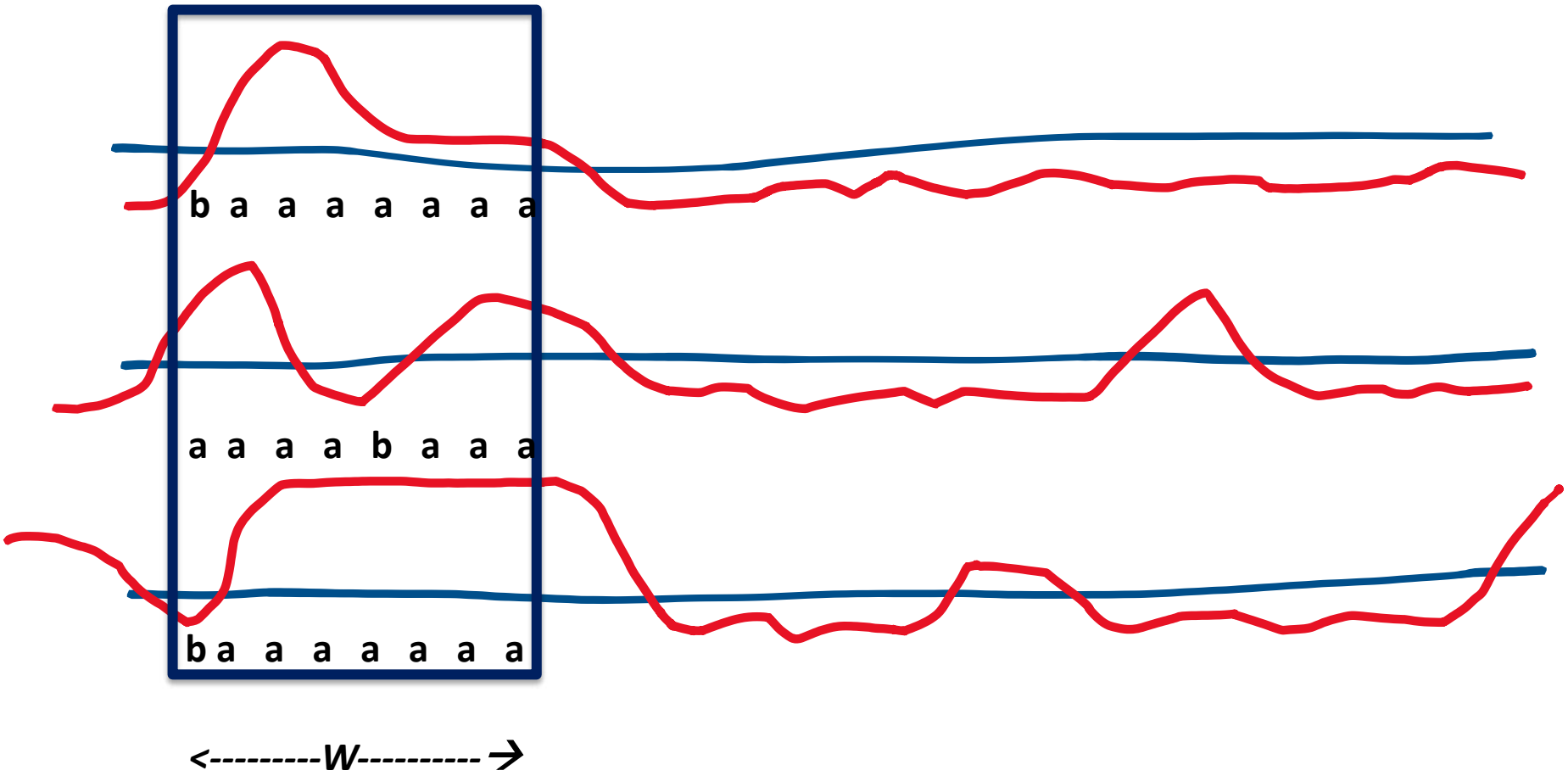
- Bottom-up hierarchical clustering algorithm with *complete linkage* (Jain 2010)
- stop hierarchical bottom-up clustering aggregation for a cluster when:

$$SD(d(centroid,t_k))<\delta$$

Where t_k is the k-th term *d()* is a distance measure, *SD* the standard deviation, *δ is a parameter*

- Clusters smaller than *f* elements are purged
- To summarize, parameters are: *W, Δ,Σ,δ,f*
- Clusters are created in **sliding windows** of lenght W; "Δ-clusters" are subsequently generated (clusters active in slot Δ)

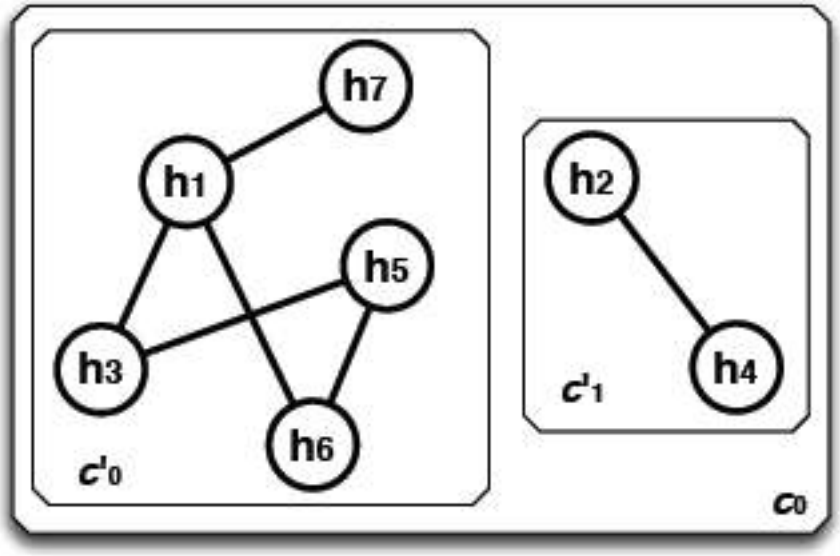
Sliding windows of lenght W and increment Δ



Several hundreds of thousand term temporal sequences analyzed in parallel, and clustered in each window W

4. Cluster splitting

1. For each cluster, create a graph G(N,E) where N is the number of co-occurring tokens in tweets and e(n1,n2) if n1 co-occurs with n2 in some of the related tweets
2. Extrac **Hopcroft and Ta**

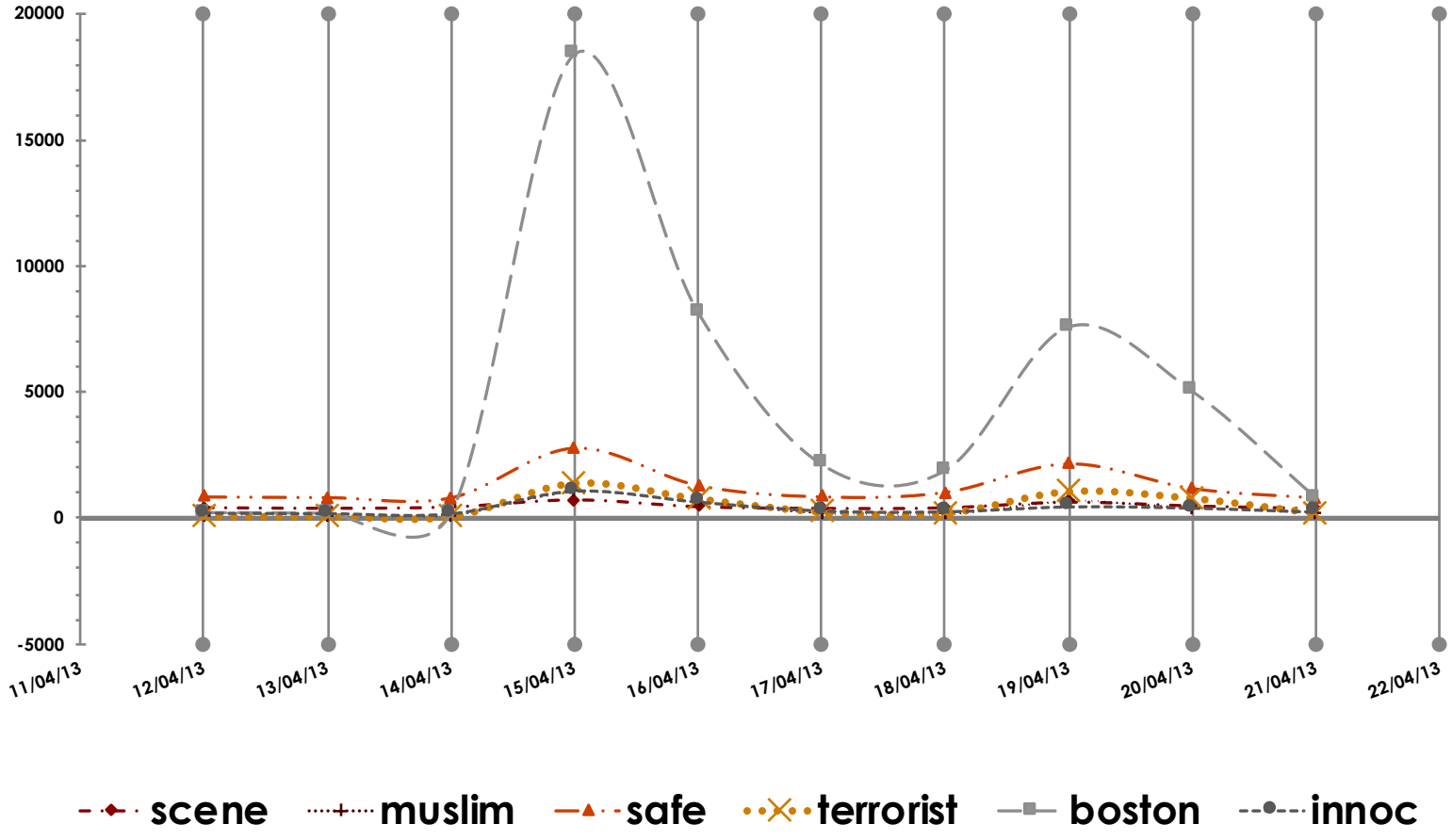


Note: does not heavily impact on complexity given co-occurrences are extracted from filtered tweets and graphs are small

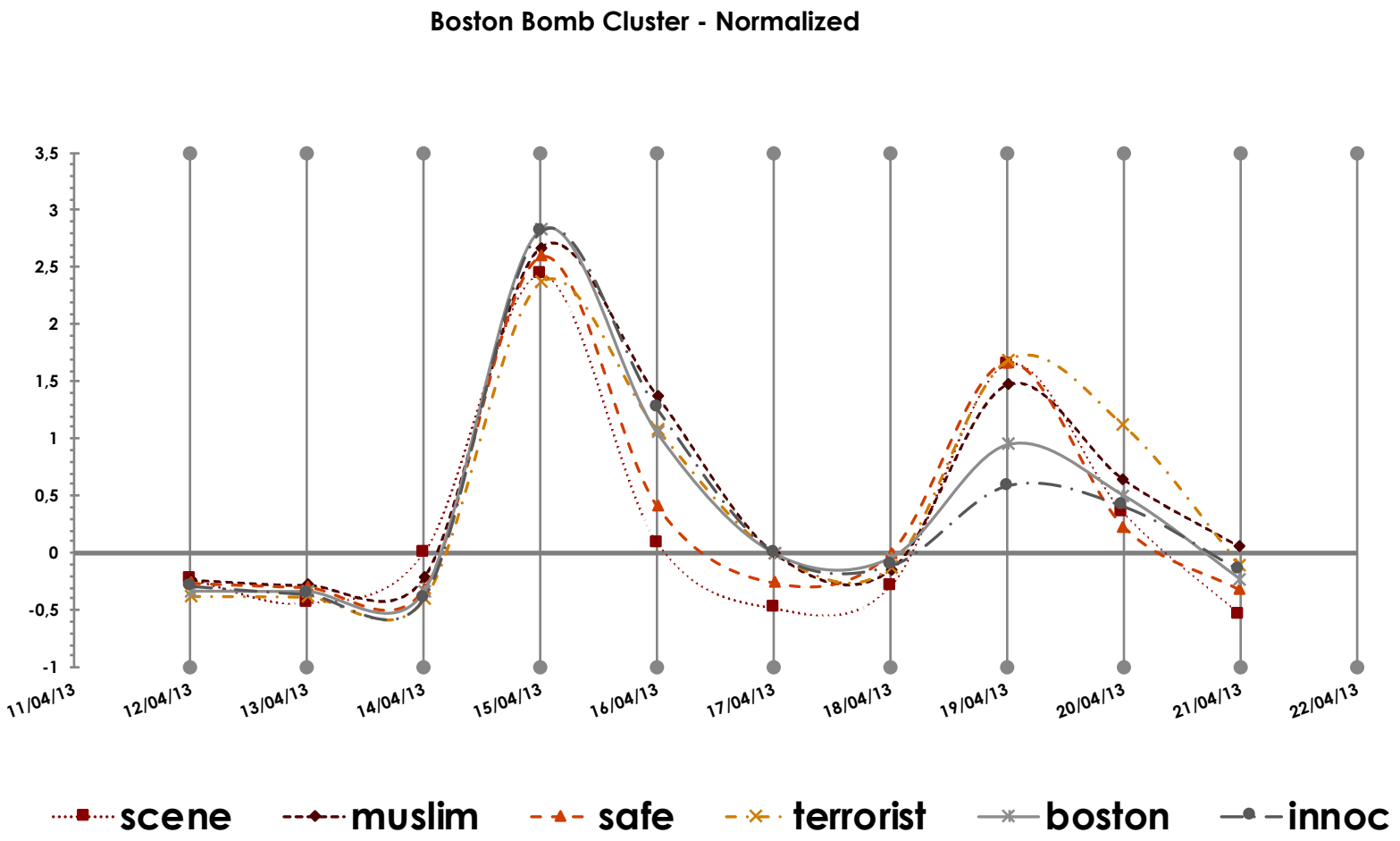
Experiments

- 3 year 1% Twitter stream (2012-13) ~7TB of Data.
- 2 types of experiments: **event detection** (in English) and (multilingual) **hashtag sense clustering**
- Parameters setting (especially W, Δ, Σ) depends on "density" and locality of stream. With 1% world-wide stream only "big events" can be detected. See papers for detailed parameter tuning.
- Best results with W=10 days, Δ=1 day, Σ=a,b
- For each experiment (events, hashtags), SAX* clustering is performed 365 times (one for each sliding window Wi).

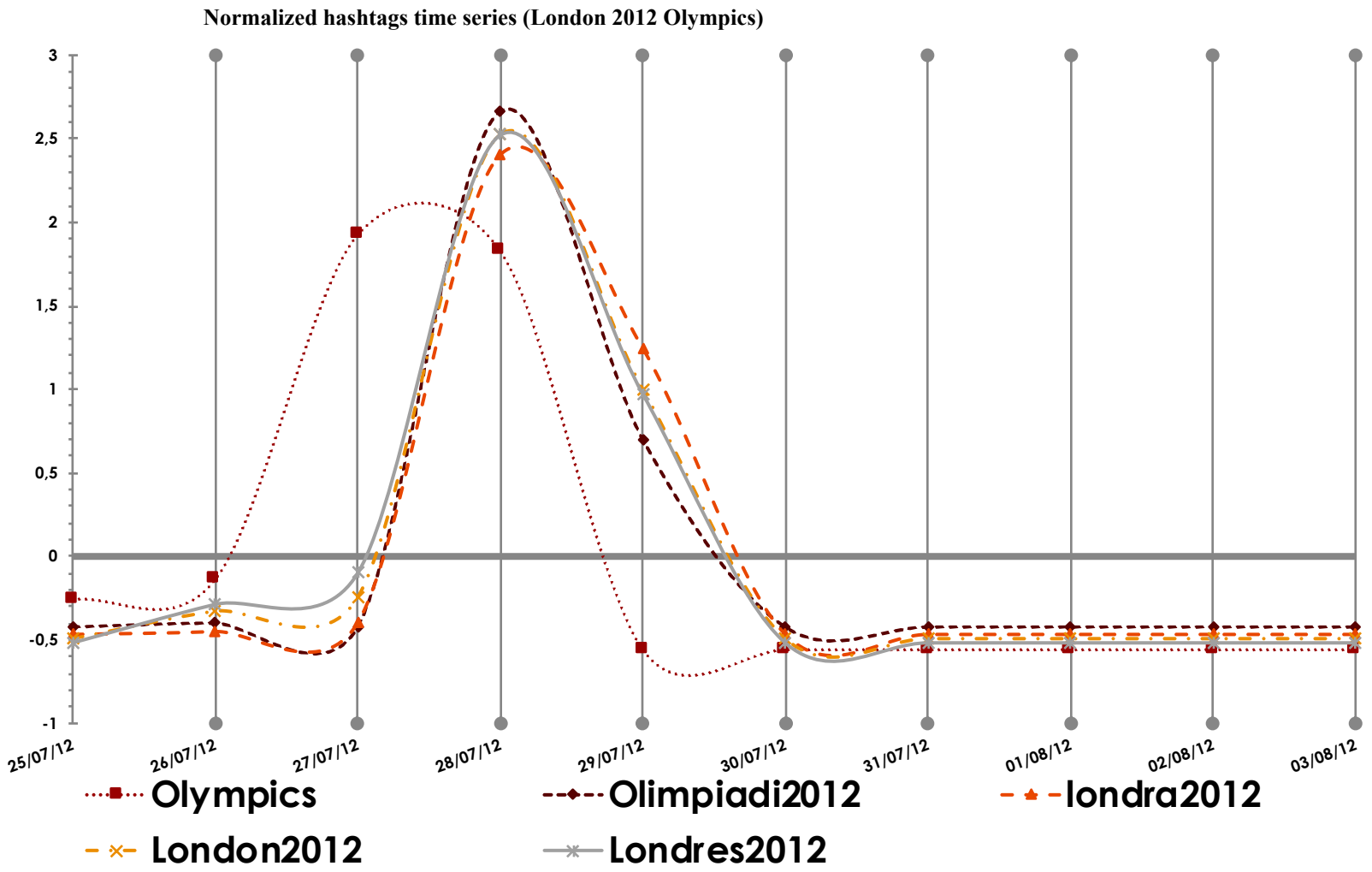
Example: “Bomb during Boston marathon, non normalized



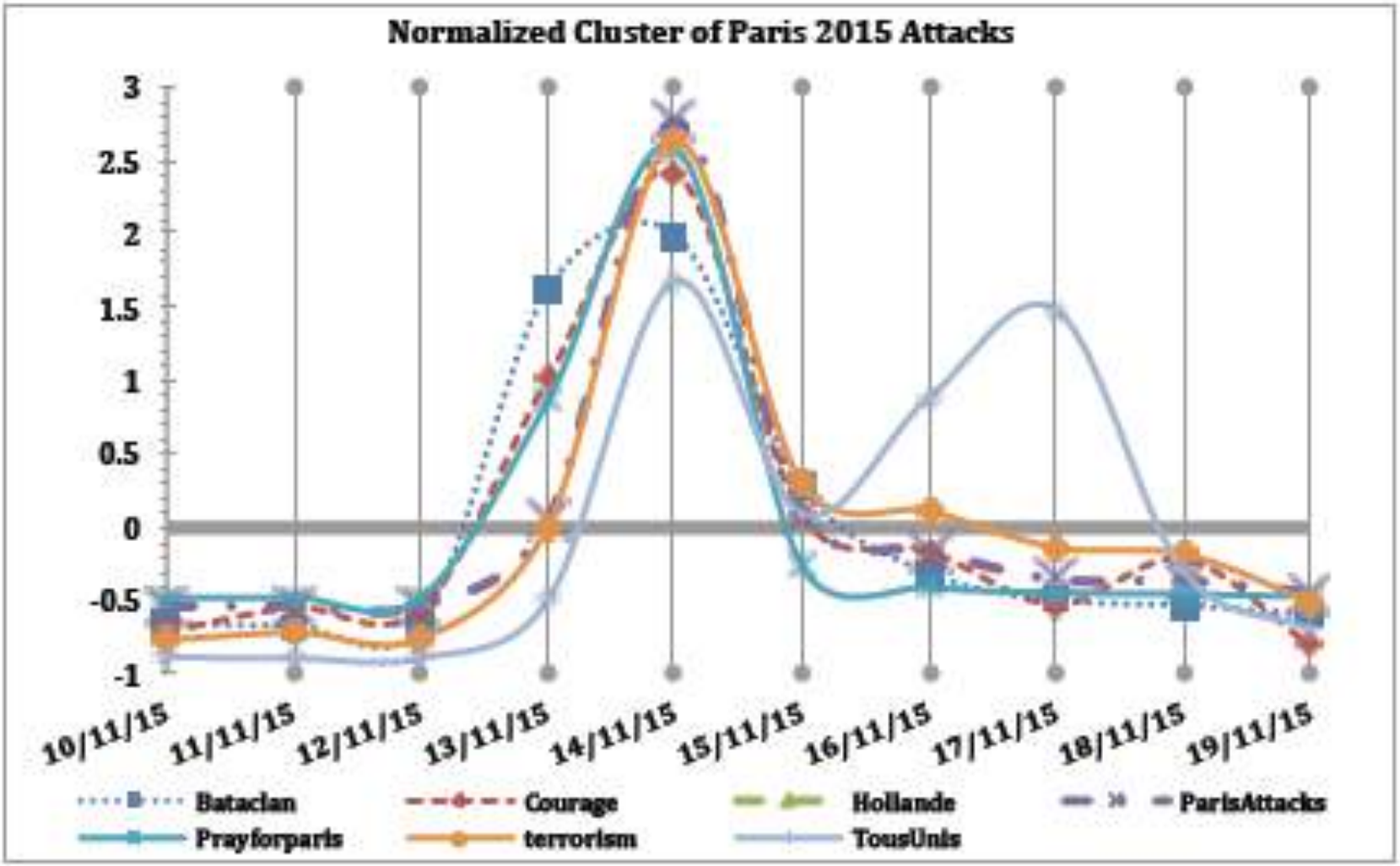
Example: “Bomb during Boston marathon, normalized



Example: London-olympics hahstags Summer 2012



Example: Paris attack in 2015



Example:multilingual hashtag clustering

- **#allathometogether, #allathomecofeeandtea,#stayathomemom, #allathomeworkout,#stiamoacasacheèmeglio,#restiamoacasaadingrassare,#estiamoacasa!,#restamosacasa, #restonàlamaison..**

To deepen on trending topic (buzz) detection in social networks

- https://arxiv.org/pdf/1907.11229.pdf (a survey)
- https://www.researchgate.net/publication/277689549_Efficient_temporal_mining_of_micro-blog_texts_and_its_application_to_event_discovery (SAX*)

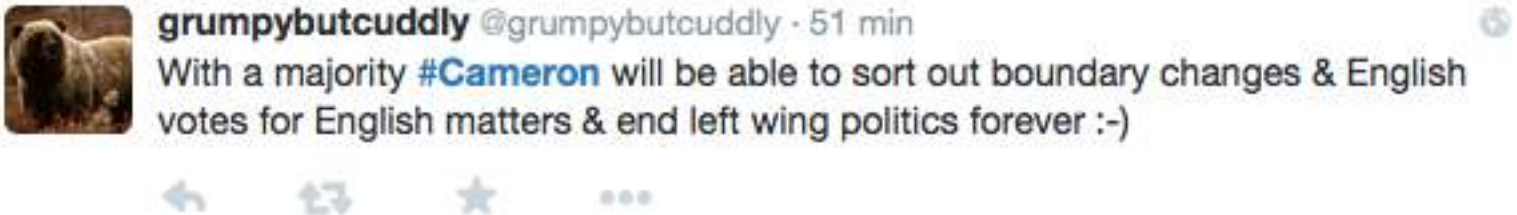
3. Influence

1. Reach
2. Buzz
3. **Influence**
4. Sentiment

- Your message is valuable when it is repeated and/or commented
  - High probability of others referencing & reproducing what you say
  - E.g. Twitter: reply/mention (@xxx) & retweet (RT)

Twitter as a mean to disseminate information

- Its primary function is not as a social network but perhaps to spread news (including personal news) or other information.
- An unusual feature of Twitter is re-tweeting: forwarding a tweet by posting it again: "Hmmm pretty good incentive.. RT **@RT_com**: US high school allows Muslims time for prayer if they earn good grades http://on.rt.com/kka96w"
- If re-tweeted, a tweet can expect to reach an average of **1000 users (Kwak et al.)**
- Another communicational feature of Twitter is the hashtag: a meta-tag beginning with # that is designed to help others find a post:



Measures of Influential Analysis
Influential index (on Twitter)

- **Retweet** and **Reply** features of Twitter is used to enable real-time study

$$\text{Influential Index} = \frac{n(\text{Reply}) + n(\text{Retweet})}{n(\text{Tweet})}$$

For example, a tweet :
Verizon will launch iPhone 4 on 10 Feb sent by user ABC

Retweet (think of it as forwarding)
RT @ABC Verizon will launch iPhone 4 on 10 Feb

Reply
@ABC thanks… I will be there to get one

Measures of Influential Analysis : Amplification

- On Twitter:
  - Amplification = # of Retweets Per Tweet
- On Facebook, Google Plus:
  - Amplification = # of Shares Per Post
- On a blog, YouTube:
  - Amplification = # of Share Clicks Per Post (or Video)

Measures of Influential Analysis : Applause

- On Twitter:
  - Applause Rate = # of Favorite Clicks Per Post
- On Facebook:
  - Applause Rate = # of Likes Per Post

- On Google Plus:
  - Applause Rate = # of +1s Per Post
- On a Blog, YouTube:
  - Applause Rate = # of +1s and Likes Per Post (or video)

Summary (Reach, Buzz, Influence)

Measure		
Reach	Social reach	#total followers
	Growth	social reach growth along time
	Engagement	$\frac{\#\text{ Likes} + \#\text{ Shares} + \#\text{ Retweets} + \#\text{ blog comments}}{\#\text{ of published posts or pieces of content}}$
Buzz	Nominations /visualizations	#bookmarks, #mentions on web, #likes, keyword trends
Influence	Influential index	(#reply+#retweets)/#tweets
	Amplification	# of Retweets (Shares) Per Tweet (post)
	Applause	#favorite clicks (or like, or +) x post

Sentiment analysis in a dedicated lesson

Exercise

- If you have a social account, or more than one, measure your Reach, Buzz and Social Influence