

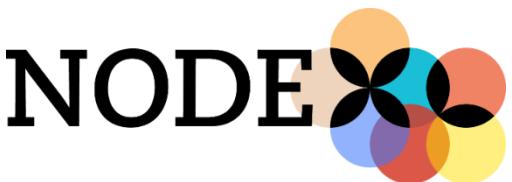
GIJC19 - NODEXL TUTORIAL (SESSION 2)

Mapping Virtual Crowd Networks for Journalists - Application and Examples

Tutorial materials: bit.ly/nxlgijs

Harald Meier harald@smrfoundation.org

Hamburg – September 28th, 2019



A project from the  socialmedia
RESEARCH FOUNDATION

AutoSave off

NodeXLGraph1 - Read-Only - Excel

File Home Insert Page Layout Formulas Data Review View Help NodeXL Pro

Import Export Prepare Data Data Graph

Show Graph Type: Undirected
Summary Layout: Fruchterma...
Autofill Columns Color Vertex Shape
Opacity Vertex Size Edge Width
Visibility Groups

Dynamic Filters Graph Metrics
Subgraph Images Workbook Columns
Import Export Graph Elements
Use Current for New Reset All Show Notifications
About

Help Online \$ Donate About

A1

Visual Properties Labels Other C

1 Vertex 1 Vertex 2 Color Width Style Opacity Visibility Label Text Label Font Add You Column

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Edges Vertices Groups Group Vertices Overall Met ...

Document Actions

Show Graph Fruchterman-Reingo Lay Out Again Dynamic Filters Graph Options

Zoom: 100 Scale: 100 Autoscale

NODE X PRO

A PROJECT OF THE 

NodeXL Pro is updated frequently. Here are the most [recent changes](#)

- Fixed bug for Wiki User-User (Discussion) networks.
- Added a "Date" and "Time" column for Twitter networks.
- Added separate "Edge Weight" column for each "Relationship" type in Edges when exporting to GEXF.

New step-by-step [tutorials](#) on network analysis with NodeXL Pro:

- Social network and content analysis with Twitter network data ([pdf](#))
- How to Automate NodeXL Pro ([pdf](#)) ([video](#))
- Facebook Page Like Networks ([pdf](#))
- Facebook Post Networks ([pdf](#))

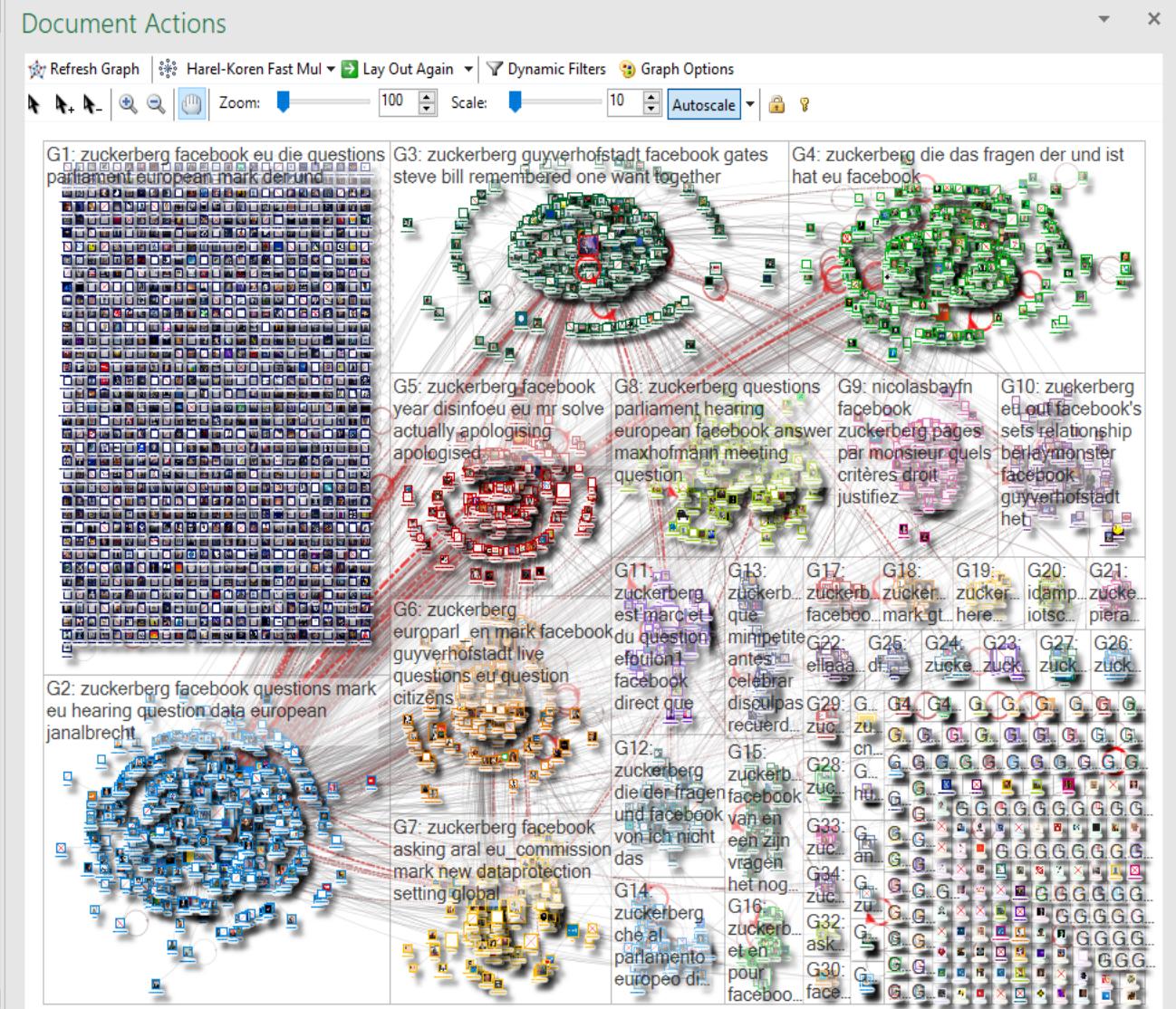
Questions, comments or requests concerning NodeXL?

- Please have a look at our [NodeXL FAQ page](#),
- send an Email to info@smrfoundation.org,
- or join us on the [NodeXL web forum](#).

Visit the [NodeXL Graph Gallery](#) to see a wide variety of graphs created by the NodeXL community:

NODE X GRAPH GALLERY

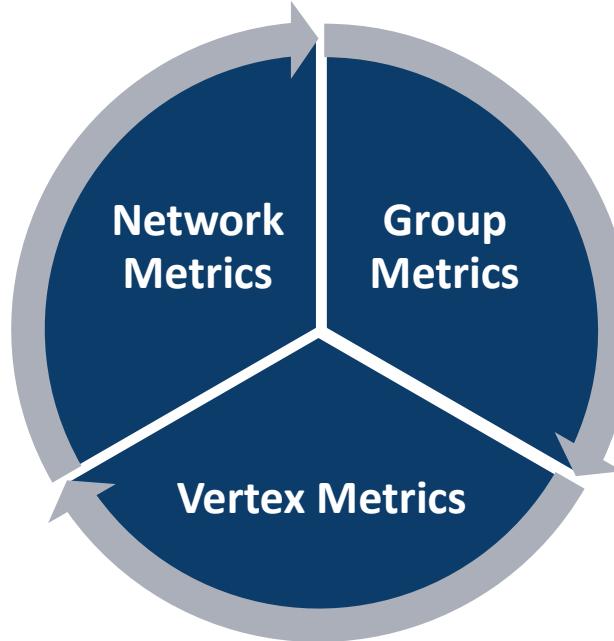
Q3	X	✓	fx	#Zuckerberg How do you want to be remembered? As one of the three Internet giants together w/ Bill Gates			
	A	B	O	P	Q	R	S
1							
2	Vertex 1	Vertex 2	Relationship	Date (UTC)	Tweet	URLs in Tweet	Domain
3	guyverhofstadt	guyverhofstadt	Tweet	5/22/2018 17:08	#Zuckerberg How do you want to be remembered? As one of the three Internet giants together w/ Bill Gates		
4	sven_giegold	sven_giegold	Tweet	5/22/2018 16:54	Das ist eine Frechheit! #Zuckerberg hat durchgesetzt, da		
5	guyverhofstadt	guyverhofstadt	Tweet	5/22/2018 17:01	#Zuckerberg You remind me of "Kalden" in the book "		
6	berlaymonster	berlaymonster	Tweet	5/22/2018 16:32	#Zuckerberg sets out Facebook's relationship with EU. I		
7	guyverhofstadt	guyverhofstadt	Tweet	5/22/2018 17:50	This brave new world of Mr #Zuckerberg in which tens o		
8	guyverhofstadt	europarl_en	Mentions	5/22/2018 16:29	LIVE I'm about to question Mark #z https://mc twitter		
9	guyverhofstadt	guyverhofstadt	Tweet	5/22/2018 17:07	#Zuckerberg Art. 82 of #GDPR states that any person		
10	aral	aral	Tweet	5/22/2018 16:59	Note: asking Facebook to "eradicate fake accounts" is		
11	guyverhofstadt	guyverhofstadt	Tweet	5/22/2018 17:04	#Zuckerberg You said you will apply the new #GDPR, b		
12	nicolasbayfn	nicolasbayfn	Tweet	5/22/2018 17:30	"Monsieur #Zuckerberg, par quels critères de droit justif		
13	disinfoeu	guyverhofstadt	Mentions	5/22/2018 16:55	"You're apologising every year Mr #Zuckerberg. You've		
14	disinfoeu	aldegroup	Mentions	5/22/2018 16:55	"You're apologising every year Mr #Zuckerberg. You've		
15	eu_commission	eu_commission	Tweet	5/22/2018 16:44	We are proud to be setting the new e https://ec . europa		
16	terryreintke	terryreintke	Tweet	5/22/2018 17:09	I would have preferred a direct question-and-answer-se		
17	kattascha	kattascha	Tweet	5/22/2018 17:40	Warte darauf, dass #Zuckerberg noch sein liebstes Blau		
18	nicolasbayfn	nicolasbayfn	Tweet	5/22/2018 17:08	"Ce mois-ci, les pages #Facebook du mouvement frança		
19	horn	horn	Tweet	5/22/2018 16:49	Ganz im Ernst: erst alle Fragen, dann die Antworten!?		
20	guyverhofstadt	guyverhofstadt	Tweet	5/22/2018 17:03	#Zuckerberg Nearly every year since 2003 there was a		
21	netzpolitik_org	netzpolitik_org	Tweet	5/22/2018 17:31	Zuckerberg erzählt hier die Golden-Oldie-Hits aus der Au		
22	spreeblick	spreeblick	Tweet	5/22/2018 16:47	Äh ... ich höre jetzt gefühlt 372 Fragen in mittelmäßigen		
23	maxschrems	maxschrems	Tweet	5/22/2018 17:46	"I know that there were many specific questions that I		
24	sven_giegold	sven_giegold	Tweet	5/22/2018 17:50	Die Anhörung ist zur Ausflucht von #Zuckerberg geword		
25	woelken	facebook	Mentions	5/22/2018 17:15	Das Format des #zuckerberghearing ist ein schlechter So		
26	woelken	ep_president	Mentions	5/22/2018 17:15	Das Format des #zuckerberghearing ist ein schlechter So		
27	maxhofmann	maxhofmann	Tweet	5/22/2018 17:02	This system where group leaders of the European Parlia		
28	efoulon1	efoulon1	Tweet	5/22/2018 17:14	DIRECT : le représentant du Front National a l'opportu		
29	kattascha	kattascha	Tweet	5/22/2018 17:48	Ich wünsche #Zuckerberg, das er mal eine ganz dringend		
30	maxkoschyk	maxkoschyk	Tweet	5/22/2018 17:05	Two thirds into into the meeting, #Zuckerberg still hasn'		
31	netzpolitik.org	netzpolitik.org	Tweet	5/22/2018 16:59	Wenn das so weitergeht, bleiben Zuckerberg noch ca. 2		



KEY FEATURES OF NODEXL PRO

4

2. Network Analysis

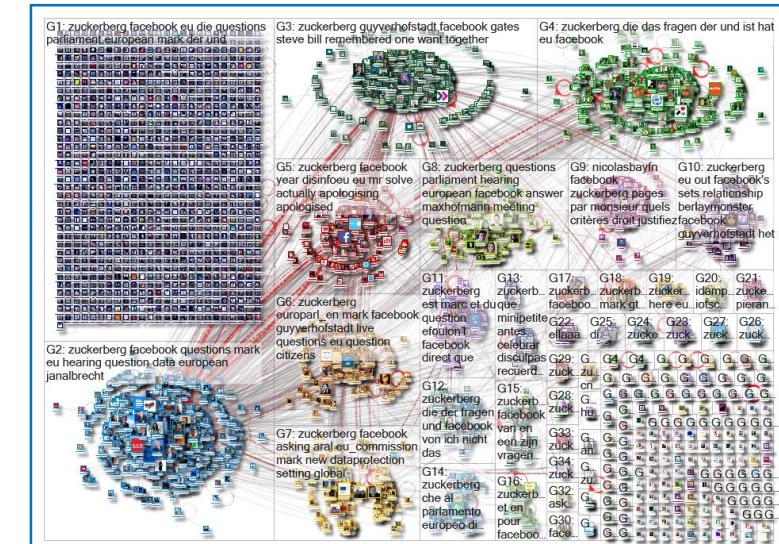


3. Content Analysis

Text Analysis

Top Contents Analysis

4. Visualization



1. Data Import

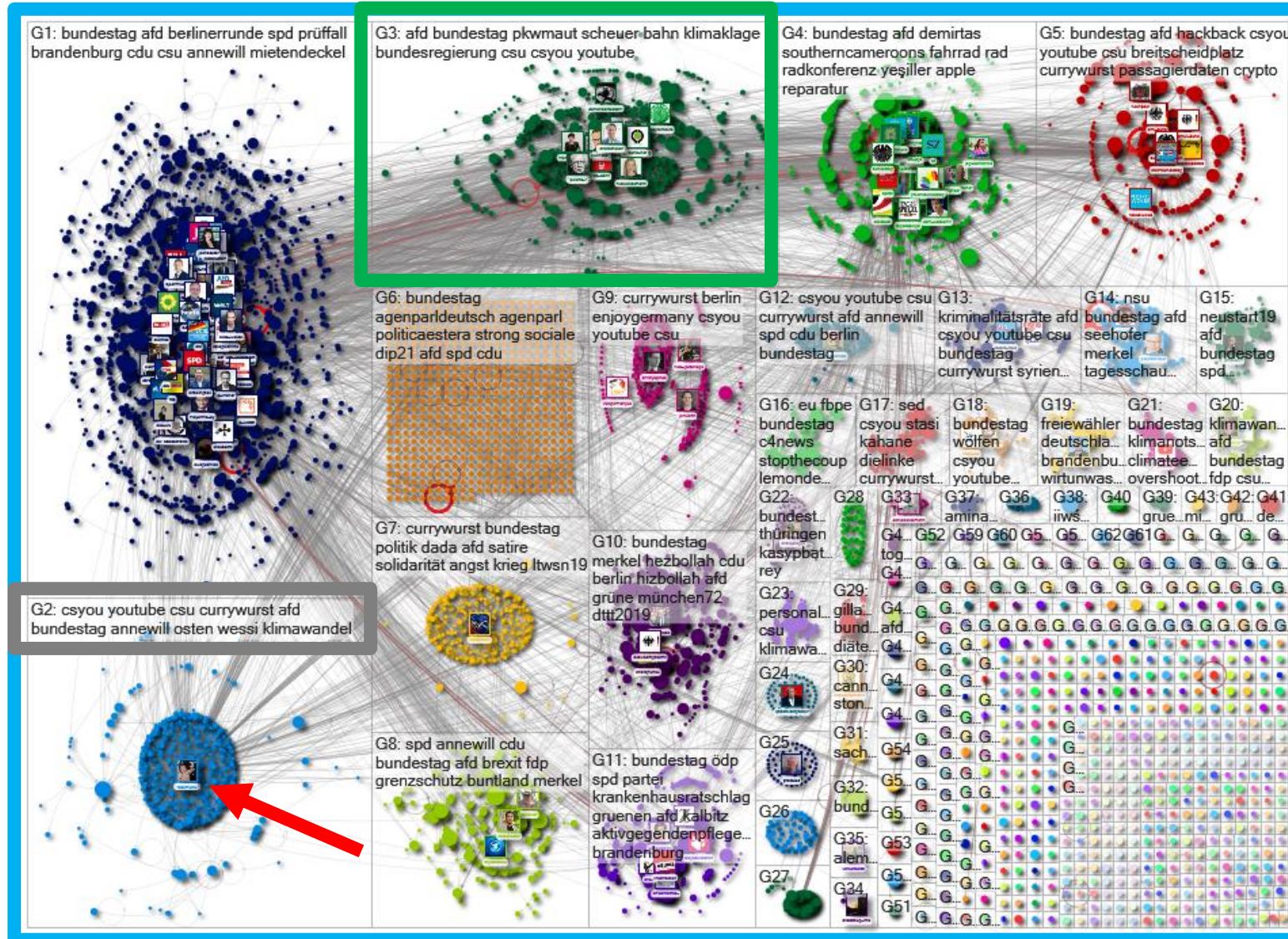


6. Automation with Data Recipes

5. Publish



SOCIAL NETWORK AND CONTENT ANALYSIS



Network Overview

- Quantity / Density / Modularity

Group Analysis

- Cluster Algorithm
- Density

Vertex Metrics

- Centrality: Betweenness, Closeness, Eigenvector, ...

Content Analysis

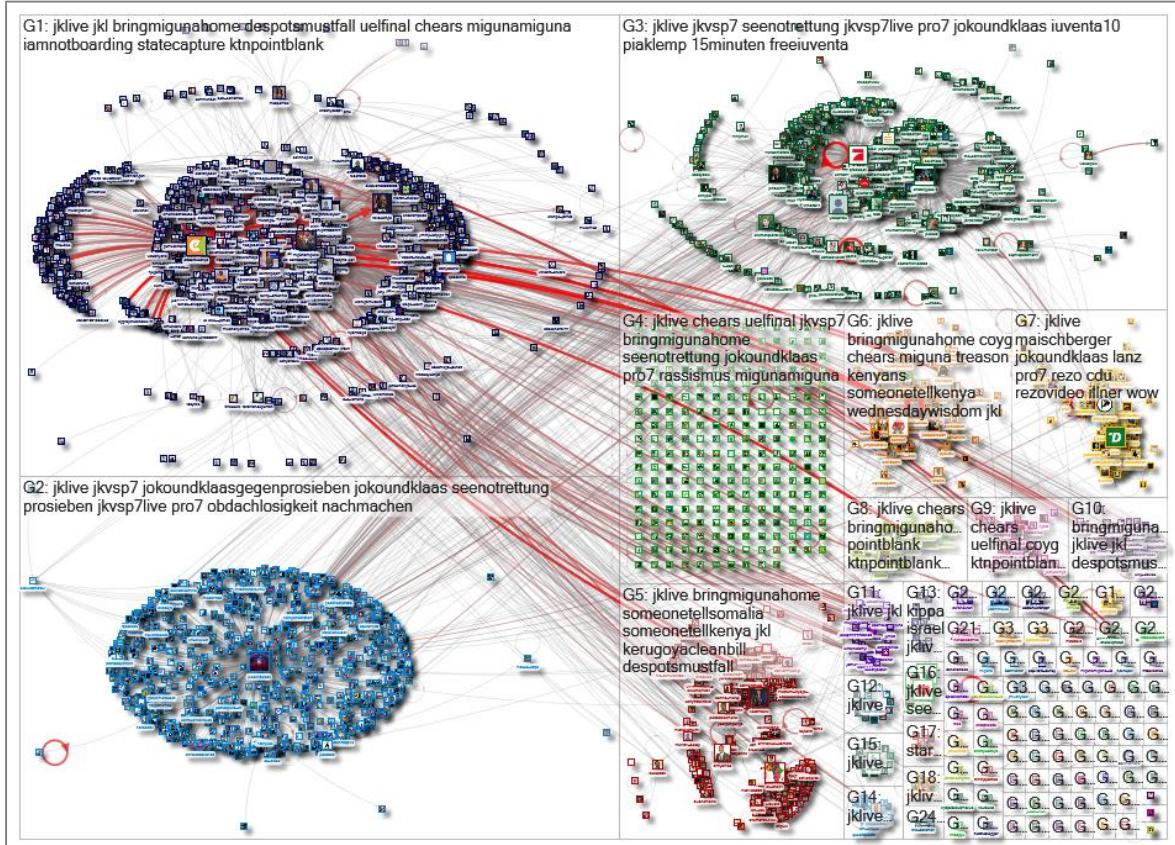
- Top hashtags, words, URLs, ...
- Sentiment, time series

Layout Algorithms

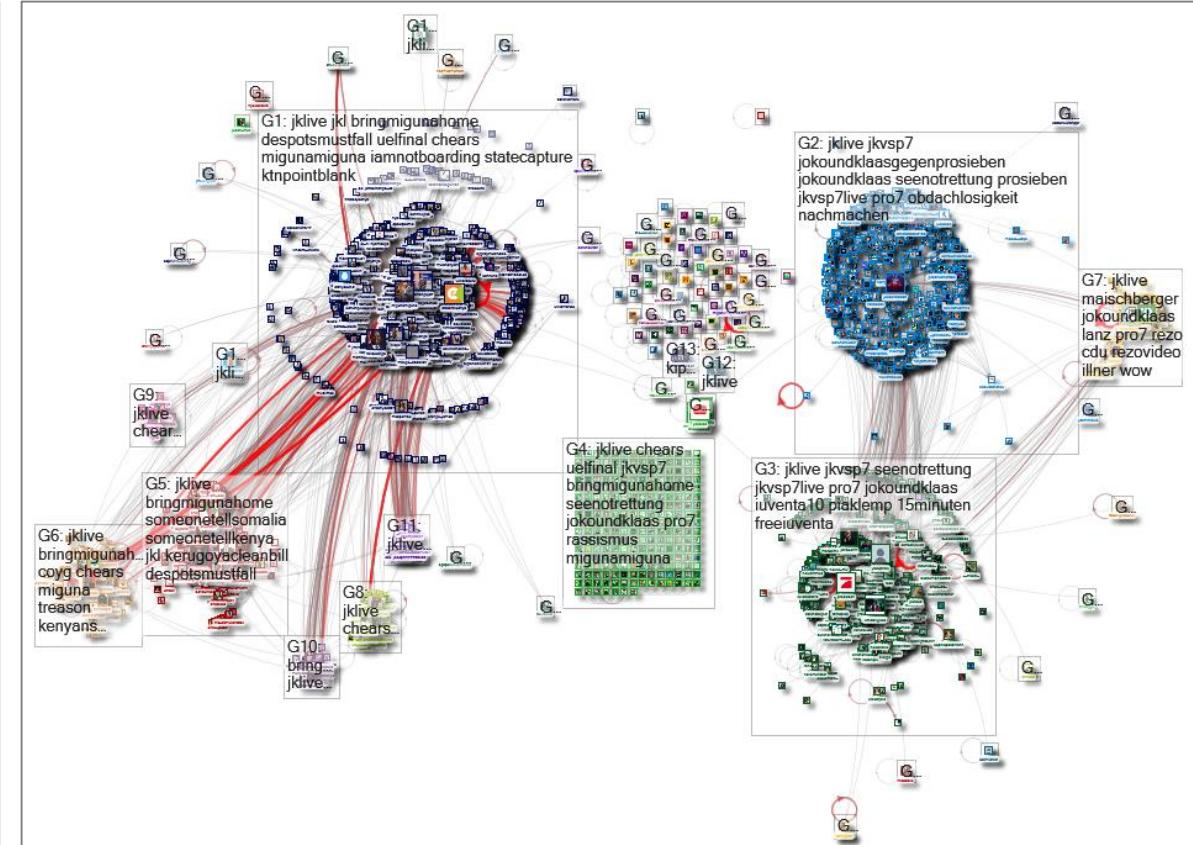
- Group-In-A-Box: Treemap
- Harel-Koren Fast Multiscale

VISUALIZATION: GROUP-IN-A-BOX

6



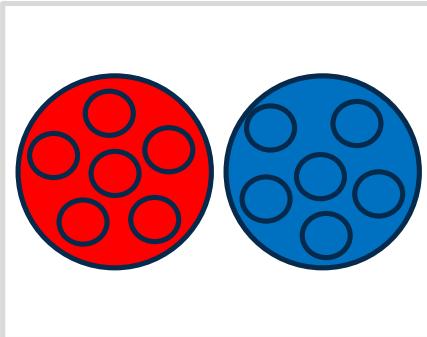
Treemap



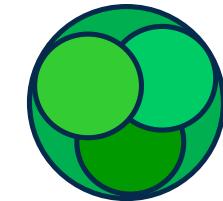
Force-Directed

NETWORK SHAPES

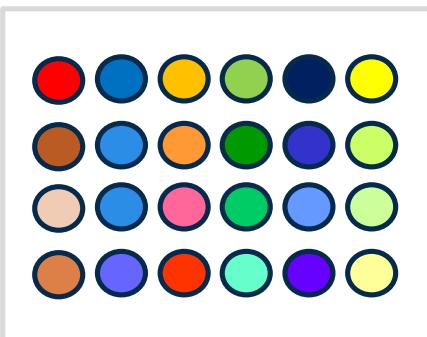
[Divided]
Polarized Crowds



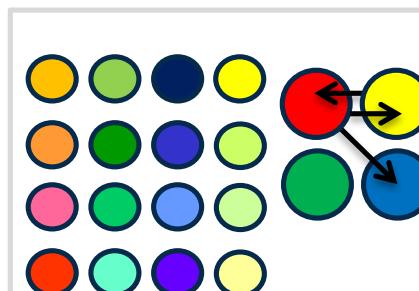
[Unified]
Tight Crowd



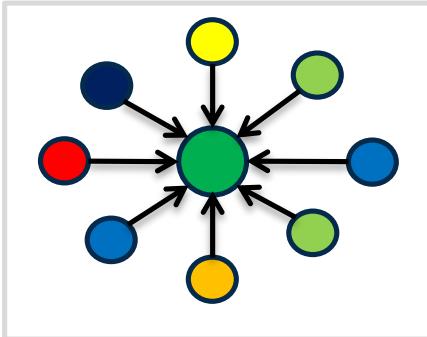
[Fragmented]
Brand Clusters



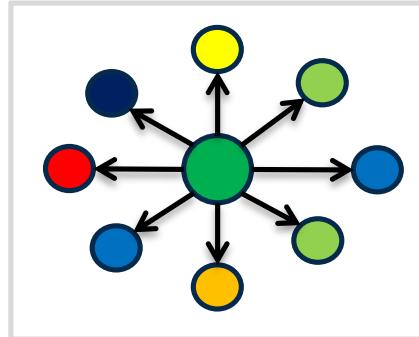
[Clustered]
Community Clusters



[In-Hub & Spoke]
Broadcast Network

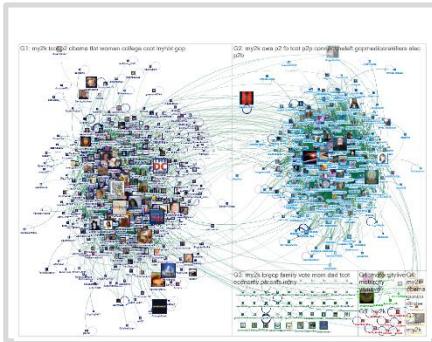


[Out-Hub & Spoke]
*Support Network
Retweet/Spam Bot*

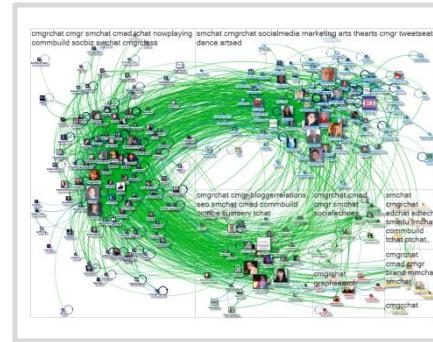


NETWORK SHAPES

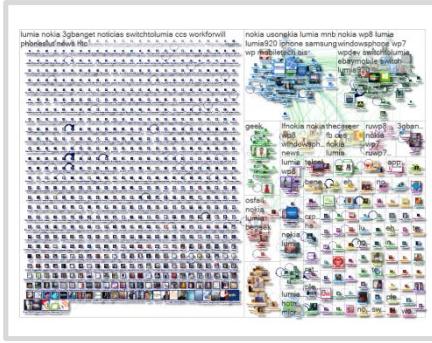
[Divided]
Polarized Crowds



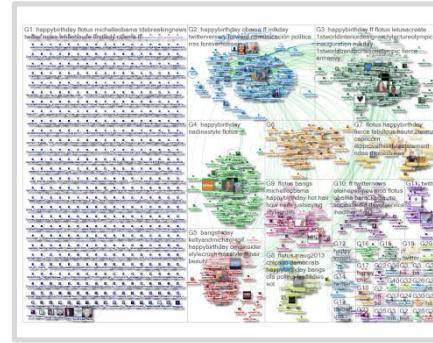
[Unified]
Tight Crowd



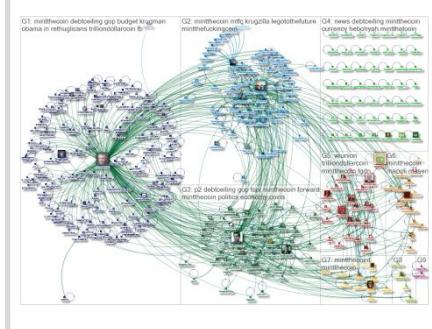
[Fragmented]
Brand Clusters



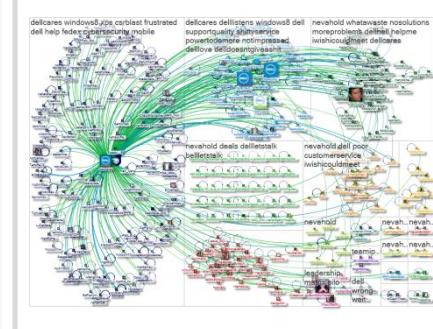
[Clustered]
Community Clusters



[In-Hub & Spoke]
Broadcast Network



[Out-Hub & Spoke]
Support Network



NETWORK SHAPES

9

PewResearch Internet Project

U.S. POLITICS | MEDIA & NEWS | SOCIAL TRENDS | RELIGION | INTERNET & TECH | HISPANICS | GLOBAL

PUBLICATIONS | TOPICS | PRESENTATIONS | INTERACTIVES | KEY INDICATORS | DATASETS | ABOUT

REPORT

FEBRUARY 20, 2014

Mapping Twitter Topic Networks: From Polarized Crowds to Community Clusters

BY MARC A. SMITH, LEE RAINIE, BEN SHNEIDERMAN AND ITAI HIMELBOIM

Summary of Findings

Polarized Crowds: Political conversations on Twitter

Conversations on Twitter create networks with identifiable contours as people reply to and mention one another in their tweets. These conversational structures differ, depending on the subject and the people driving the conversation. Six structures are regularly observed: divided, unified, fragmented, clustered, and inward and outward hub and spoke structures. These are created as individuals choose whom to reply to or mention in their Twitter messages and the structures tell a story about the nature of the conversation.

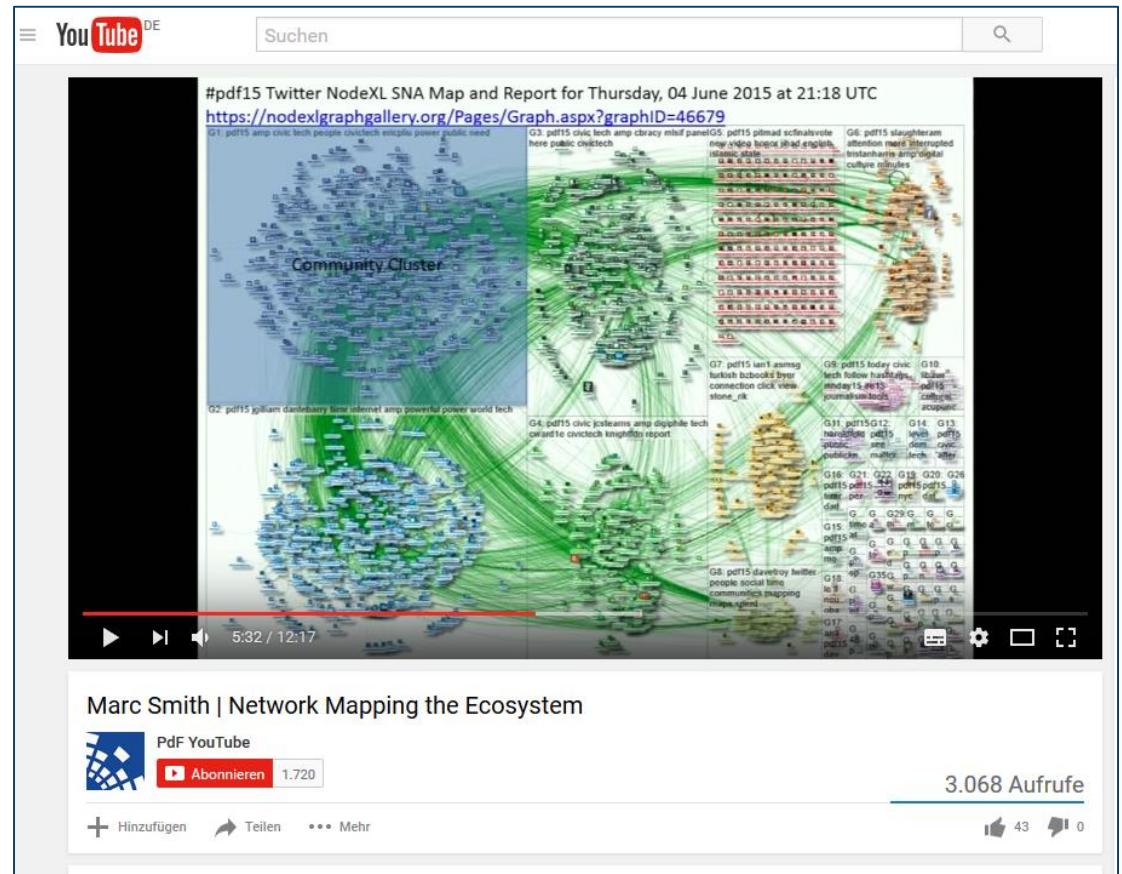
If a topic is political, it is common to see two separate, polarized crowds take shape. They form two distinct discussion groups that mostly do not interact with each other. Frequently these are recognizably liberal or conservative groups. The participants within each separate group commonly mention very different collections of website URLs and use distinct hashtags and words. The split is clearly evident in many highly controversial discussions: people in clusters that we identified as liberal used URLs for mainstream news websites, while groups we identified as conservative used links to conservative news websites and commentary sources. At the center of each group are discussion leaders, the

REPORT MATERIALS

- Complete Report
- Press Release
- Data gallery: Examples of six kinds of Twitter social media networks
- How we did it: Analyzing Twitter social media networks with NodeXL
- Fact Tank: Q/A: How Pew Research mapped the conversations on Twitter
- Infographic: The six types of Twitter conversations

TABLE OF CONTENTS

- Overview
- Summary of Findings
- Polarized Crowds: Political



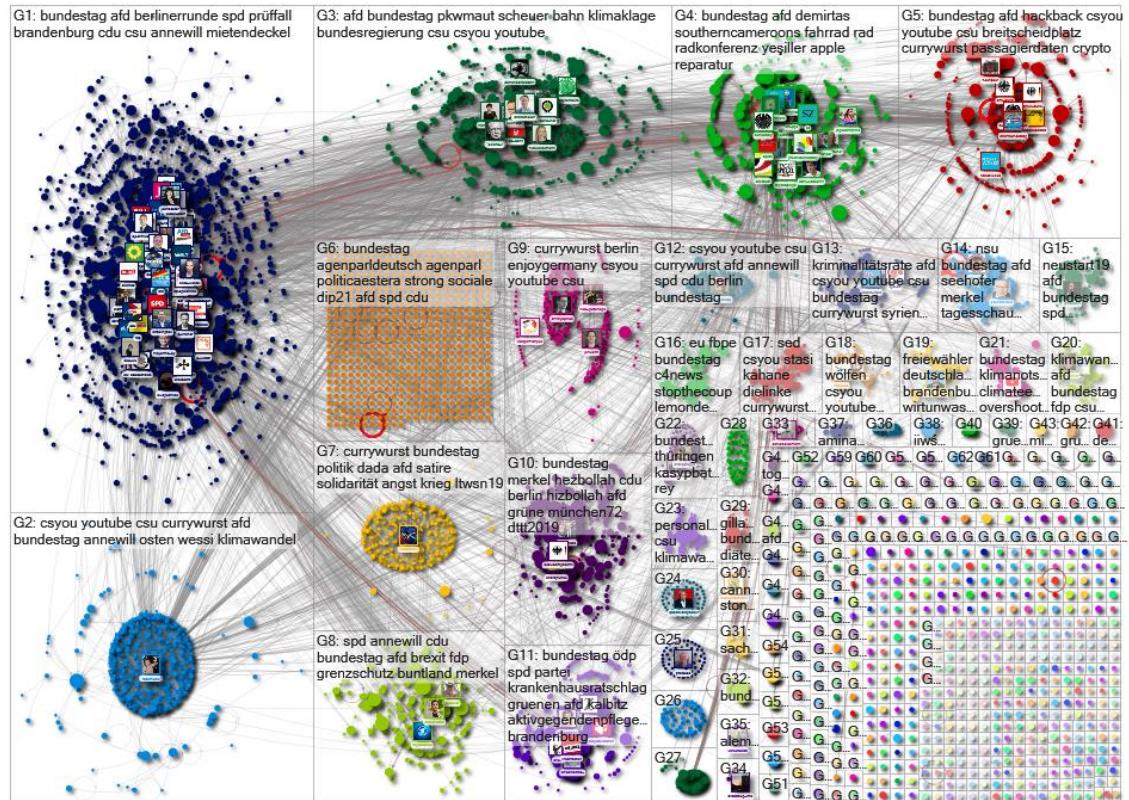
PEW Report: Mapping Twitter Topic Networks: From Polarized Crowds to Community Clusters. PEW Research Report 2014: <http://www.pewinternet.org/2014/02/20/mapping-twitter-topic-networks-from-polarized-crowds-to-community-clusters/>

Video: SMRF Director Marc Smith | Network Mapping the Ecosystem: <https://www.youtube.com/watch?v=kDiGI-2m868>

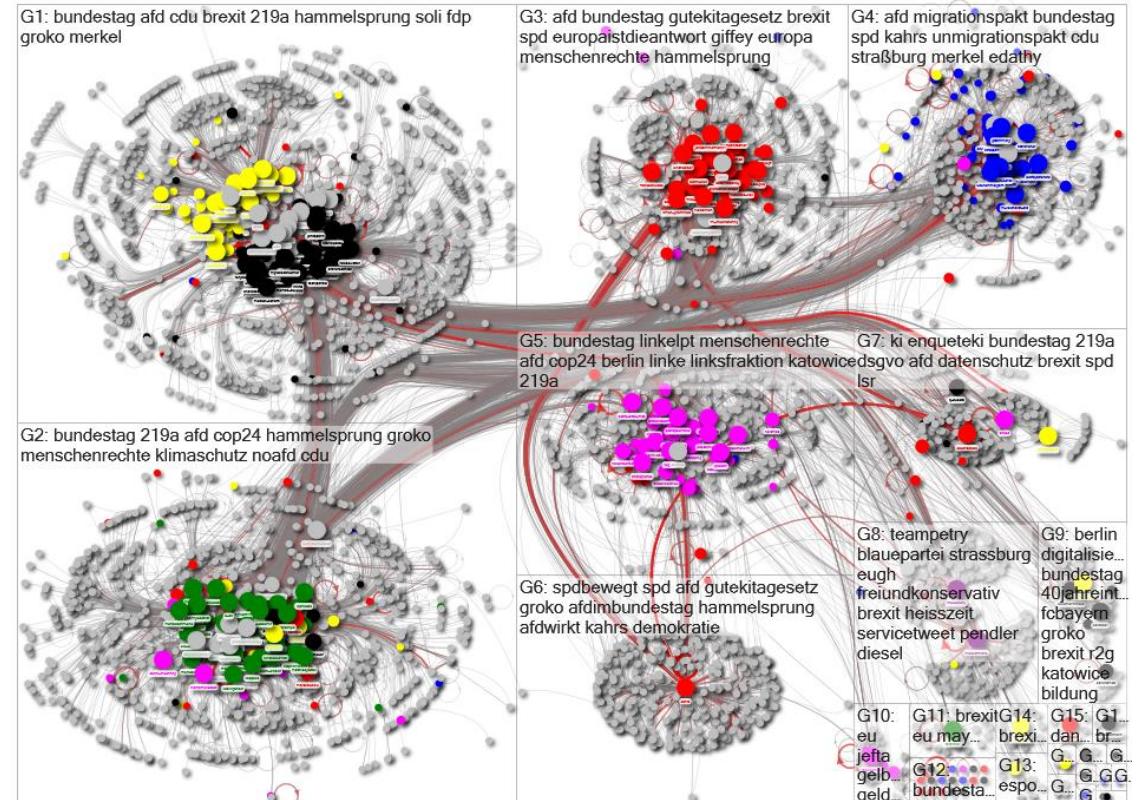
TWITTER NETWORK DATA PERSPECTIVES

10

Twitter Search API: Open space



Twitter Users API: Restricted space



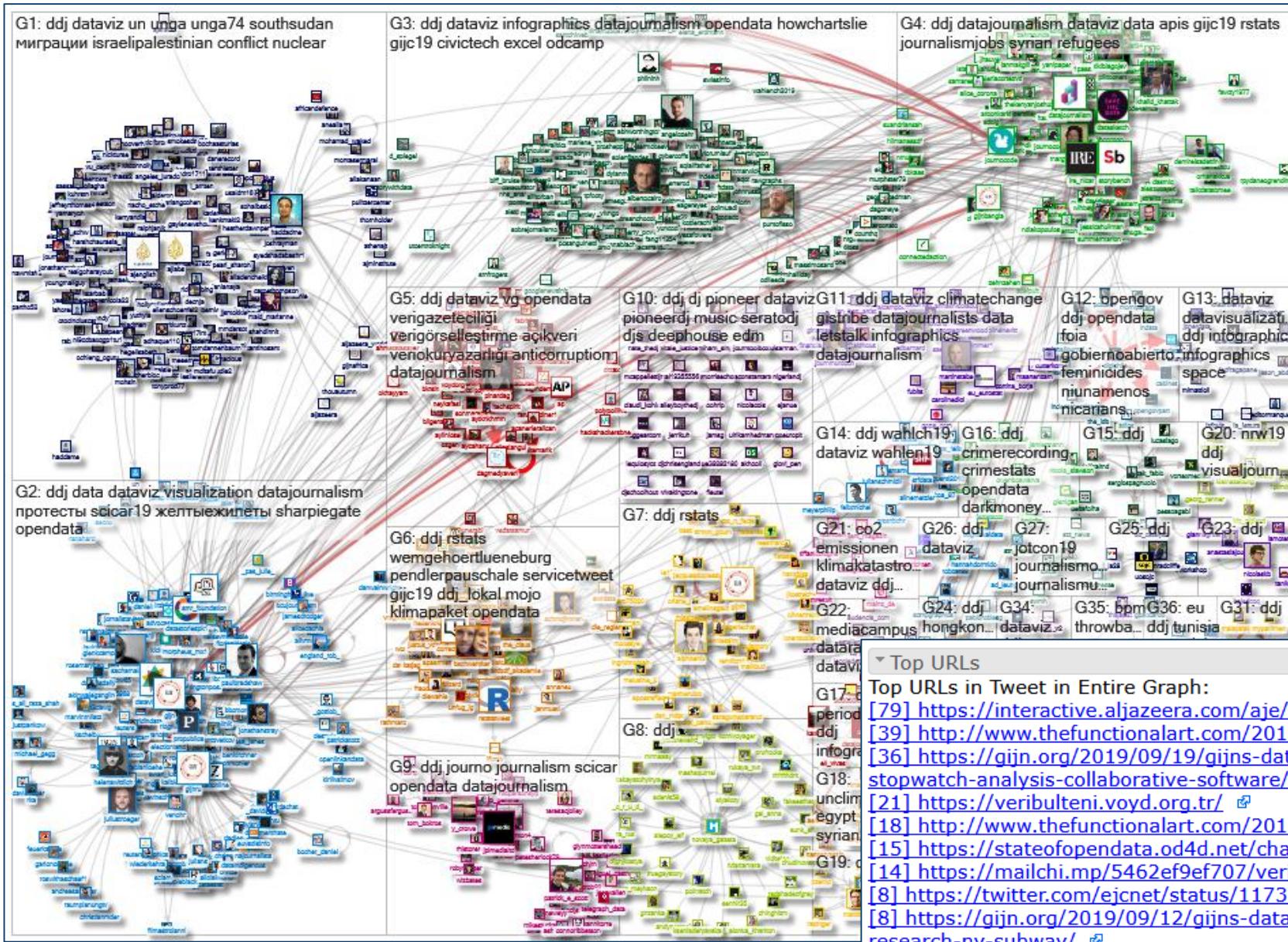
- past 10 days / max. 18,000 tweets per query

- max. 3,200 tweets per user

Summarize and explore

11

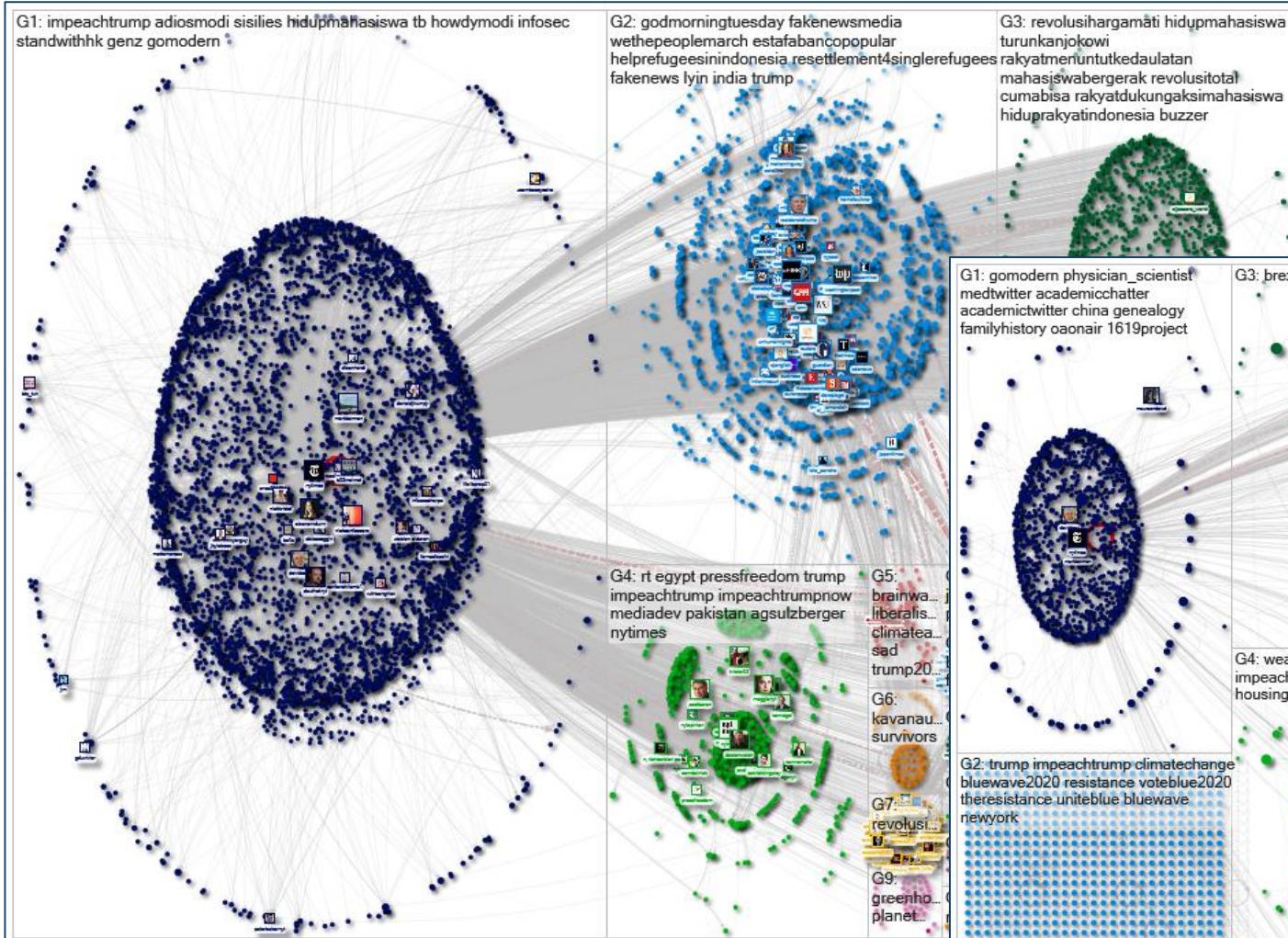
Search term: #ddj



Top URLs

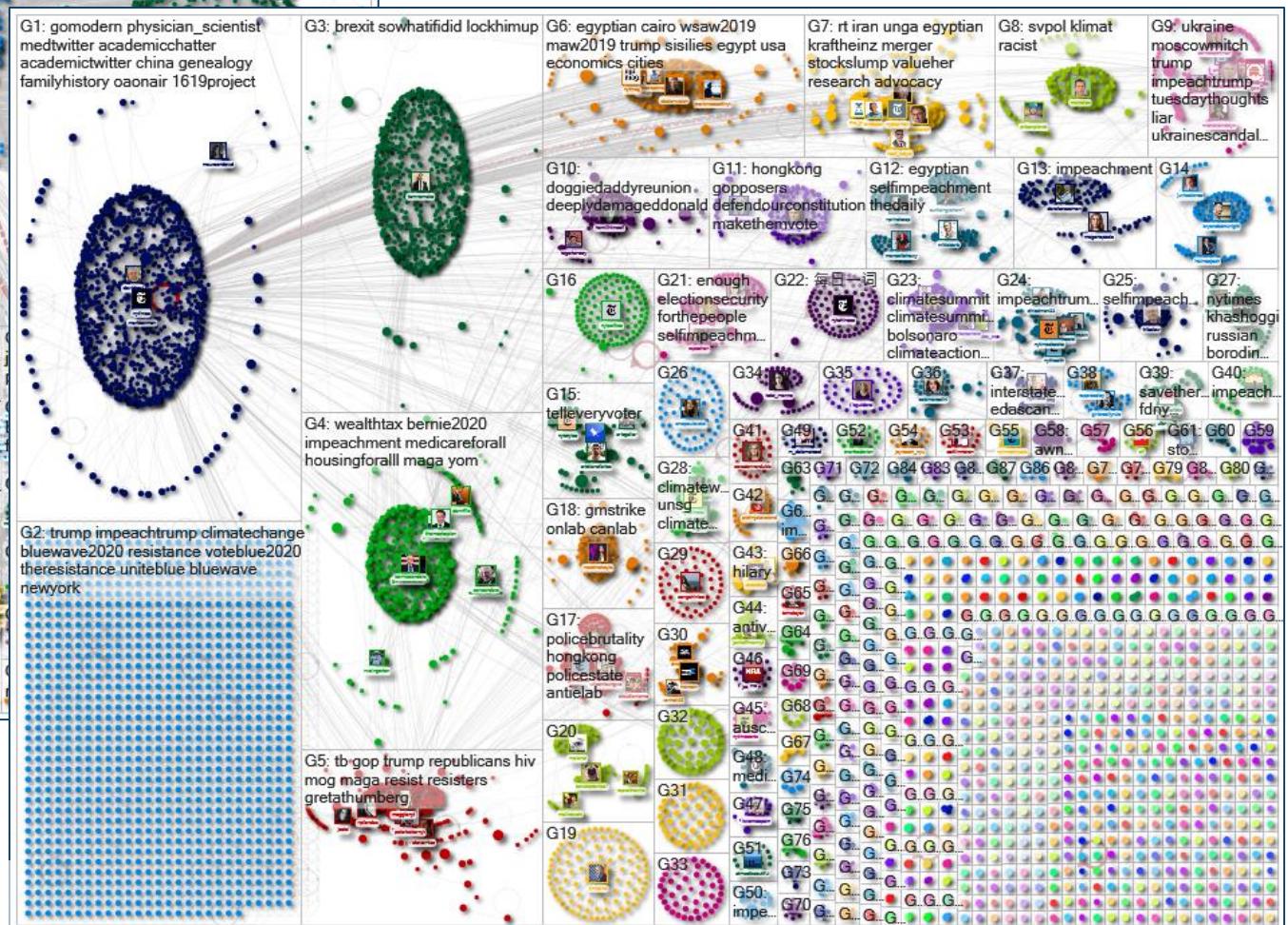
Top URLs in Tweet in Entire Graph:

- [79] <https://interactive.aljazeera.com/aje/2019/how-has-my-country-voted-at-unga/index.html>
- [39] <http://www.thefunctionalart.com/2019/09/new-data-journalism-and-visualization.html>
- [36] <https://gijn.org/2019/09/19/gijns-data-journalism-top-10-plastic-mountains-sharpiegate-stopwatch-analysis-collaborative-software/>
- [21] <https://veribulteni.voyd.org.tr/>
- [18] <http://www.thefunctionalart.com/2019/09/how-to-build-data-narrative.html>
- [15] <https://stateofopendata.od4d.net/chapters/sectors/accountability.html>
- [14] <https://mailchi.mp/5462ef9ef707/veri-bulteni47>
- [8] <https://twitter.com/ejcnet/status/1173587534745673734>
- [8] <https://gijn.org/2019/09/12/gijns-data-journalism-top-10-3d-animation-brexit-borders-bad-research-ny-subway/>
- [6] <https://wid.world/>



Search term: @nytimes

12

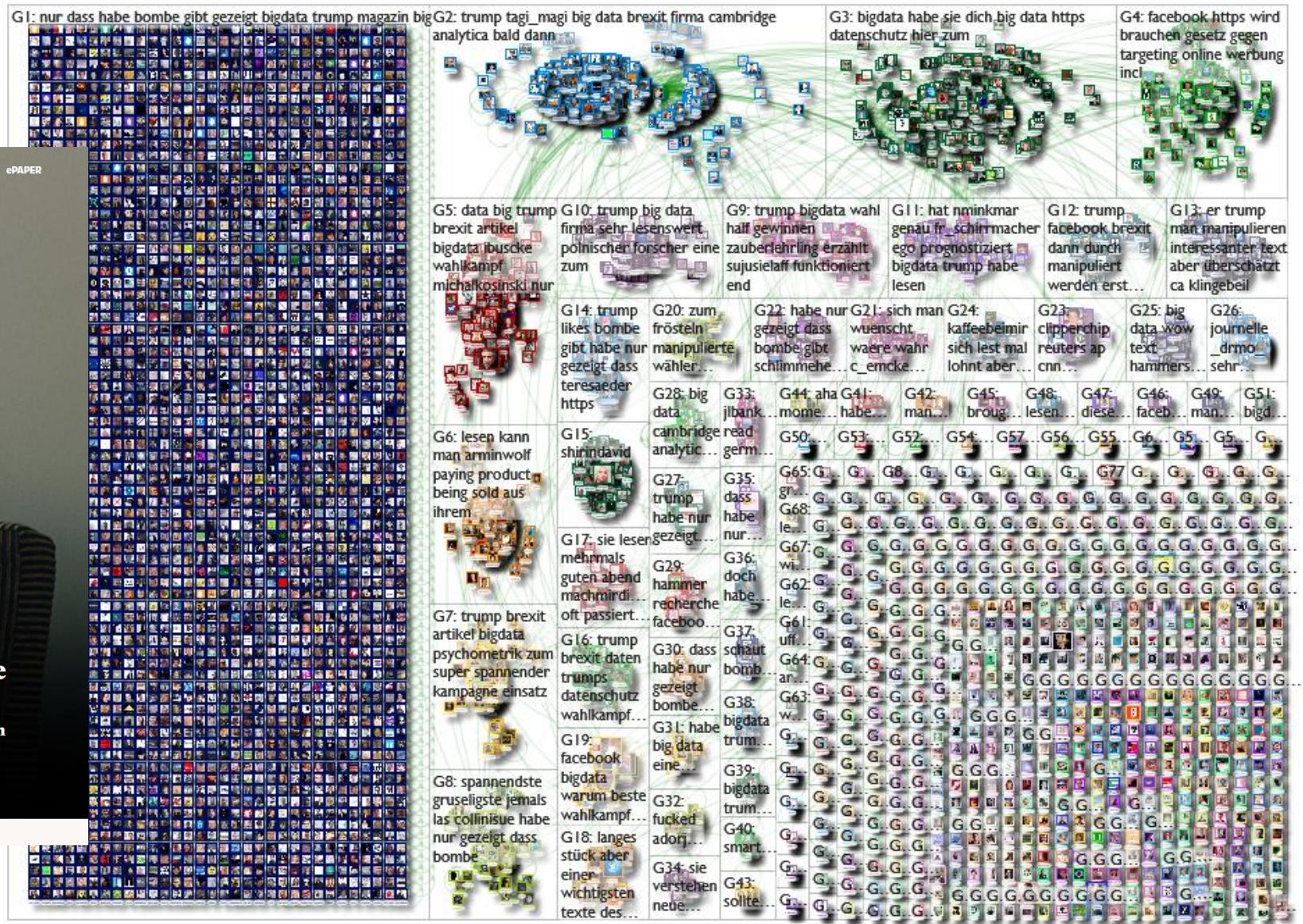


Search term: url:nytimes

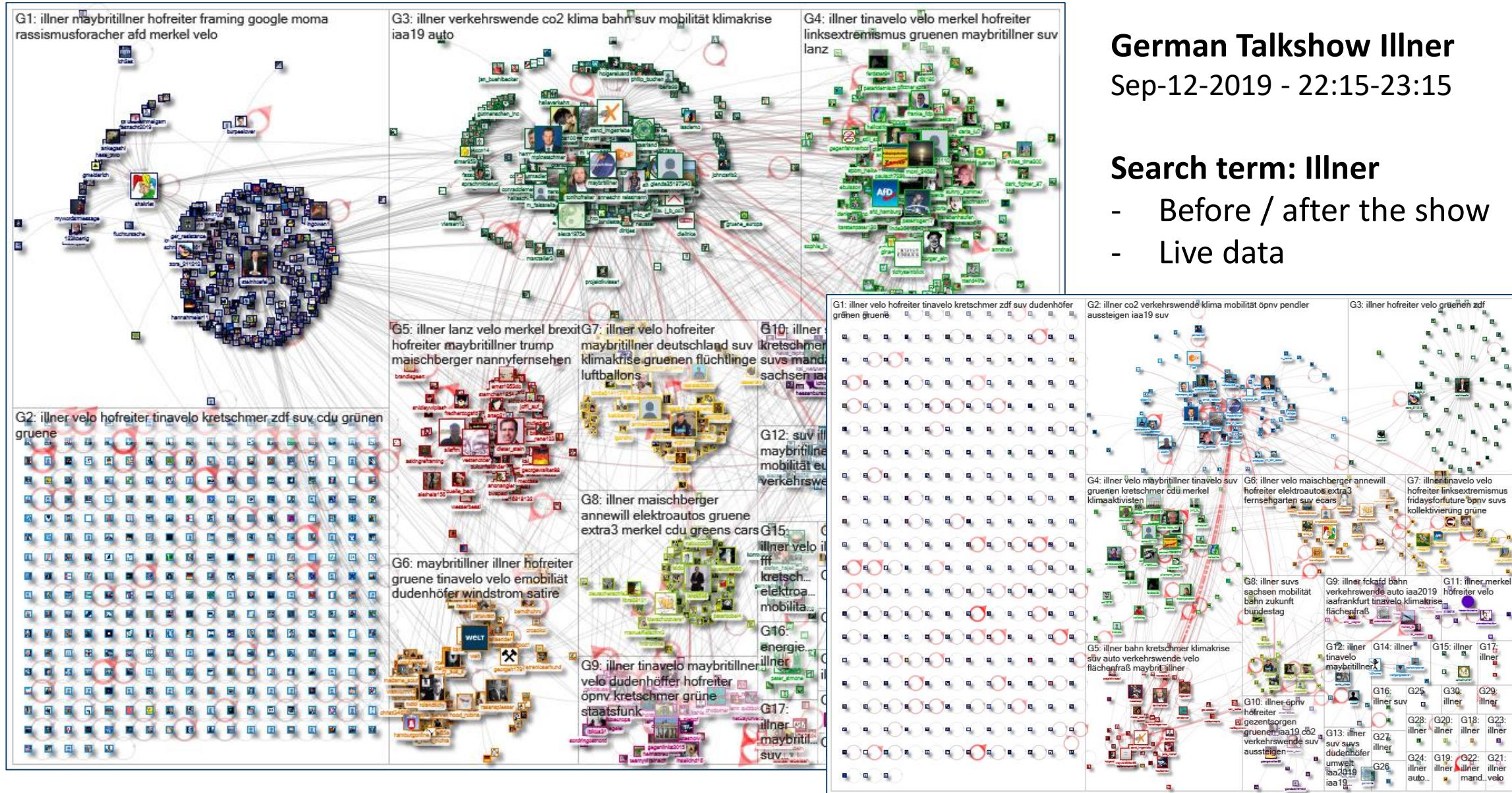
Search term: dasmagazin.ch/2016/12/03/ich-habe-nur-gezeigt-dass-es-die-bombe-gibt



<https://www.dasmagazin.ch/2016/12/03/ich-habe-nur-gezeigt-dass-es-die-bombe-gibt/>



<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=84200>

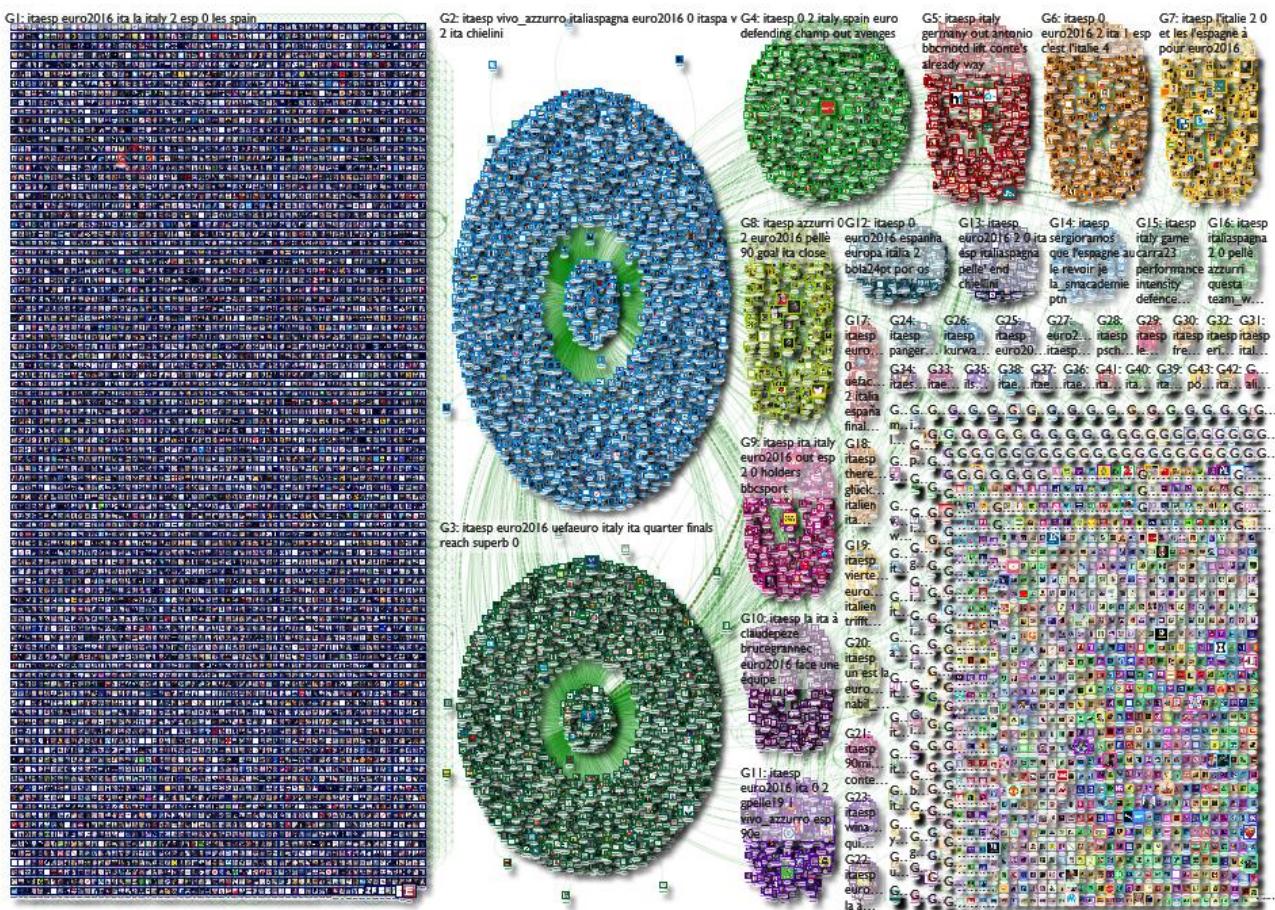
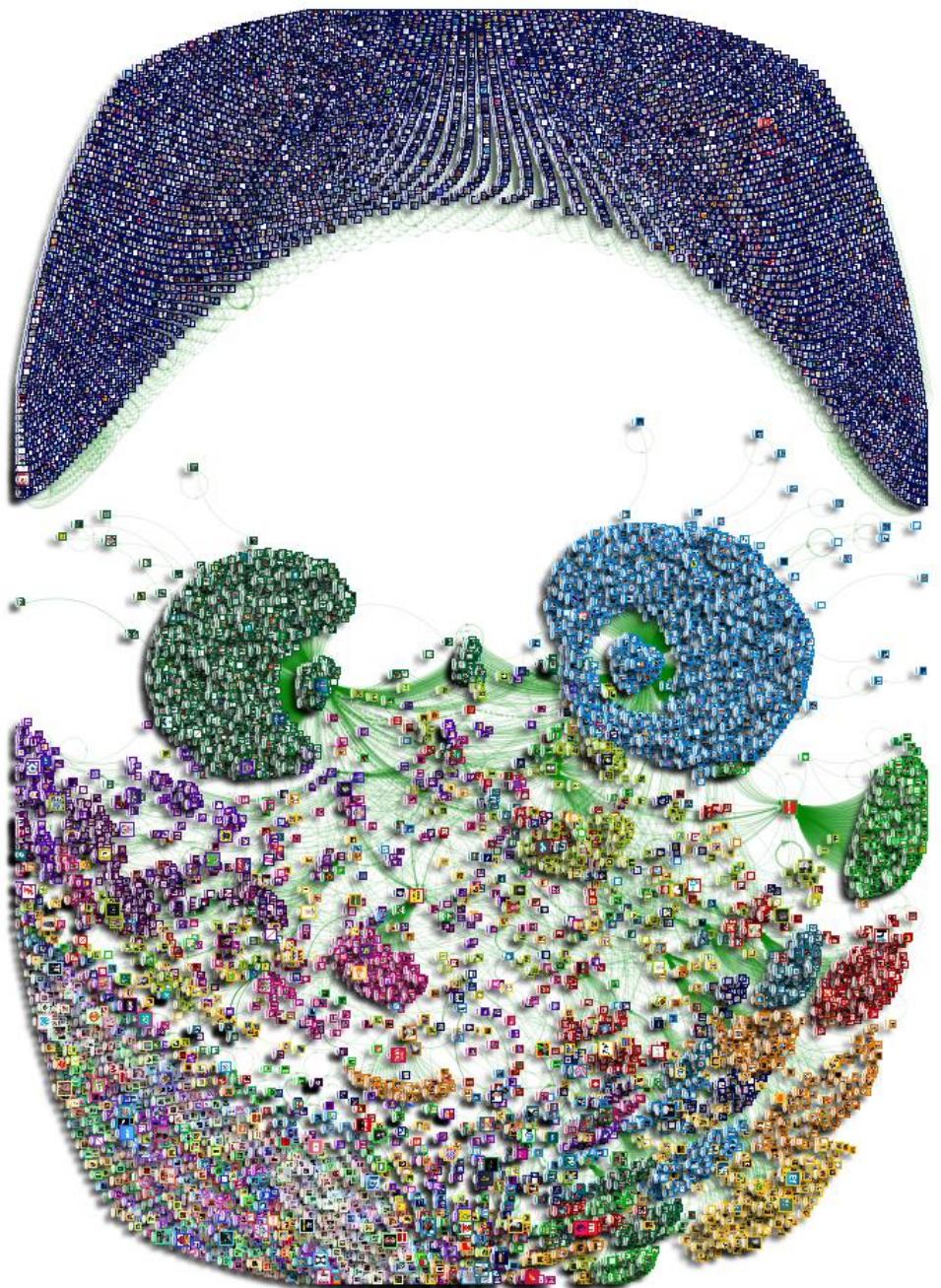


German Talkshow Illner

Sep-12-2019 - 22:15-23:15

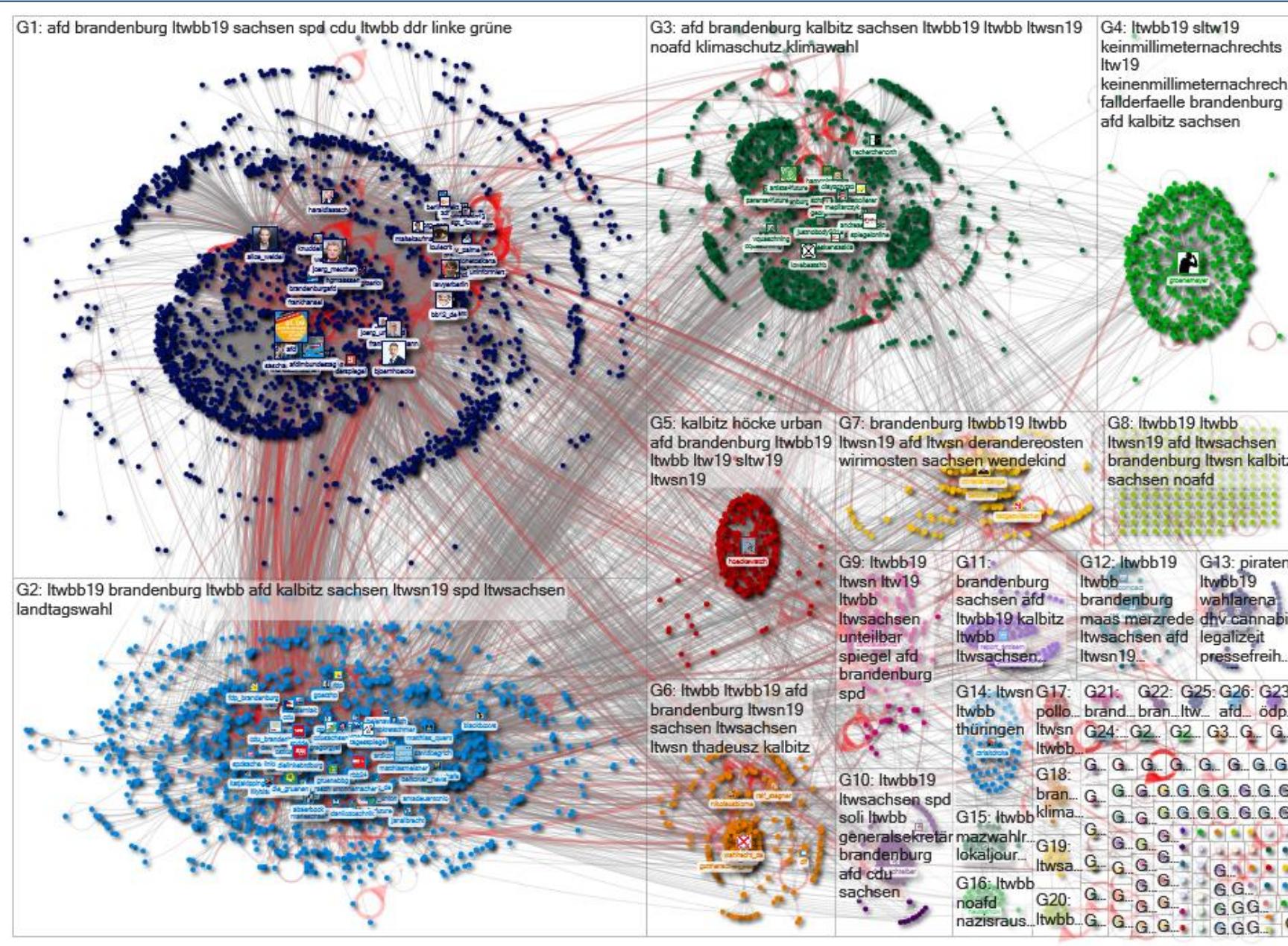
Search term: Illner

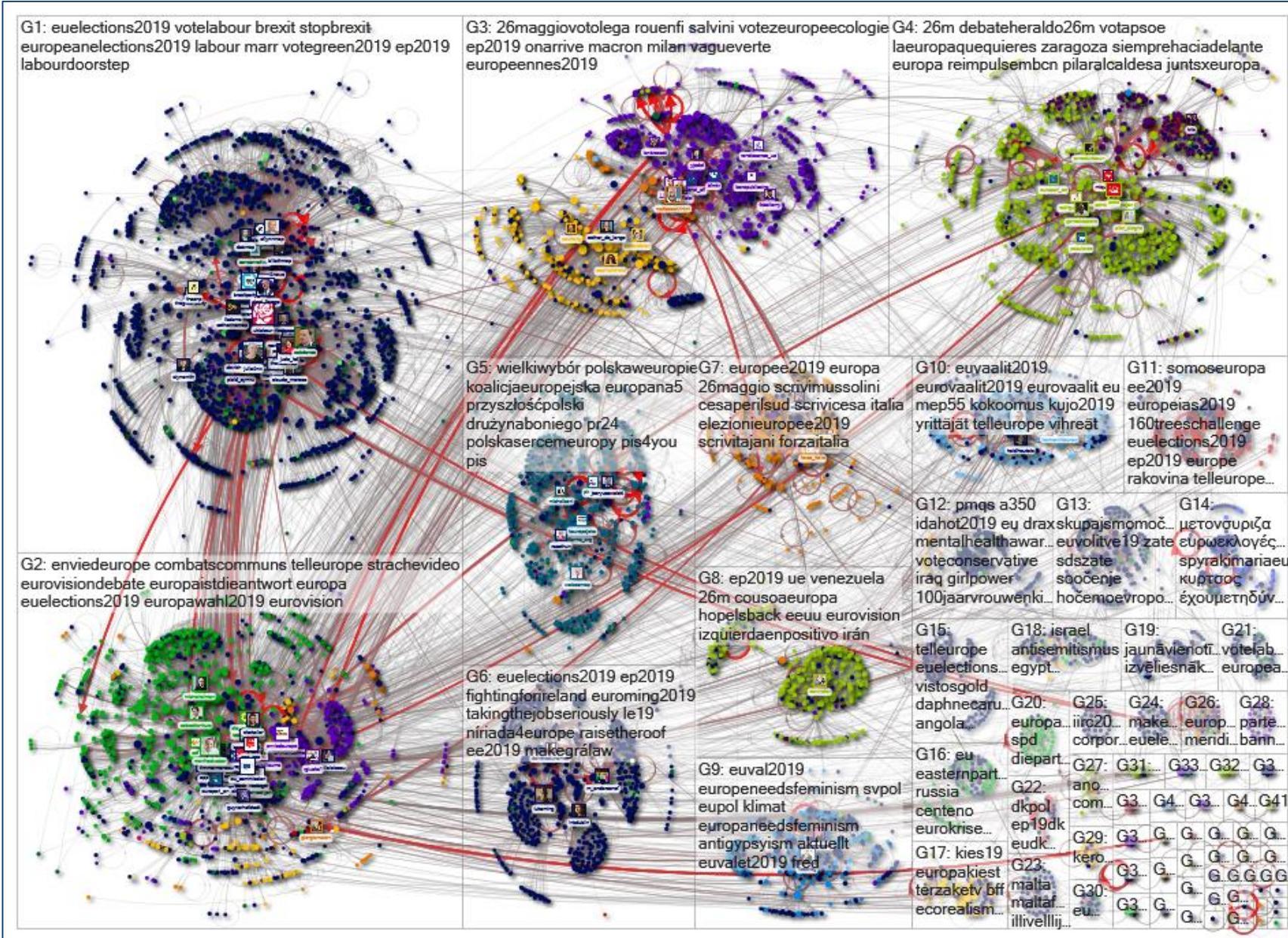
- Before / after the show
- Live data



Sports Coverage: EURO 2016 – June 27, 2016

Search term:
#ITAESP



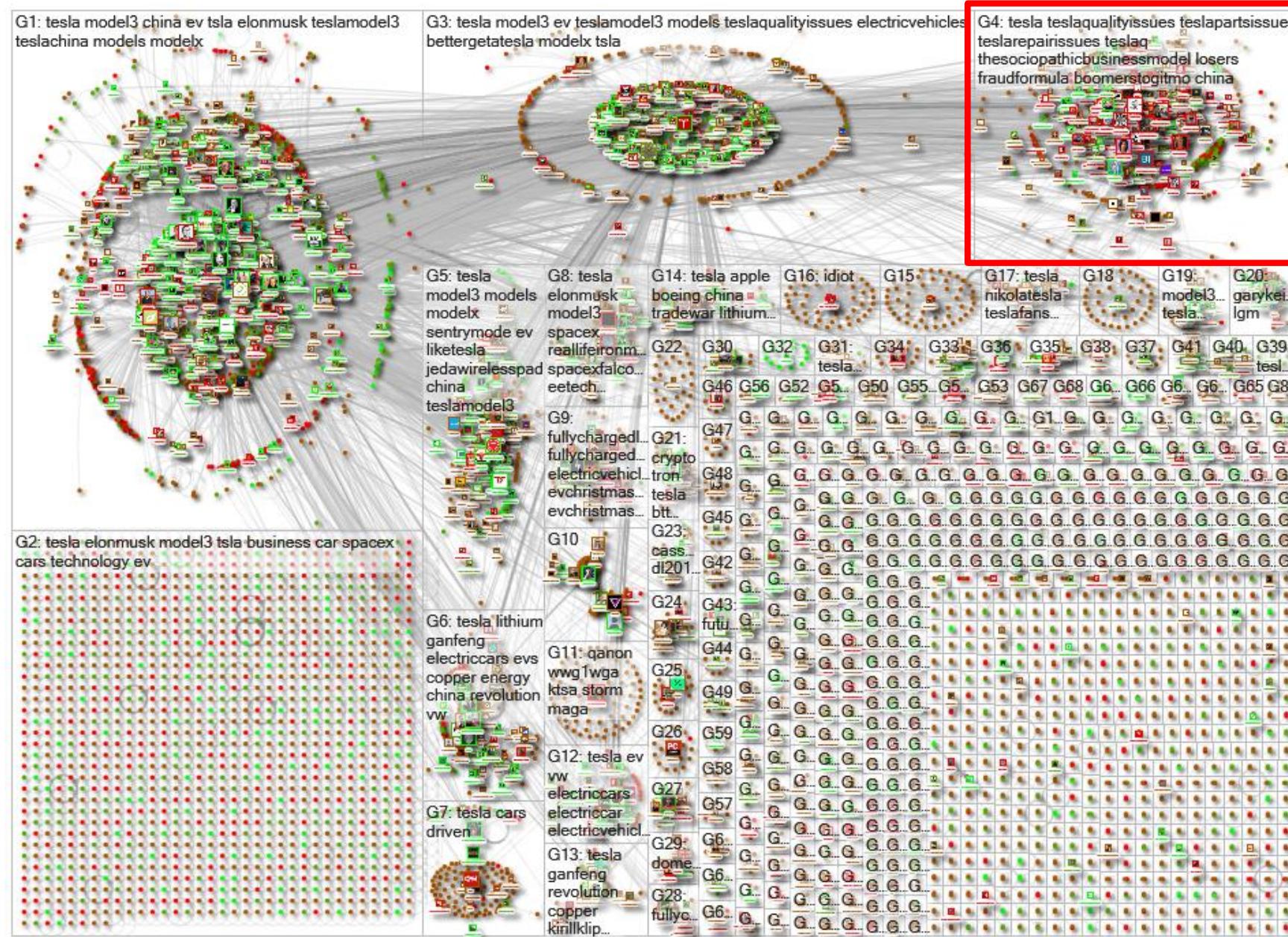


Members of the European Parliament before the European Elections

Color by Language

Search term:

list:Europarl_EN/all-meeps-on-twitter



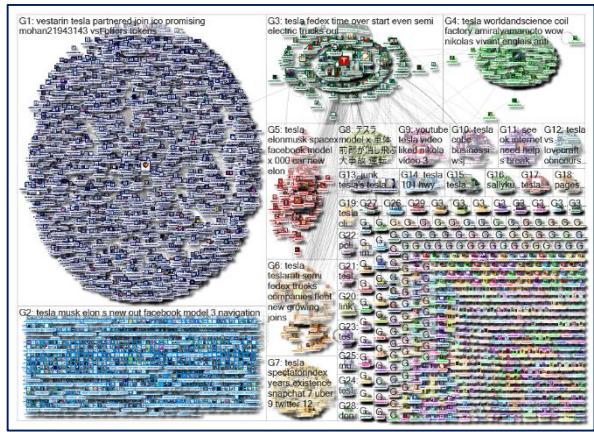
Visualizing Sentiment

Color by Language

Search term:
Tesla lang:en

TWITTER SEARCH NETWORK COMPARISON

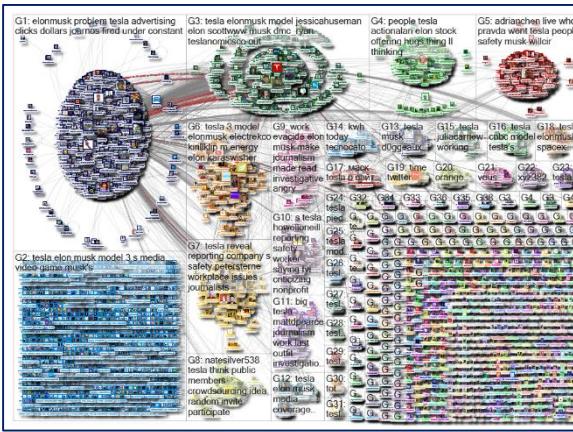
19



Tesla Twitter Brand Network

2018-03-26

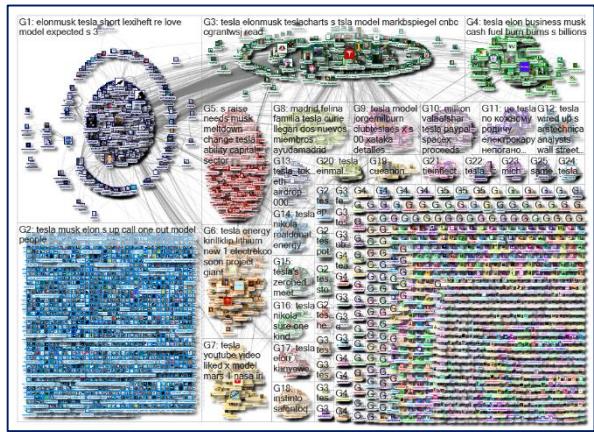
Positive Words: 3.83%
Negative Words: 1.41%



Tesla Twitter Brand Network 2018-05-24

<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=152963>

Positive Words: 2.60%
Negative Words: 2.93%

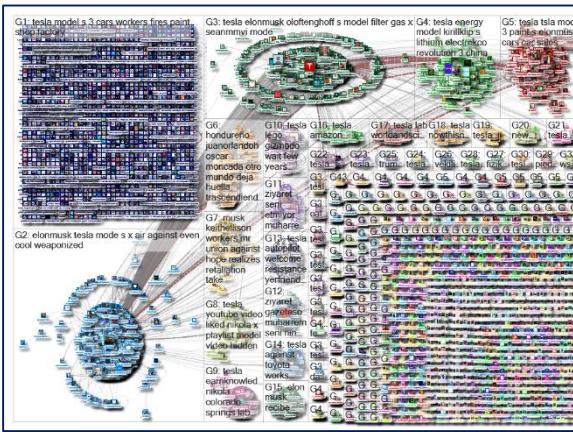


Tesla Twitter Brand Network

2018-05-07

<https://nodeXLgraphgallery.org/Pages/Graph.aspx?graphID=150936>

Positive Words: 2.38%
Negative Words: 2.56%

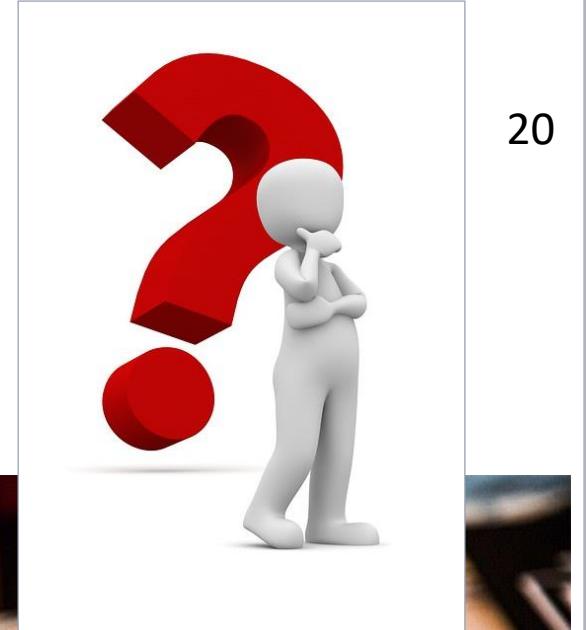


Tesla Twitter Brand Network 2018-06-01

<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=155439>

Positive Words: 3.12%
Negative Words: 1.72%

USER ACCOUNT INVESTIGATION



<https://theguardiansofdemocracy.com/trump-schedules-last-minute-meetings-based-whatever-saw-fox-friends-report/>
<https://www.vanityfair.com/news/2017/06/trump-says-he-wont-stop-tweeting>

TWITTER USERS NETWORK: EGO NETWORK 1.0

21

Import from Twitter Users Network

This might take a long time: Twitter rate limiting

Twitter users I'm interested in

The Twitter users with these usernames:
realdonaldtrump
(Separate with spaces, commas or returns)

The Twitter users in this Twitter List:
bob/bobs

What to import

Basic network
Show who was mentioned or replied to in the users' recent tweets
[More about this option](#)

Basic network plus friends and followers (very slow!)
Add some of the users' friends and followers
[More about this option](#)

Import only the Twitter users I'm interested in

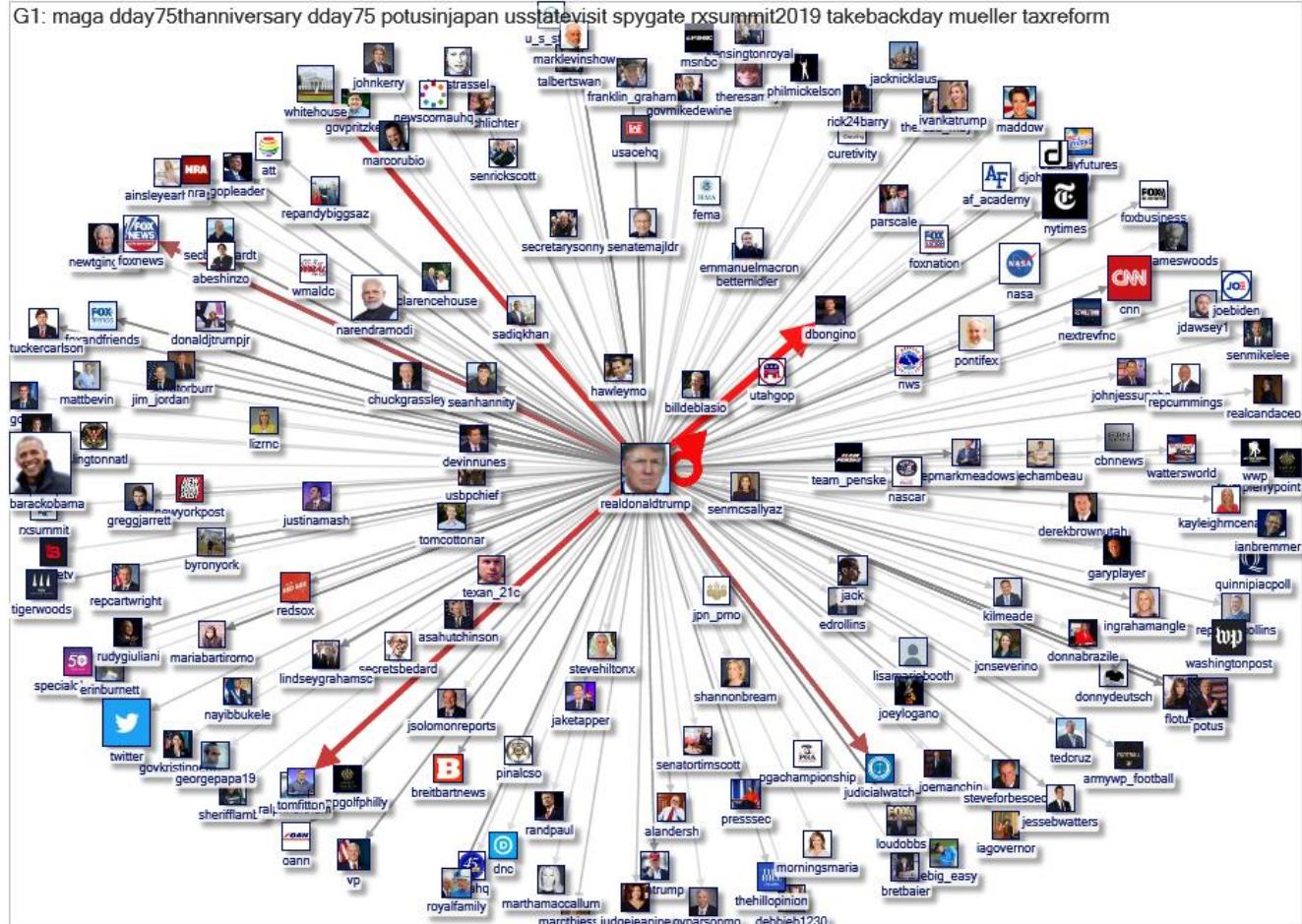
Your Twitter account

I have a Twitter account, but I have not yet authorized NodeXL to use my account to import Twitter networks. Take me to Twitter's authorization Web page.

I have a Twitter account, and I have authorized NodeXL to use my account to import Twitter networks.

Limit to 1,000 recent tweets per user
 Limit friends and followers to 2,000 per user
 Expand URLs in recent tweets (slower)
 Extended analysis: perform a second pass on the collected Tweets to ensure that all Retweets are collected and all RetweetedIDs are correct. (Slow!)

OK Cancel



realdonaldtrump Userlist 1000 2019-06-09

<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=199512>

TWITTER USERS NETWORK: EGO NETWORK 2.0

22

Donald J. Trump

@realDonaldTrump

45th President of the United States of America

Washington, DC

Instagram.com/realdonaldtrump

Joined March 2009

[Tweet to Donald J. Trump](#)

31 Followers you know

2,674 Photos and videos

Who to follow [Refresh](#) [View all](#)

President Trump @PO... [Follow](#)

Dan Scavino Jr. @Scavino45 [Follow](#)

Kellyanne Conway @KellyannePolls [Follow](#)

Reince Priebus @Reince [Follow](#)

Ronna McDaniel @GOPChairwoman [Follow](#)

Brad Parscale @parscale [Follow](#)

Sarah Sanders @PressSec [Follow](#)

Tucker Carlson @TuckerCarlson [Follow](#)

Jesse Watters @JesseBWatters [Follow](#)

The White House @WhiteHouse [Follow](#)

Tweets 38K Following 46 Followers 53M Likes 25 Moments 6 [Follow](#)

Import from Twitter Users Network [X](#)

This might take a long time: Twitter rate limiting

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(Separate with spaces, commas or returns)

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I have a Twitter account, and I have authorized NodeXL to use my account to import Twitter networks.

Diagram illustrating the Twitter network graph structure:

```
graph TD; A(( )) -- Replies To --> B(( )); A -- Mentions --> C(( )); A -- Follows --> D(( )); B -- Replies To --> E(( )); B -- Mentions --> F(( )); B -- Follows --> G(( )); C -- Replies To --> H(( )); C -- Mentions --> I(( )); C -- Follows --> J(( )); D -- Replies To --> K(( )); D -- Mentions --> L(( )); D -- Follows --> M(( )); E -- Replies To --> N(( )); E -- Mentions --> O(( )); E -- Follows --> P(( )); F -- Replies To --> Q(( )); F -- Mentions --> R(( )); F -- Follows --> S(( )); G -- Replies To --> T(( )); G -- Mentions --> U(( )); G -- Follows --> V(( )); H -- Replies To --> W(( )); H -- Mentions --> X(( )); H -- Follows --> Y(( )); I -- Replies To --> Z(( )); I -- Mentions --> AA(( )); I -- Follows --> BB(( )); J -- Replies To --> CC(( )); J -- Mentions --> DD(( )); J -- Follows --> EE(( )); K -- Replies To --> FF(( )); K -- Mentions --> GG(( )); K -- Follows --> HH(( )); L -- Replies To --> II(( )); L -- Mentions --> JJ(( )); L -- Follows --> KK(( )); M -- Replies To --> LL(( )); M -- Mentions --> MM(( )); M -- Follows --> NN(( )); N -- Replies To --> OO(( )); N -- Mentions --> PP(( )); N -- Follows --> QQ(( )); O -- Replies To --> RR(( )); O -- Mentions --> TT(( )); O -- Follows --> UU(( )); P -- Replies To --> SS(( )); P -- Mentions --> VV(( )); P -- Follows --> WW(( )); Q -- Replies To --> XX(( )); Q -- Mentions --> YY(( )); Q -- Follows --> ZZ(( )); R -- Replies To --> AA(( )); R -- Mentions --> CC(( )); R -- Follows --> DD(( )); S -- Replies To --> BB(( )); S -- Mentions --> DD(( )); S -- Follows --> EE(( )); T -- Replies To --> CC(( )); T -- Mentions --> DD(( )); T -- Follows --> EE(( )); U -- Replies To --> DD(( )); U -- Mentions --> EE(( )); U -- Follows --> FF(( )); V -- Replies To --> EE(( )); V -- Mentions --> FF(( )); V -- Follows --> GG(( )); W -- Replies To --> FF(( )); W -- Mentions --> GG(( )); W -- Follows --> HH(( )); X -- Replies To --> GG(( )); X -- Mentions --> HH(( )); X -- Follows --> II(( )); Y -- Replies To --> HH(( )); Y -- Mentions --> II(( )); Y -- Follows --> KK(( )); Z -- Replies To --> II(( )); Z -- Mentions --> KK(( )); Z -- Follows --> MM(( )); AA -- Replies To --> KK(( )); AA -- Mentions --> MM(( )); AA -- Follows --> NN(( )); BB -- Replies To --> MM(( )); BB -- Mentions --> NN(( )); BB -- Follows --> OO(( )); CC -- Replies To --> NN(( )); CC -- Mentions --> OO(( )); CC -- Follows --> PP(( )); DD -- Replies To --> OO(( )); DD -- Mentions --> PP(( )); DD -- Follows --> QQ(( )); EE -- Replies To --> PP(( )); EE -- Mentions --> QQ(( )); EE -- Follows --> RR(( )); FF -- Replies To --> QQ(( )); FF -- Mentions --> RR(( )); FF -- Follows --> TT(( )); GG -- Replies To --> RR(( )); GG -- Mentions --> TT(( )); GG -- Follows --> UU(( )); HH -- Replies To --> TT(( )); HH -- Mentions --> UU(( )); HH -- Follows --> VV(( )); II -- Replies To --> TT(( )); II -- Mentions --> UU(( )); II -- Follows --> CC(( )); KK -- Replies To --> UU(( )); KK -- Mentions --> TT(( )); KK -- Follows --> VV(( )); MM -- Replies To --> VV(( )); MM -- Mentions --> TT(( )); MM -- Follows --> CC(( )); NN -- Replies To --> VV(( )); NN -- Mentions --> TT(( )); NN -- Follows --> CC(( )); OO -- Replies To --> VV(( )); OO -- Mentions --> TT(( )); OO -- Follows --> CC(( )); PP -- Replies To --> VV(( )); PP -- Mentions --> TT(( )); PP -- Follows --> CC(( )); QQ -- Replies To --> VV(( )); QQ -- Mentions --> TT(( )); QQ -- Follows --> CC(( ));
```

Limit to 1 recent tweets per user

Limit friends and followers to 46 per user

Expand URLs in recent tweets (slower)

Extended analysis: perform a second pass on the collected Tweets to ensure that all Retweets are collected and all RetweetedIDs are correct. (Slow!)

[OK](#) [Cancel](#)

TWITTER USERS NETWORK: EGO NETWORK 2.0

23

Import from Twitter Users Network

This might take a long time: Twitter rate limiting

Twitter users I'm interested in

The Twitter users with these usernames:
billoreilly clewandowski_danscavino diamondandsilk donaldtrumpjr drudge_report ericbolling erictrump foxandfriends garyplayer geraldonivera gopchairwoman greta ingrahamangle jessebwatters jim_jordan
(Separate with spaces, commas or returns)

The Twitter users in this Twitter List:
bob/bobs

What to import

Basic network
Show who was mentioned or replied to in the users' recent tweets
[More about this option](#)

Basic network plus friends and followers (very slow!)
Add some of the users' friends and followers
[More about this option](#)

Import only the Twitter users I'm interested in

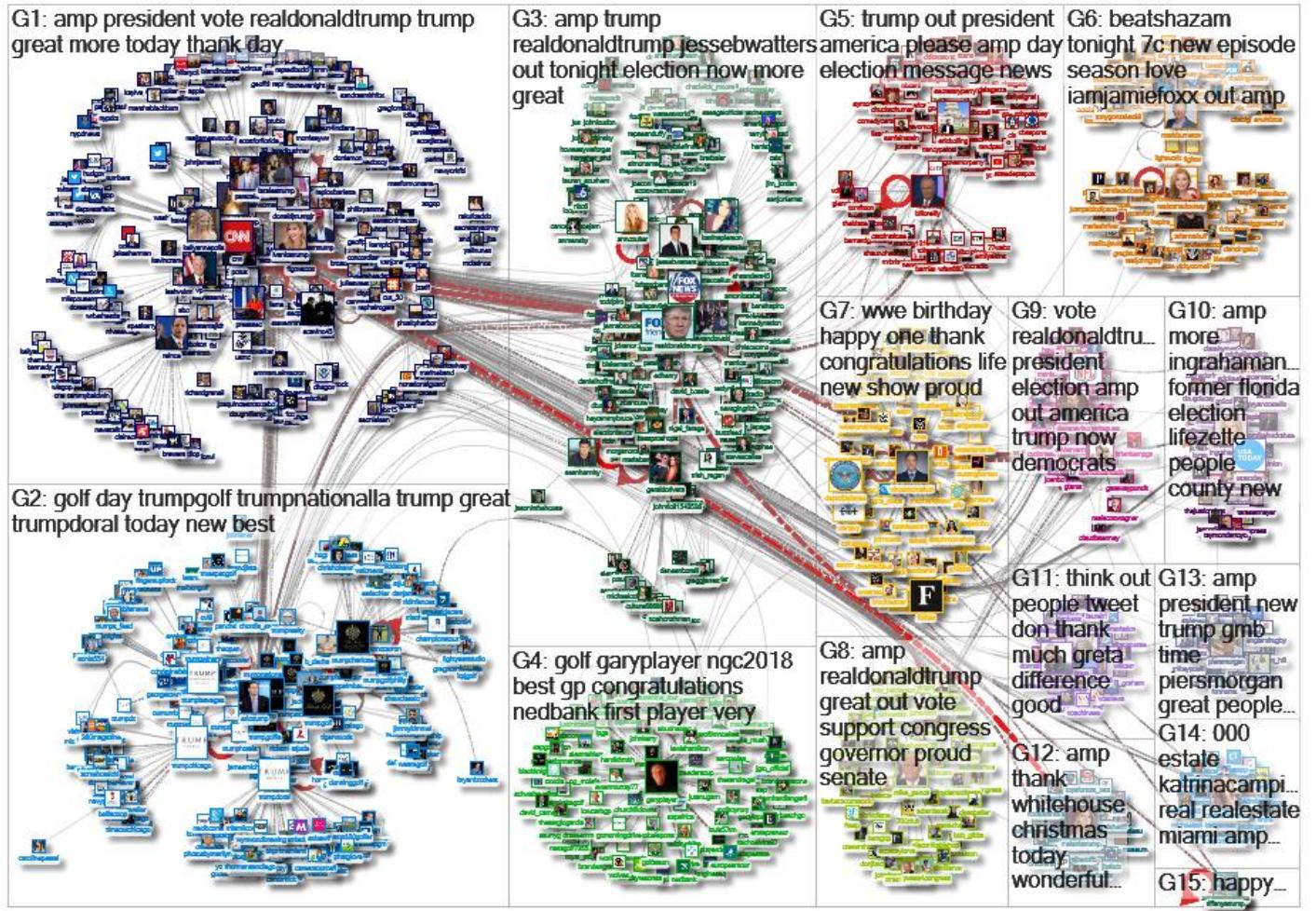
Your Twitter account

I have a Twitter account, but I have not yet authorized NodeXL to use my account to import Twitter networks. Take me to Twitter's authorization Web page.

I have a Twitter account, and I have authorized NodeXL to use my account to import Twitter networks.

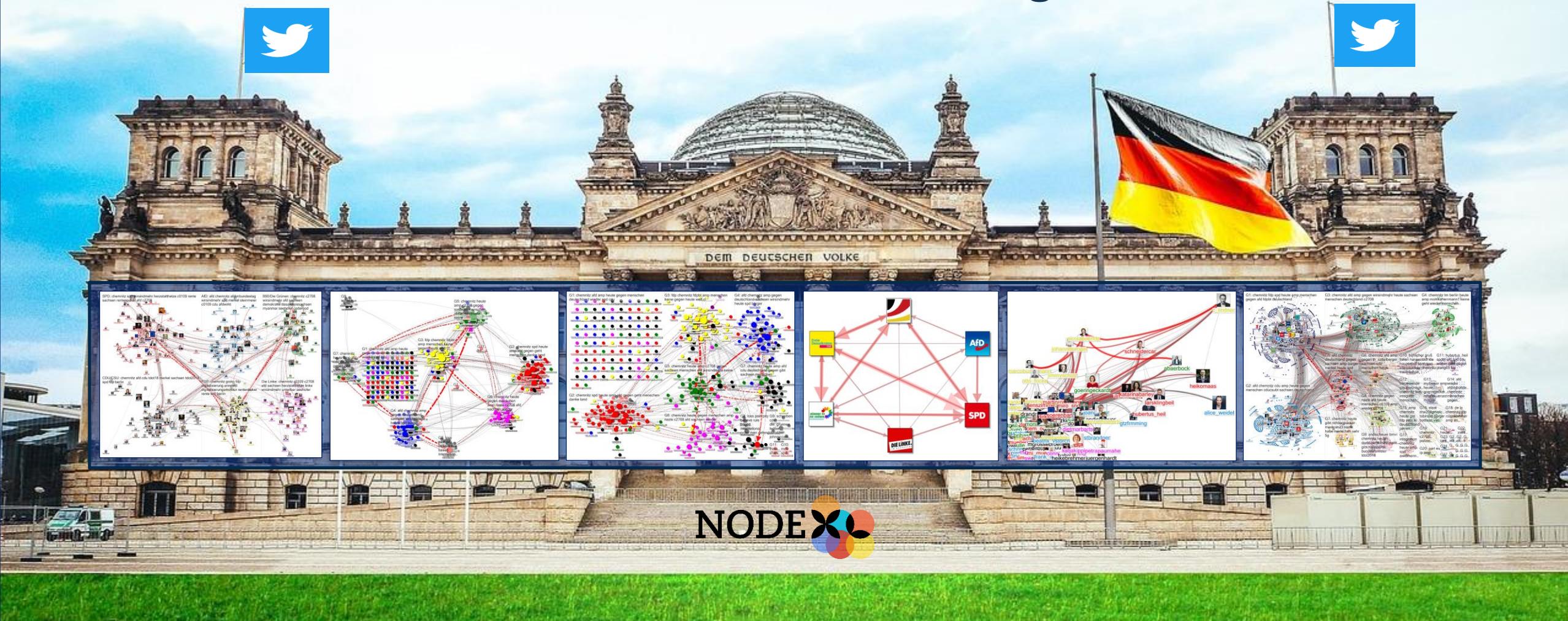
Limit to 100 recent tweets per user
 Limit friends and followers to 46 per user
 Expand URLs in recent tweets (slower)
 Extended analysis: perform a second pass on the collected Tweets to ensure that all Retweets are collected and all RetweetedIDs are correct.
(Slow!)

OK Cancel



Based on Twitter users followed by @realdonaldtrump
<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=174922>

Social Network Analysis – Insights from mapping the Twitter network of the German Bundestag



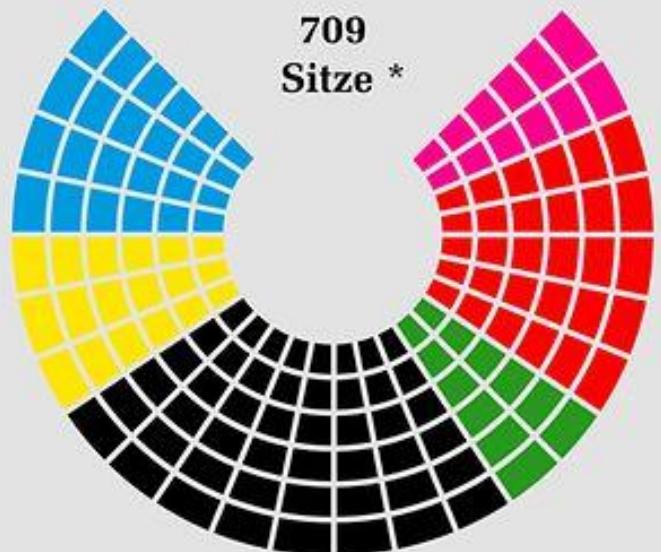
19. BUNDESTAG: TWITTER USEAGE



25

Sitzverteilung im 19. Deutschen Bundestag

Stand: Oktober 2017

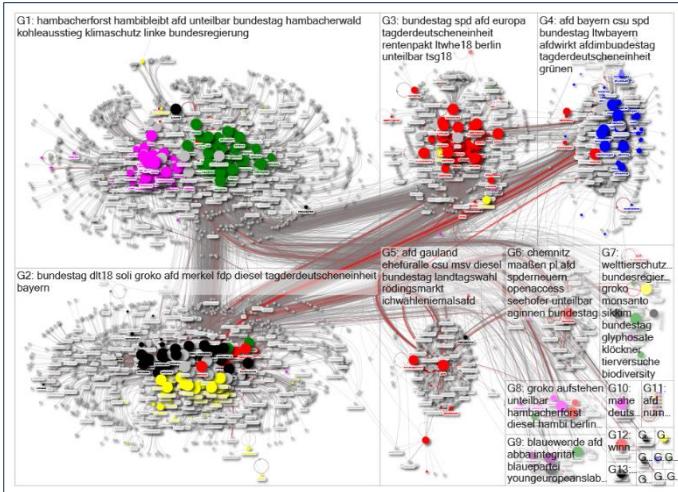


Party	Color	Seats	Twitter users	Twitter users per seat
CDU/CSU	Black	246	131	53 %
SPD	Red	153	123	80 %
AfD	Blue	92	85	92 %
FDP	Yellow	80	72	90 %
Die Linke	Pink	69	60	87 %
B90/Die Grünen	Green	67	64	96 %
no affiliation		2	2	100 %
All		709	537	76 %

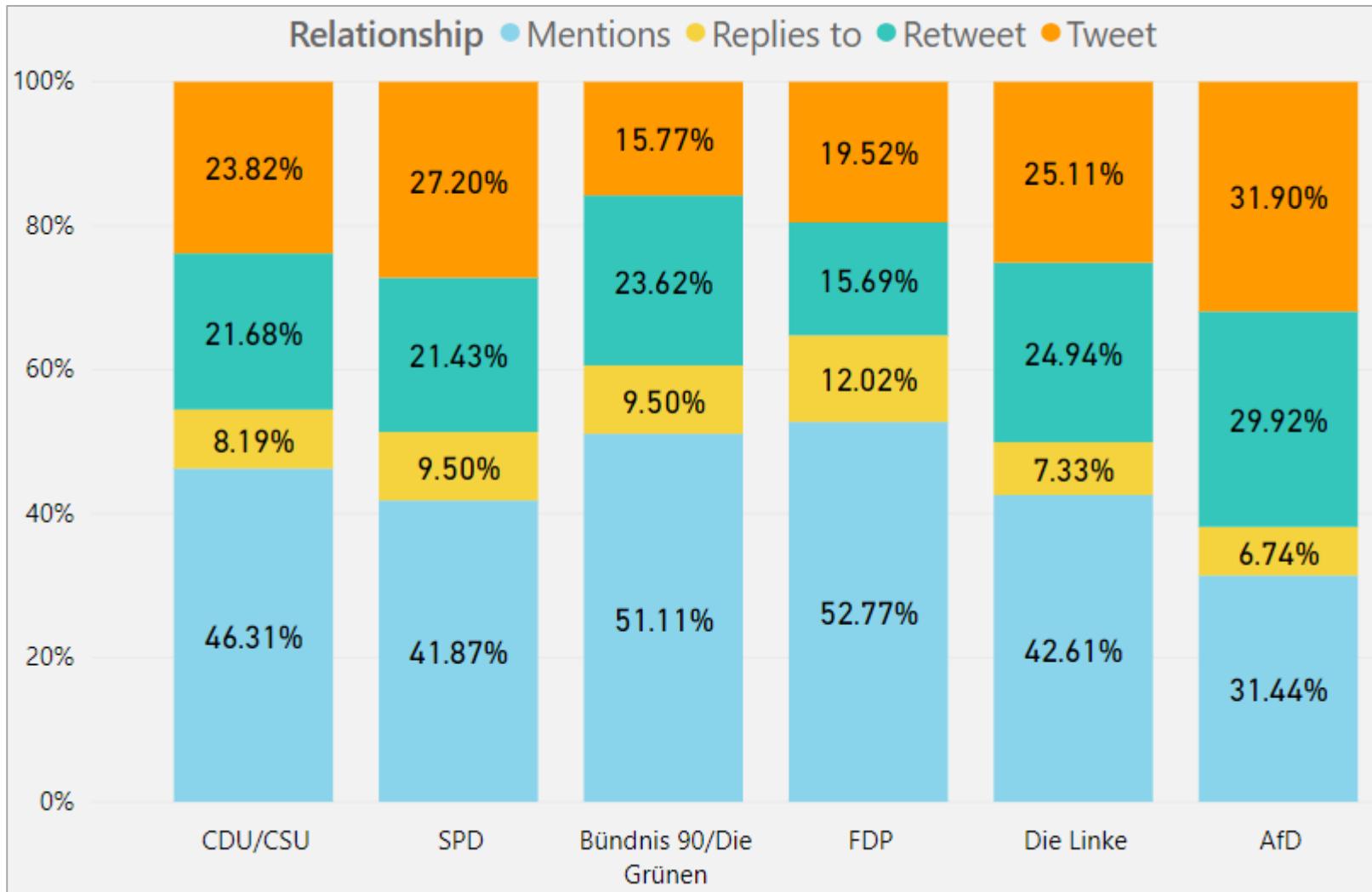
https://www.bundestag.de/parlament/plenum/sitzverteilung_19wp

NETWORK MAPS CREATED FROM ONE DATASET

Full Network Map



TWEETING STRATEGIES BY PARTY

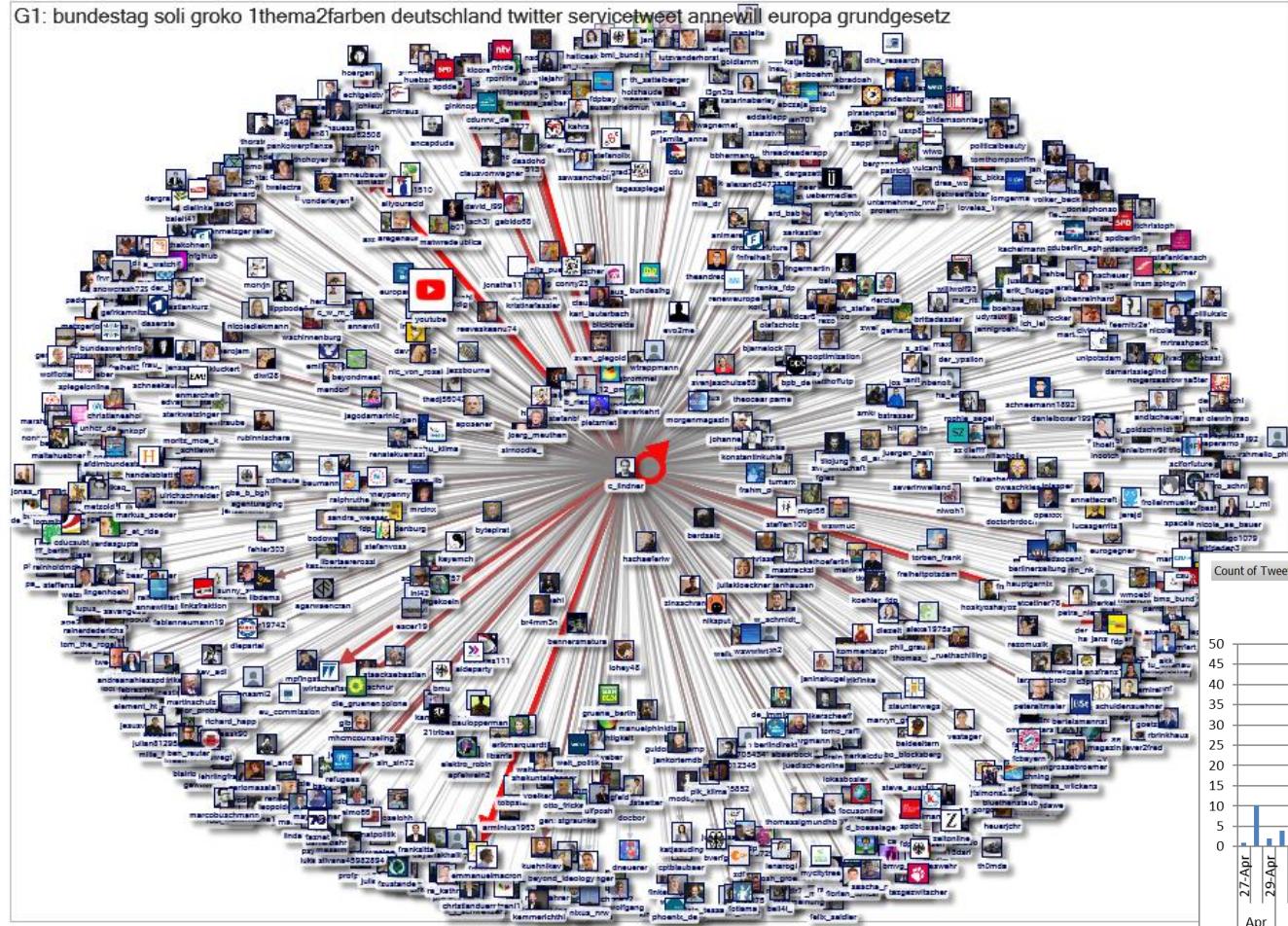


Network Edge Relationships:

- Tweet
→ No interaction
- Retweet
→ Amplification
- Replies to
→ Talking to someone
- Mentions
→ Talking about someone

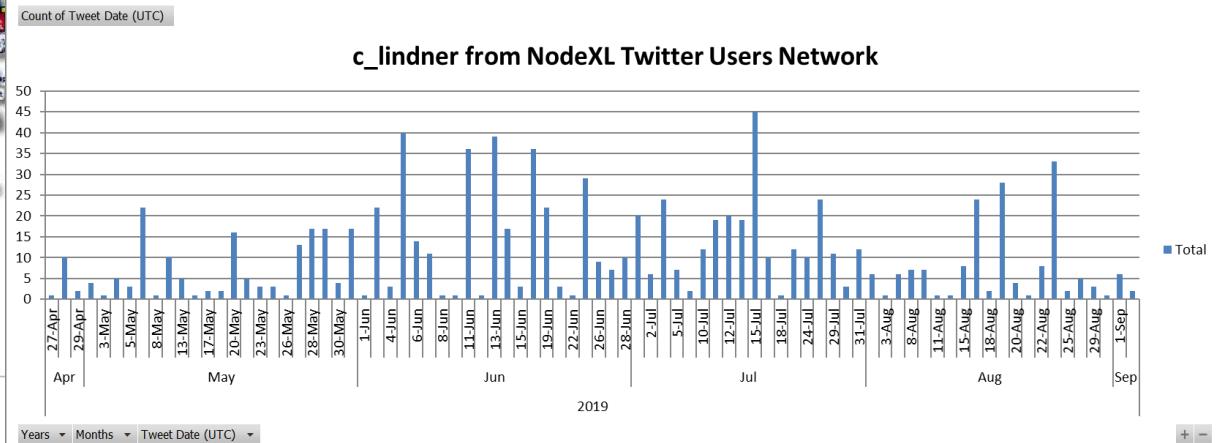
Dataset: 1000 tweets per User / Sep 2, 2019 / 581,088 network edges

TWEETING STRATEGIES: @c_lindner (FDP)

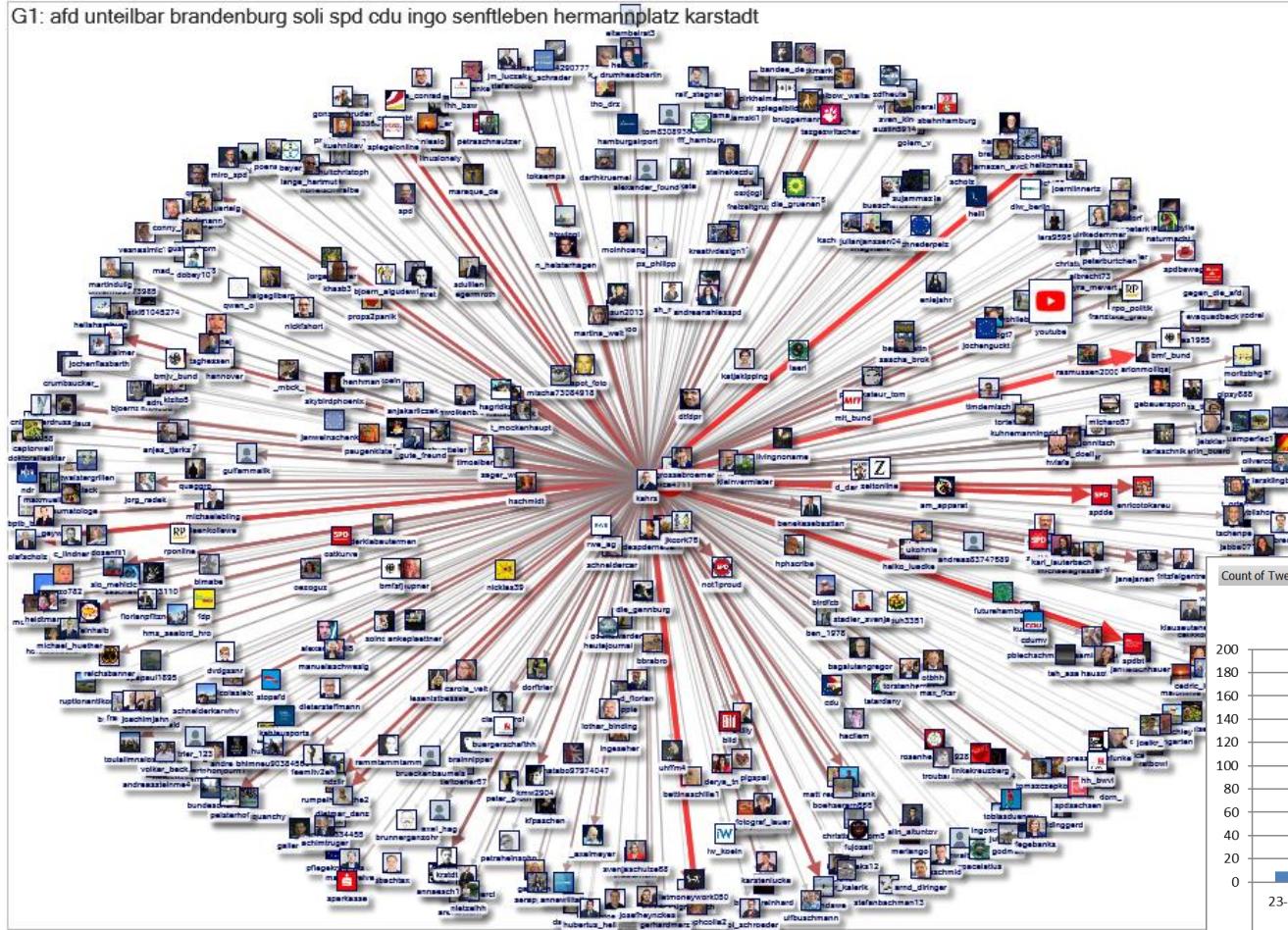


Vertex 1	Vertex 2	Edge Weight
c_lindner	c_lindner	123
c_lindner	fdpbt	117
c_lindner	fdp	109
c_lindner	luisamneubauer	67
c_lindner	fridayforfuture	66
c_lindner	die_gruenen	43
c_lindner	wirtschaftsrat	37
c_lindner	spdde	34
c_lindner	faznet	25
c_lindner	olafscholz	23
c_lindner	akk	21
c_lindner	rponline	20
c_lindner	lindateuteberg	19
c_lindner	diezeit	17

Vertices : 884
Relationship:
 Mentions : 1316
 Replies to : 663
 Tweet : 123
 Retweet : 112

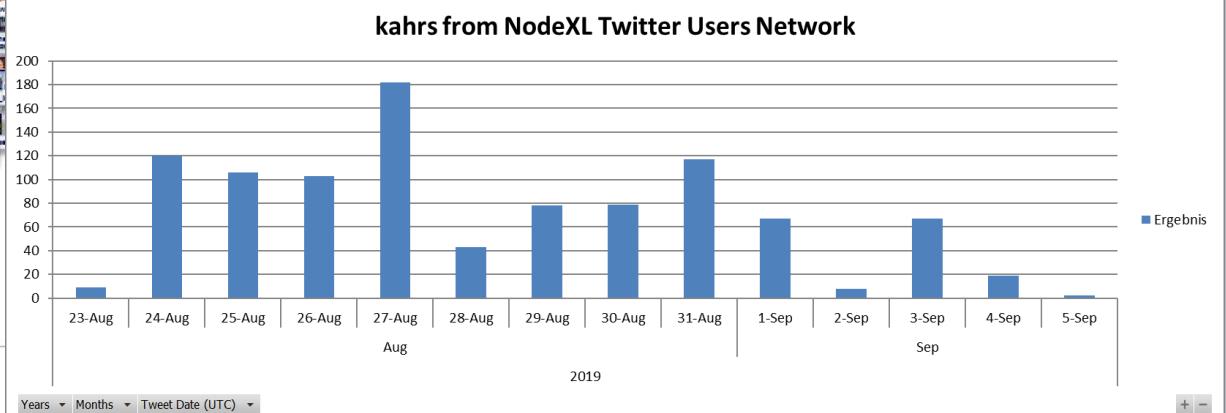


TWEETING STRATEGIES: @KAHRS (SPD)

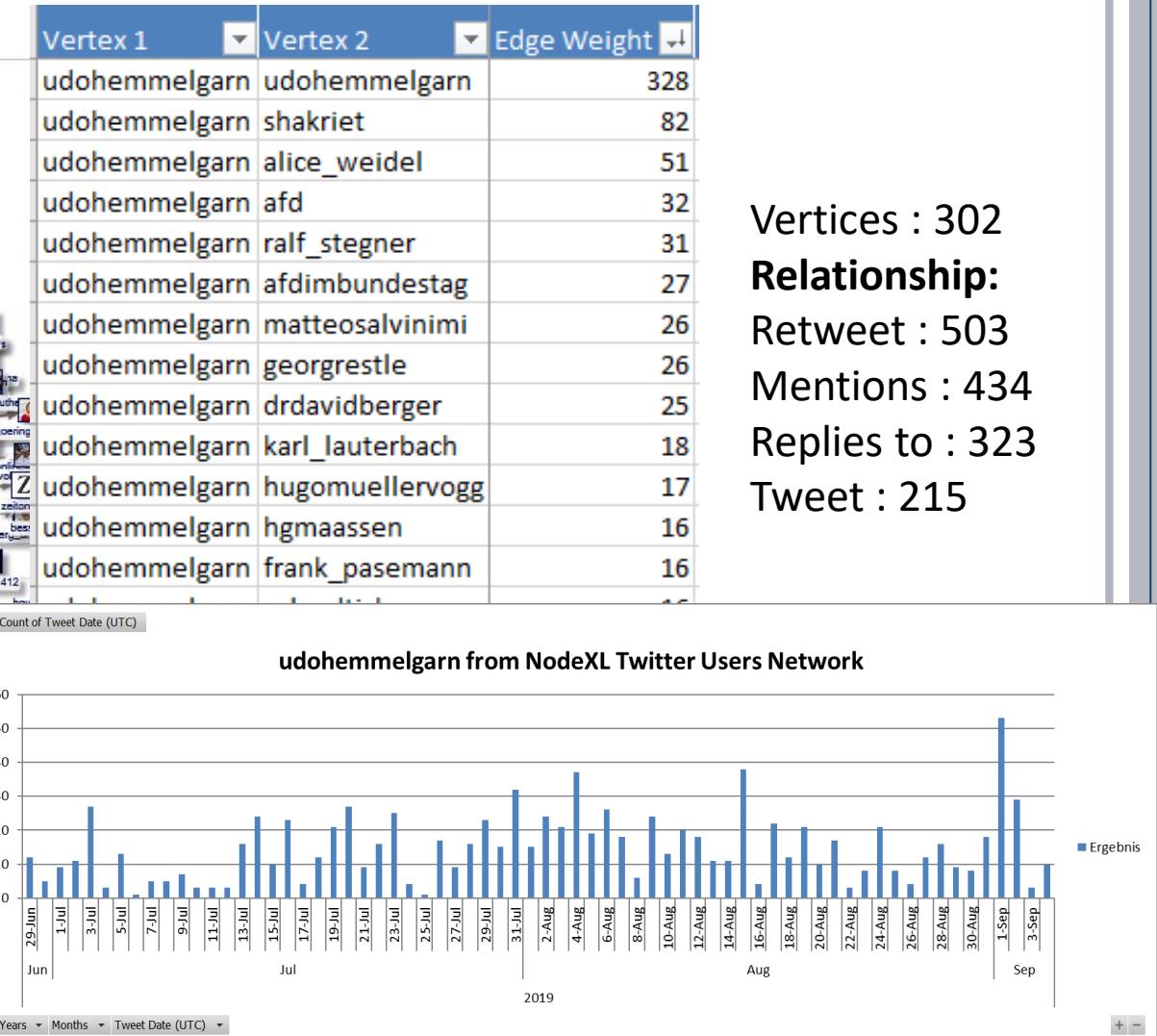
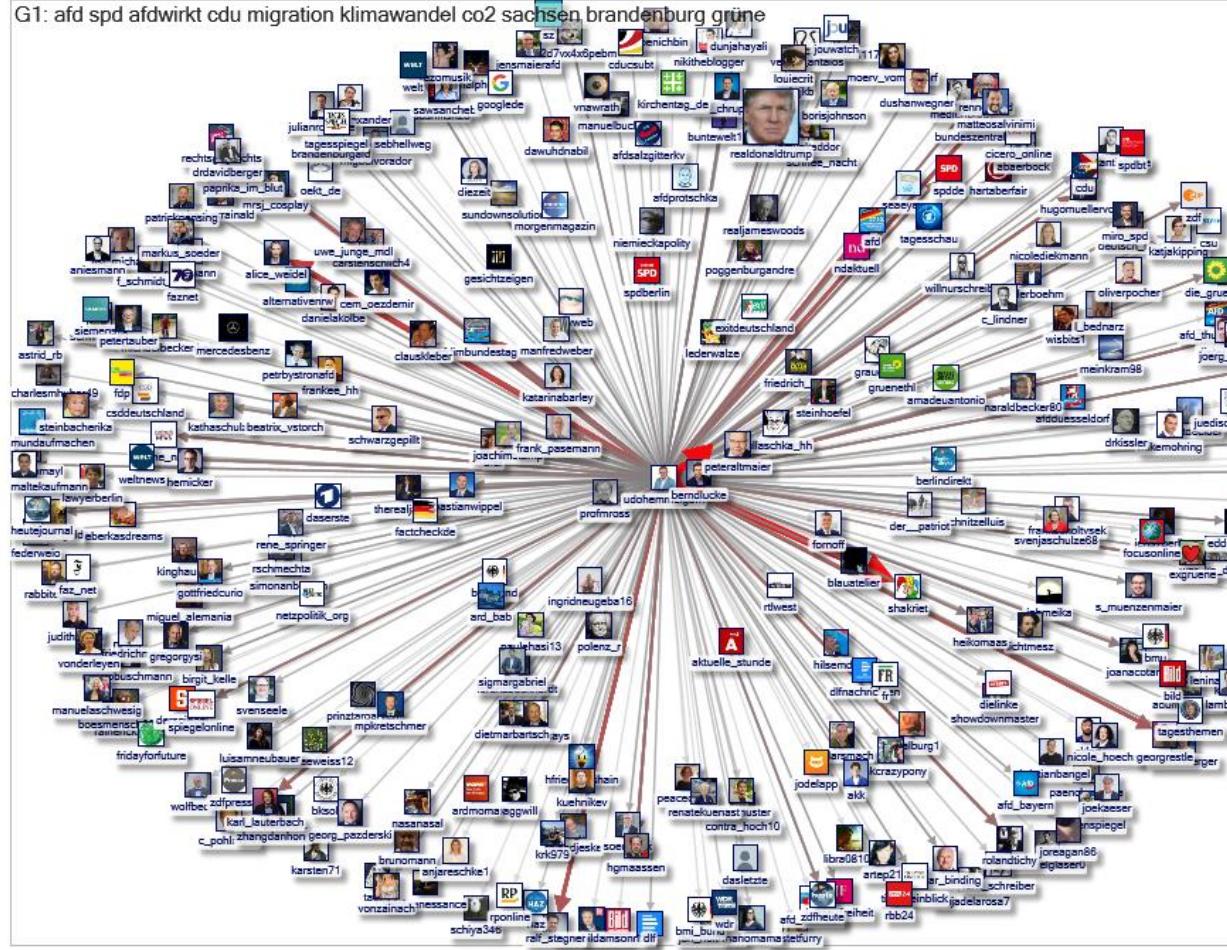


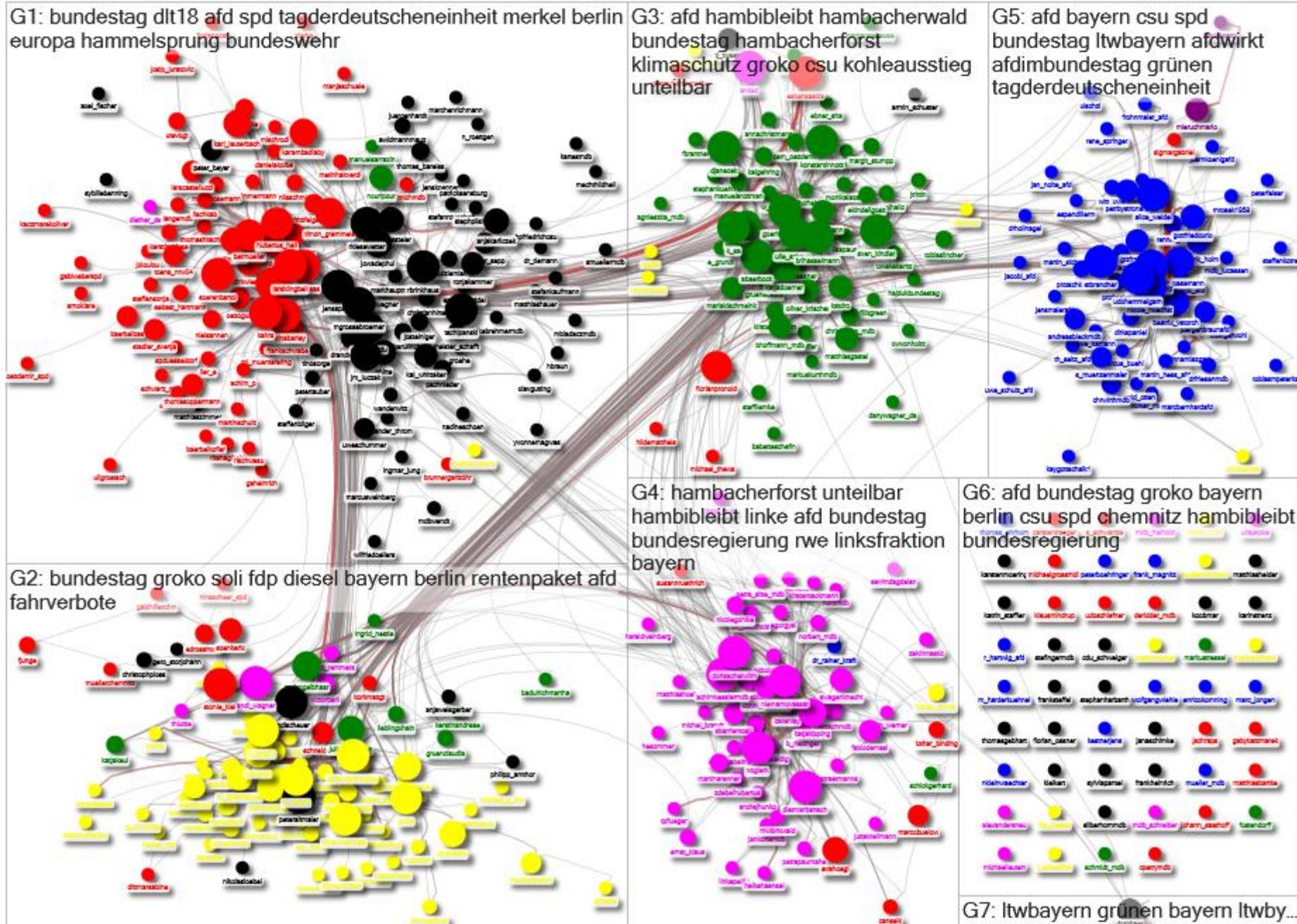
Vertex 1	Vertex 2	Edge Weight
kahrs	kahrs	81
kahrs	spdbt	47
kahrs	christophcolla2	34
kahrs	arionmolliqaj	28
kahrs	heikomaas	27
kahrs	spdde	20
kahrs	olafscholz	20
kahrs	tokaempa	17
kahrs	spiegelonline	16
kahrs	klaus62bunk	16
kahrs	enricotokareu	15
kahrs	floriandawe	13
kahrs	slo_mehicic	13

Vertices : 457
Relationship:
 Replies to : 847
 Mentions : 488
 Tweet : 76
 Retweet : 52



TWEETING STRATEGIES: @UDOHEMMELGARN (AFD)

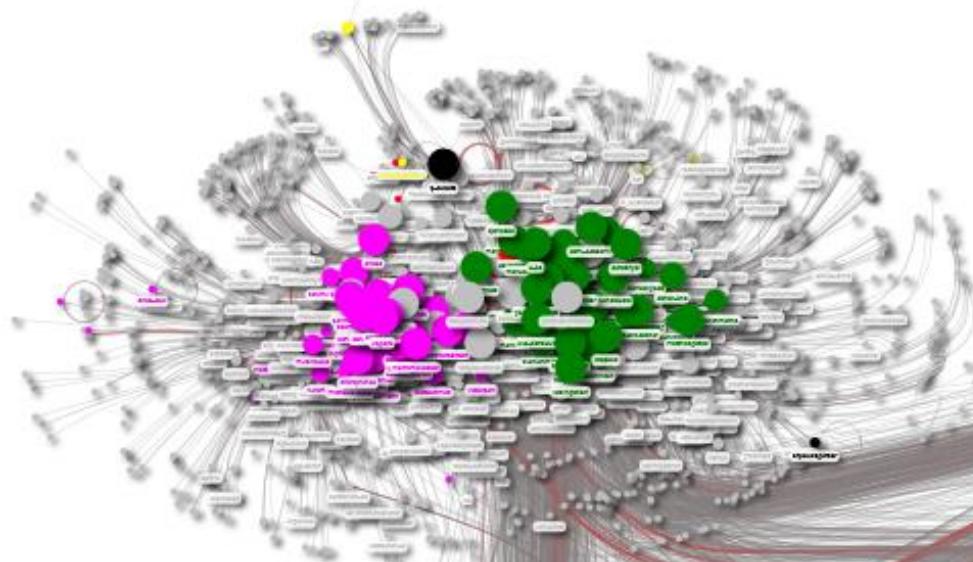




Bundestag:
Oct-12-2018
Internal Network

Bundestag:
Oct-12-2018
Full Network

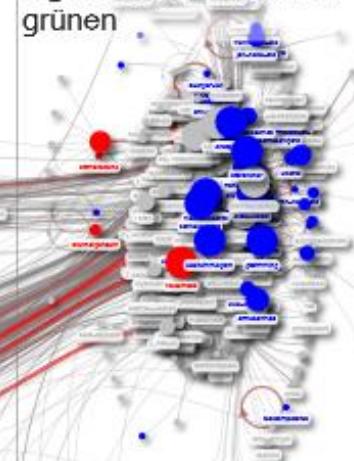
G1: hambacherforst hambibleibt afd unteilbar bundestag hambacherwald
kohleausstieg klimaschutz linke bundesregierung



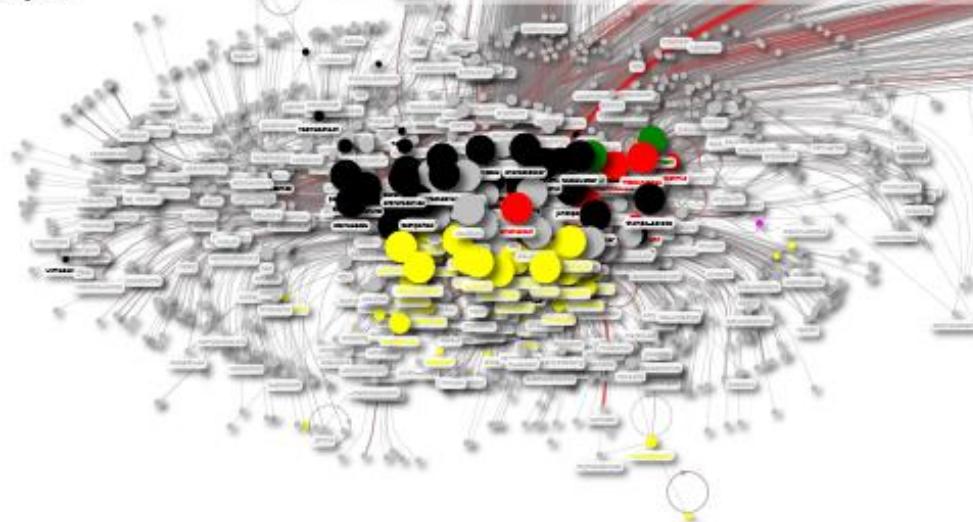
G3: bundestag spd afd europa
tagerdeutscheneinheit
rentenpakt ltwh18 berlin
unteilbar tsg18



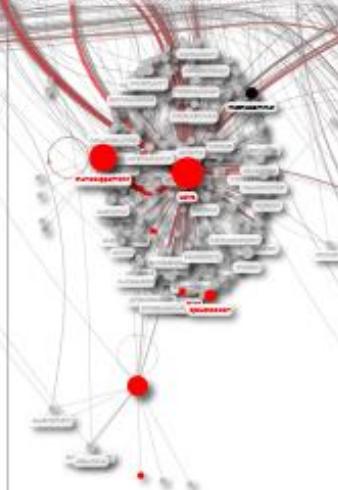
G4: afd bayern csu spd
bundestag ltwbayern
afdwirkt afdimbundestag
tagerdeutscheneinheit
grünen



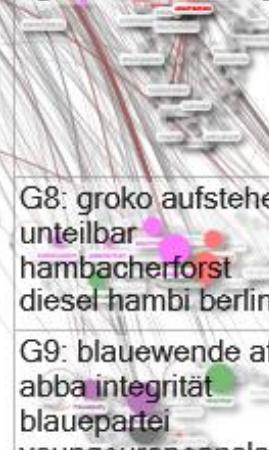
G2: bundestag dlt18 soli groko afd merkel fdp diesel tagerdeutscheneinheit
bayern



G5: afd gauland
ehefüralle csu msv diesel
bundestag landtagswahl
rödingsmarkt
ichwählenniemalsafd



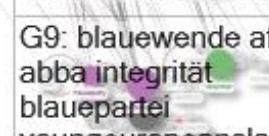
G6: chemnitz
maaßen pl afd
spderneuern
openaccess
seehofer unteilbar
aginnen bundestag



G7: welttierschutz...
bundesregier...
groko
monsanto
sikkim
bundestag
glyphosate
kläckner
tierversuche
biodiversity



G8: groko aufstehen
unteilbar
hambacherforst
diesel hambi berlin...



G10: mahe afd
deuts... num...



G11: deuts... num...



G12: G... G...

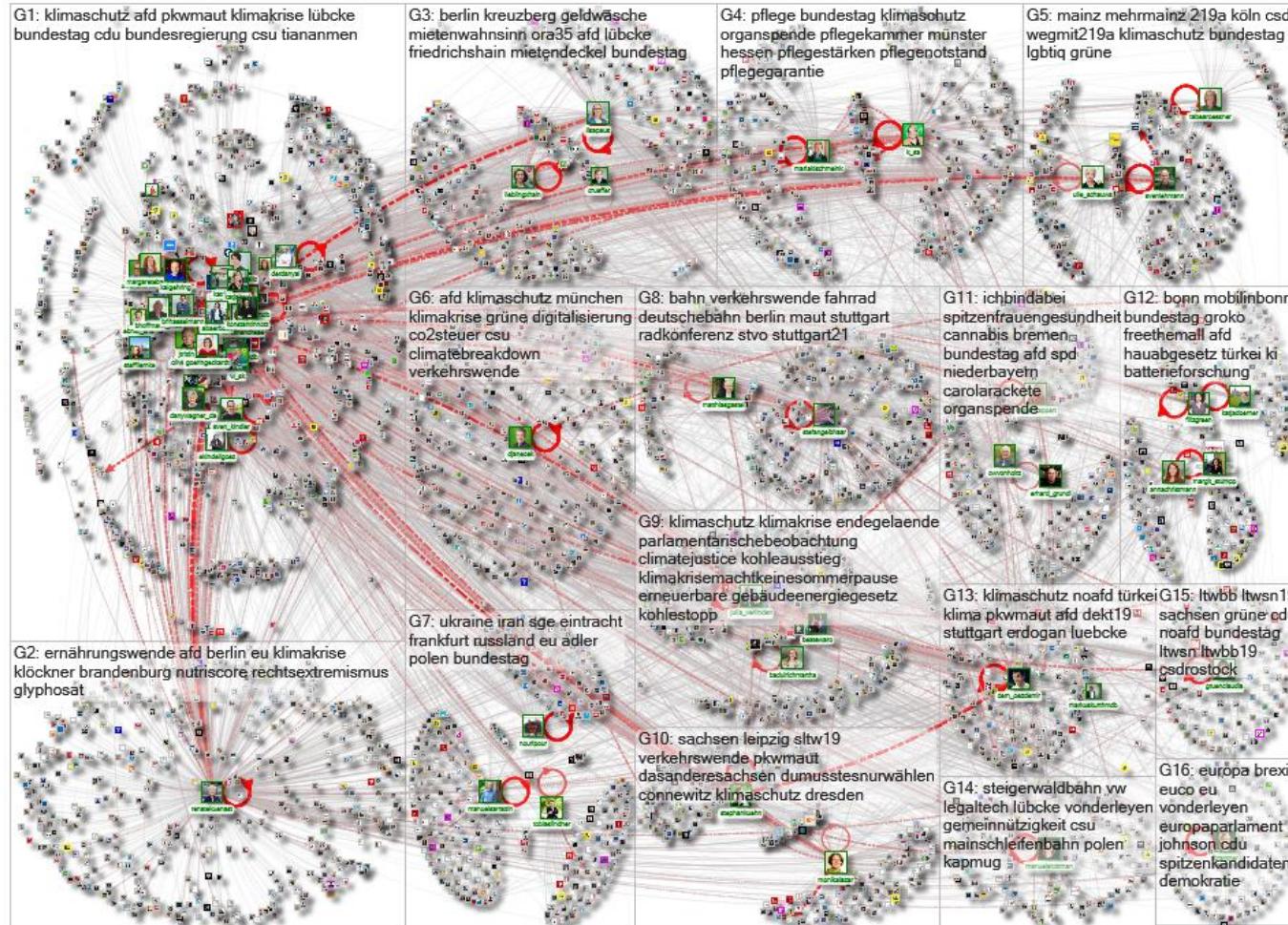


G13: G... G.G...



PARTY NETWORK: B90/DIE GRÜNEN

33



Top Influencers: Top 10 Vertices, Ranked by Betweenness Centrality

	@renatekuenast	Follow	47.2K followers
	@djanecek	Follow	10.1K followers
	@lisapaus	Follow	7,340 followers
	@k_sa	Follow	5,465 followers
	@derdanyal	Follow	3,185 followers
	@stefangelhaar	Follow	5,248 followers
	@julia_verlinden	Follow	6,711 followers
	@svenlehmann	Follow	11.6K followers
	@cem_oezdemir	Follow	149K followers
	@mariaklschmeink	Follow	4,567 followers

Top Domains

Top Domains in Tweet in Entire Graph:

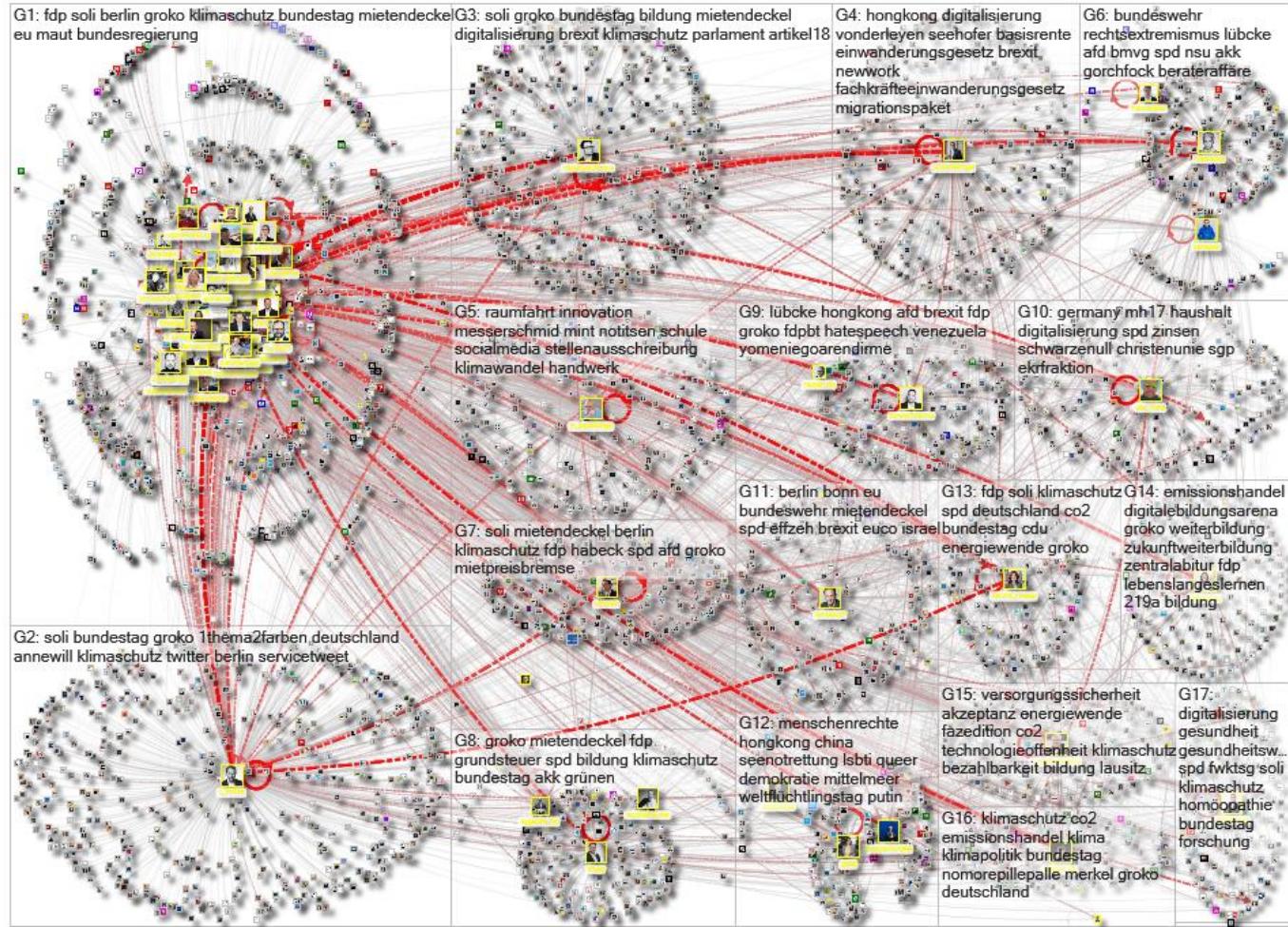
- [1262] [twitter.com](#)
- [152] [spiegel.de](#)
- [125] [gruene-bundestag.de](#)
- [116] [sueddeutsche.de](#)
- [107] [tagesschau.de](#)
- [84] [tagesspiegel.de](#)
- [68] [zeit.de](#)
- [57] [welt.de](#)
- [55] [handelsblatt.com](#)
- [55] [faz.net](#)

Top Hashtags

Top Hashtags in Tweet in Entire Graph:

- [276] [klimaschutz](#)
- [182] [afd](#)
- [160] [bundestag](#)
- [127] [klimakrise](#)
- [116] [sachsen](#)
- [112] [pkwmaut](#)
- [97] [berlin](#)
- [96] [verkehrswende](#)
- [93] [lübcke](#)
- [78] [cdu](#)

PARTY NETWORK: FDP



Top Influencers: Top 10 Vertices, Ranked by Betweenness Centrality

	@c lindner	Follow	353K followers
	@marcobuschmann	Follow	10.6K followers
	@johannesvogel	Follow	12.8K followers
	@olliluksic	Follow	6,278 followers
	@th sattelberger	Follow	6,662 followers
	@mastrackzi	Follow	7,602 followers
	@dfoest	Follow	4,568 followers
	@konstantinkuhle	Follow	13.7K followers
	@otto_fricke	Follow	10.7K followers
	@lambsdorff	Follow	12.9K followers

Top Domains

Top Domains in Tweet in Entire Graph:

- [1094] [twitter.com](#)
- [195] [welt.de](#)
- [161] [faz.net](#)
- [134] [spiegel.de](#)
- [115] [fpdbt.de](#)
- [97] [handelsblatt.com](#)
- [94] [tagesspiegel.de](#)
- [80] [bundestag.de](#)
- [68] [zeit.de](#)
- [64] [tagesschau.de](#)

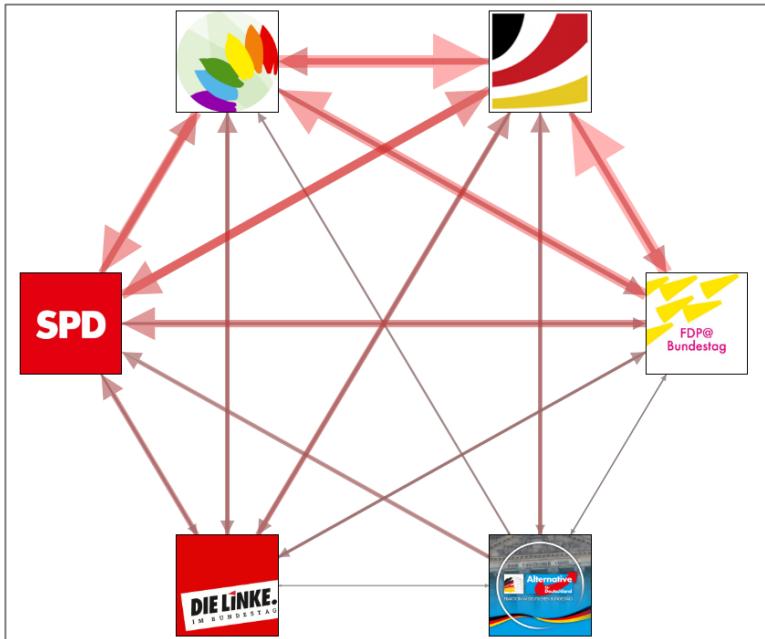
Top Hashtags

Top Hashtags in Tweet in Entire Graph:

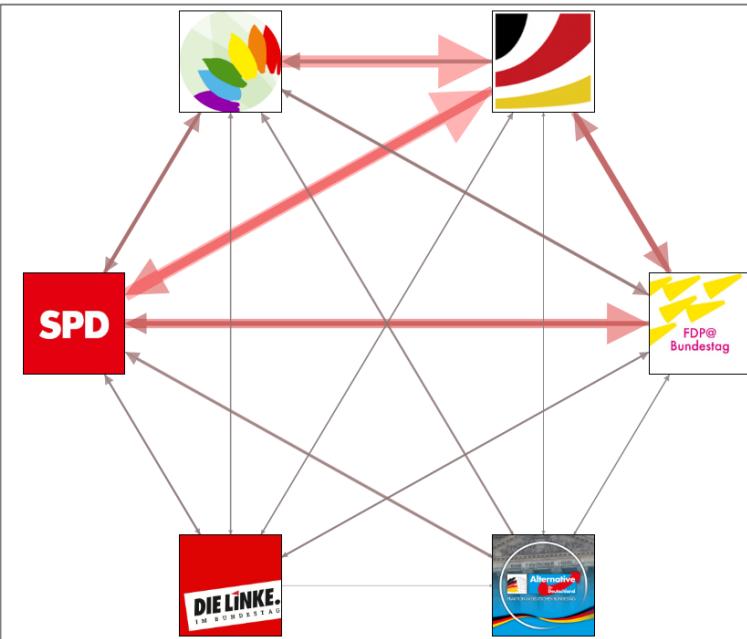
- [324] [fdp](#)
- [254] [soli](#)
- [199] [groko](#)
- [169] [berlin](#)
- [165] [klimaschutz](#)
- [156] [bundestag](#)
- [128] [mietendeckel](#)
- [110] [spd](#)
- [110] [eu](#)
- [99] [digitalisierung](#)

PARTY INTERACTION MAPS

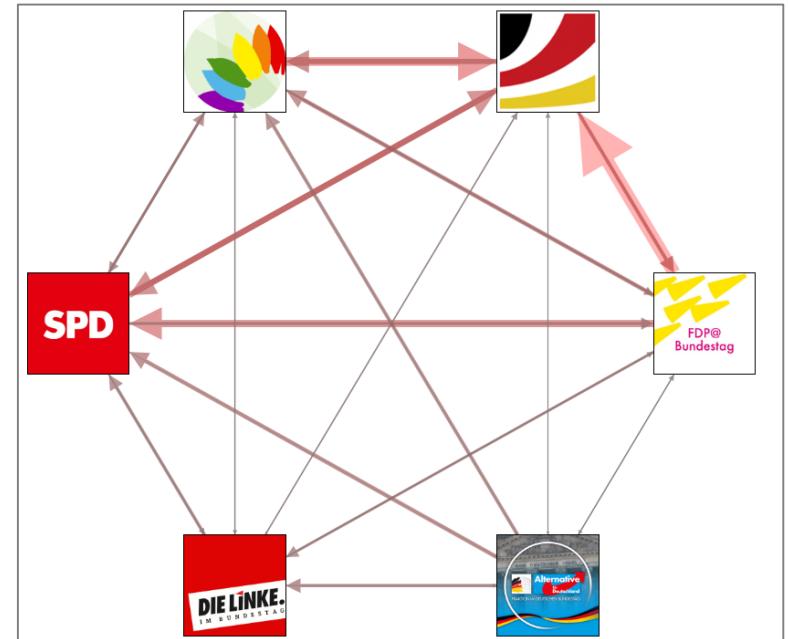
June 2019



July 2019



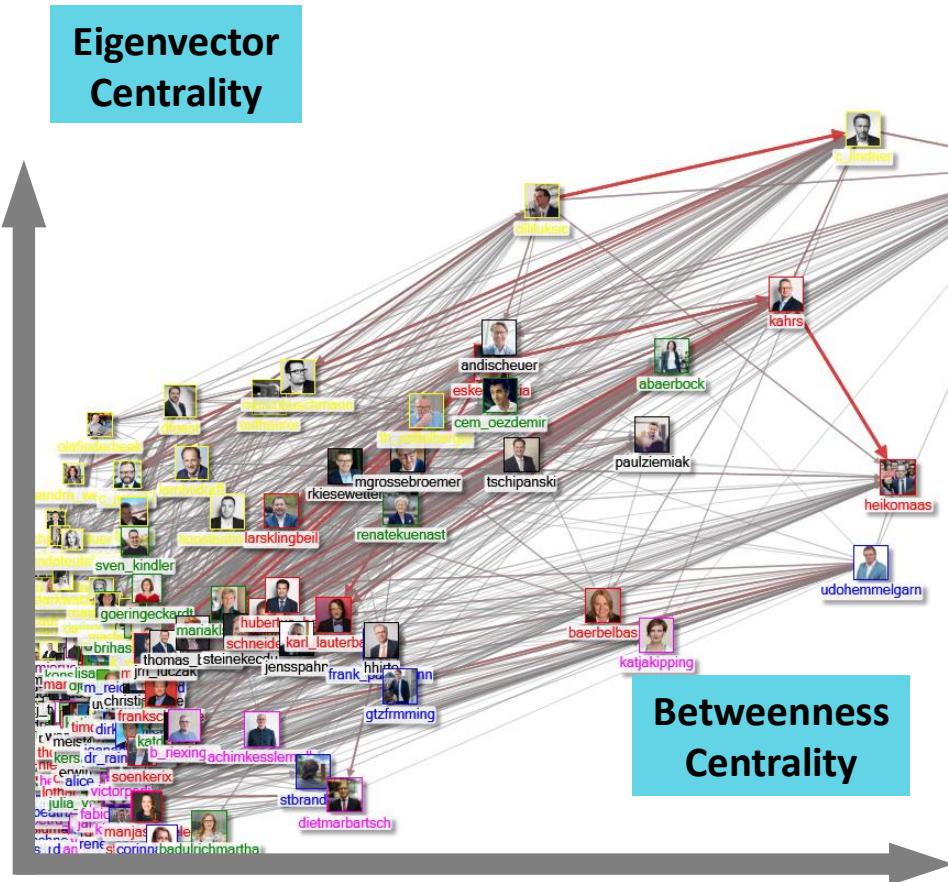
August 2019



INTERNAL NETWORK INFLUENCERS – AUGUST 2019

36

Rank	Twitter Handle	Party	In-Degree	Out-Degree	Betweenness Centrality	Eigenvector Centrality
1	peteraltmaier	CDU/CSU	52	6	13315.978	0.017
2	heikomaas	SPD	45	1	11125.246	0.009
3	udohemmelgarn	AfD	5	40	10782.212	0.007
4	c_lindner	FDP	49	19	10681.718	0.018
5	kahrs	SPD	32	44	9697.306	0.014
6	abaerbock	B90/Die Grünen	39	10	8240.197	0.012
7	katjakipping	Die Linke	28	10	8047.848	0.005
8	paulziemiak	CDU/CSU	38	8	7991.705	0.010
9	baerbelbas	SPD	12	31	7364.514	0.006
10	olliluksic	FDP	17	39	6588.962	0.016
11	tschipanski	CDU/CSU	9	36	6326.758	0.010
12	cem_oezdemir	B90/Die Grünen	34	16	6053.835	0.011
13	andischeuer	CDU/CSU	38	3	6043.266	0.013
14	eskensaskia	SPD	14	35	5943.170	0.012
15	th_sattelberger	FDP	10	33	5113.055	0.011



EXTERNAL NETWORK INFLUENCERS – AUGUST 2019

37



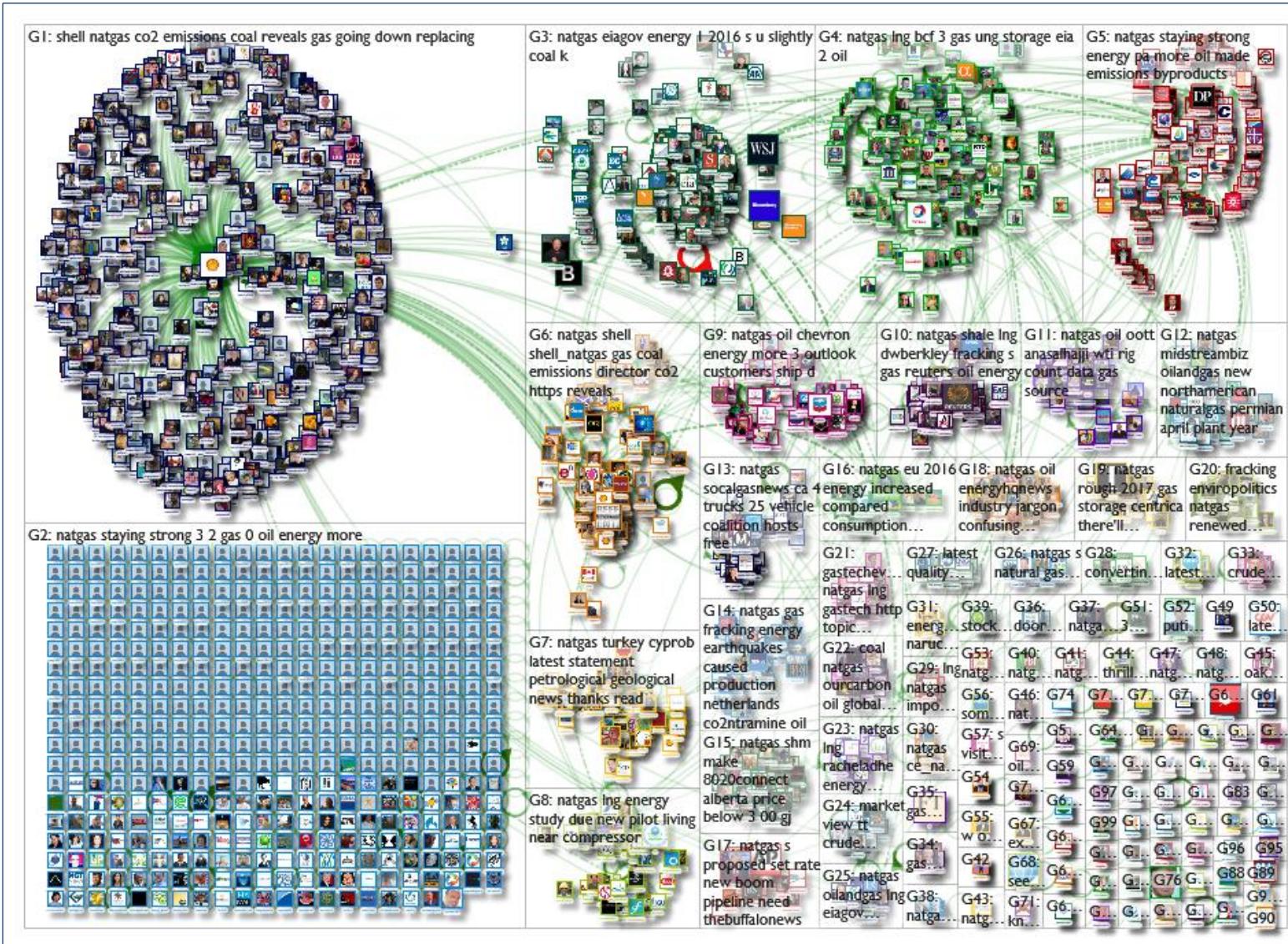
The most influential Twitter users outside the Bundestag are related national party accounts, large news media outlets and politicians without a seat in the Bundestag.



Rank	Twitter Handle	Category	Indegree	Betweenness Centrality
1	welt	News/Media	115	1988243.028
2	spdde	Party	144	1970892.003
3	spdbt	Party	128	1915653.728
4	die_gruenen	Party	109	1723811.824
5	akk	Politician	124	1556913.568
6	dielinke	Party	85	1466186.103
7	cdu	Party	114	1266732.958
8	spiegelonline	News/Media	81	1258353.580
9	cducsbt	Party	100	1202502.309
10	gruenebundestag	Party	84	1081743.754
11	olafscholz	Politician	101	1039363.609
12	tagesspiegel	News/Media	64	851519.692
13	linksfraktion	Party	64	779983.049
14	tagesschau	News/Media	65	754499.804
15	faznet	News/Media	73	748936.554
16	fdp	Party	78	661145.616
17	afd	Party	63	639764.922
18	sz	News/Media	60	614854.062
19	mpkretschmer	Politician	75	596165.392
20	tazgezwitscher	News/Media	49	548448.097

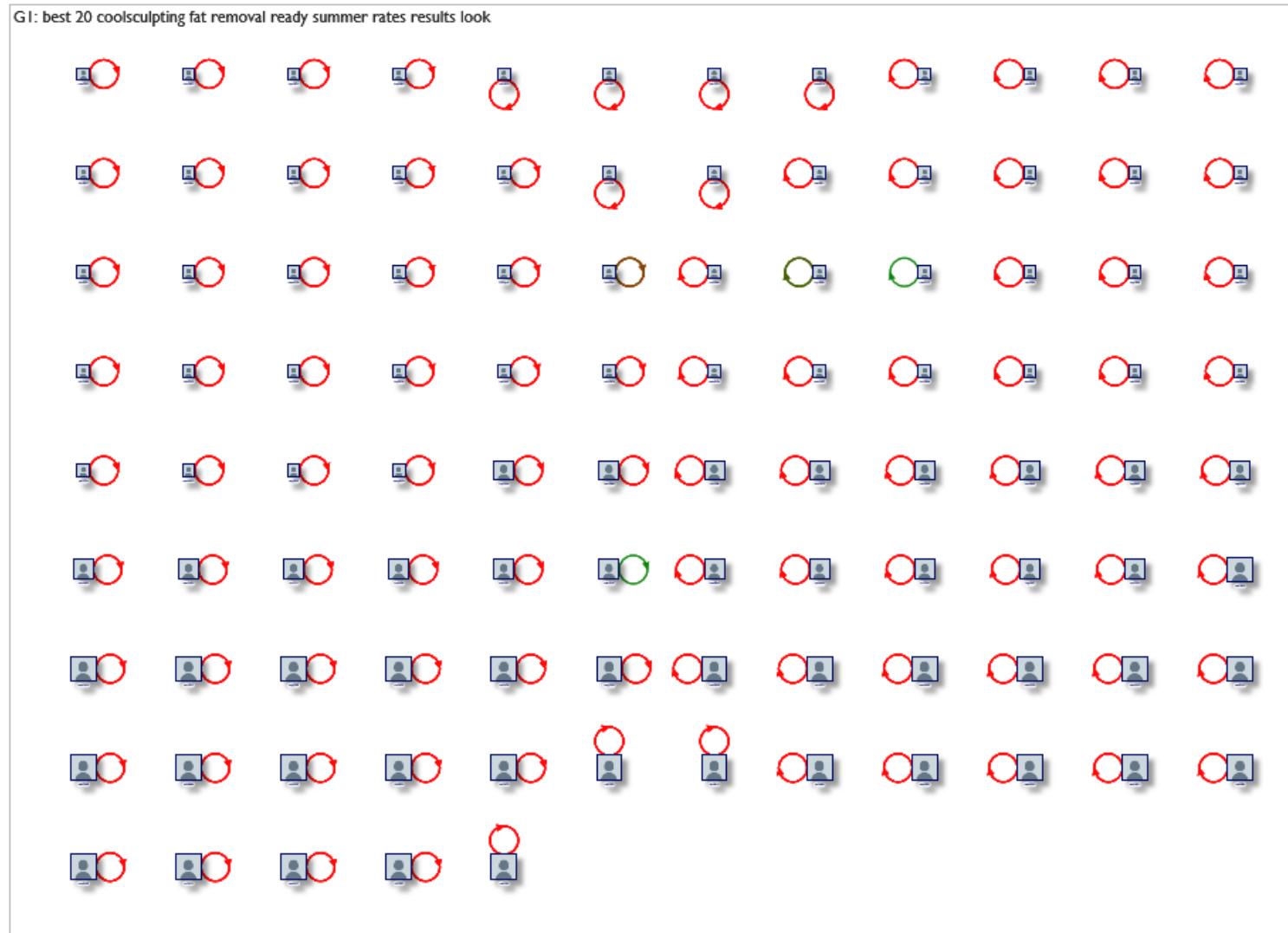
BOT NETWORK: SEARCH NETWORK #NATGAS

38



BOT NETWORK: #NATGAS USER NETWORK - INTERNAL

39



▼ Top URLs

Top URLs in Tweet in Entire Graph:

- [452] <http://uberdeal5.com/Doctor/>
- [233] <http://bingomillionsforcharity.com/Doctor/>
- [224] <http://bingobullion.com/Doctor/>
- [208] <http://bingoangels.org/Doctor/>
- [135] <http://toptweetdeals5.com/Doctor/>
- [128] <http://uberdeal4.com/Doctor/>
- [113] <http://uberdeal3.com/Doctor/>
- [81] <http://uberdeal1.com/Doctor/>
- [79] <http://tweet4topdeals2.com/Doctor/>
- [77] <http://tweet4topdeals3.com/Doctor/>

▼ Top Hashtags

Top Hashtags in Tweet in Entire Graph:

- [322] [trump](#)
- [240] [crudeoil](#)
- [212] [natgas](#)
- [180] [healthcare](#)
- [148] [laborparticipation](#)
- [137] [gdp](#)
- [135] [samsung](#)
- [127] [bryant](#)
- [122] [spurs](#)
- [119] [dow](#)

BOT NETWORK: #NATGAS USER NETWORK

40



▼ Top URLs

Top URLs in Tweet in Entire Graph:

- [452] <http://uberdeal5.com/Doctor/>
- [233] <http://bingomillionsforcharity.com/Doctor/>
- [224] <http://bingobullion.com/Doctor/>
- [208] <http://bingoangels.org/Doctor/>
- [135] <http://toptweetdeals5.com/Doctor/>
- [128] <http://uberdeal4.com/Doctor/>
- [113] <http://uberdeal3.com/Doctor/>
- [81] <http://uberdeal1.com/Doctor/>
- [79] <http://tweet4topdeals2.com/Doctor/>
- [77] <http://tweet4topdeals3.com/Doctor/>

▼ Top Hashtags

Top Hashtags in Tweet in Entire Graph:

- [322] [trump](#)
- [240] [crudeoil](#)
- [212] [natgas](#)
- [180] [healthcare](#)
- [148] [laborparticipation](#)
- [137] [gdp](#)
- [135] [samsung](#)
- [127] [bryant](#)
- [122] [spurs](#)
- [119] [dow](#)

BOT NETWORK: NODEXL „6 TYPES OF“

41

Harry Miller
@Harry_Robots

Follow

6 Types of Twitter Social Media Networks
[#INFOGRAPHICS]
by @nodexl |

#IoT #InternetOfThings #DigitalMarketing
#BigData #Analytics #DataScience
#DataScientists #SocialNetworks #RT

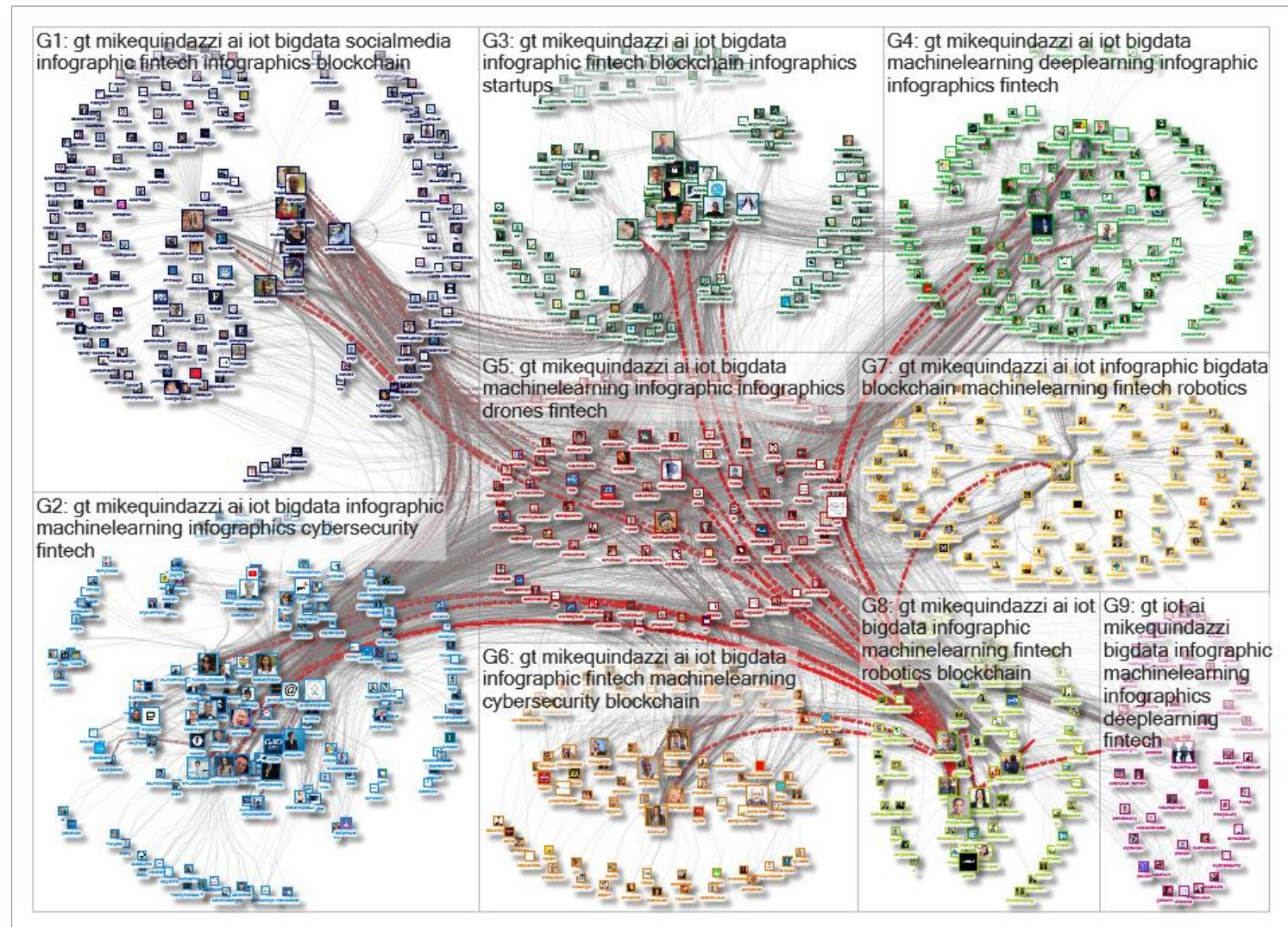
Cc: @MikeQuindazzi CC @mikequindazzi
#BigData #MachineLearning #AI #IoT
#infographic #DeepL

6 Types of Twitter Social Media Networks

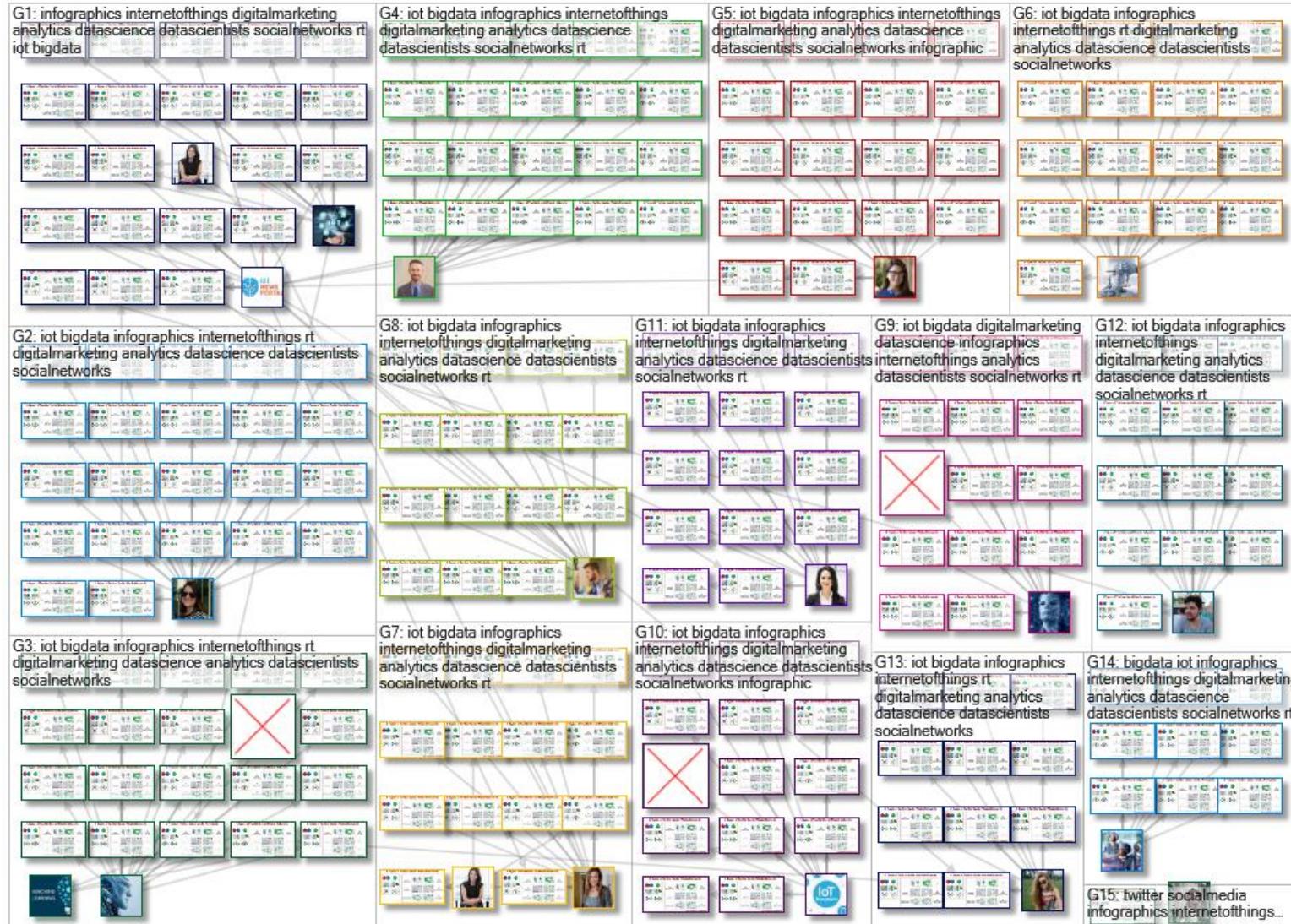
source connected action via @mikequindazzi

1:34 AM - 27 Aug 2018

13 Retweets 16 Likes



MULTIMODAL NETWORKS: USER - MEDIA



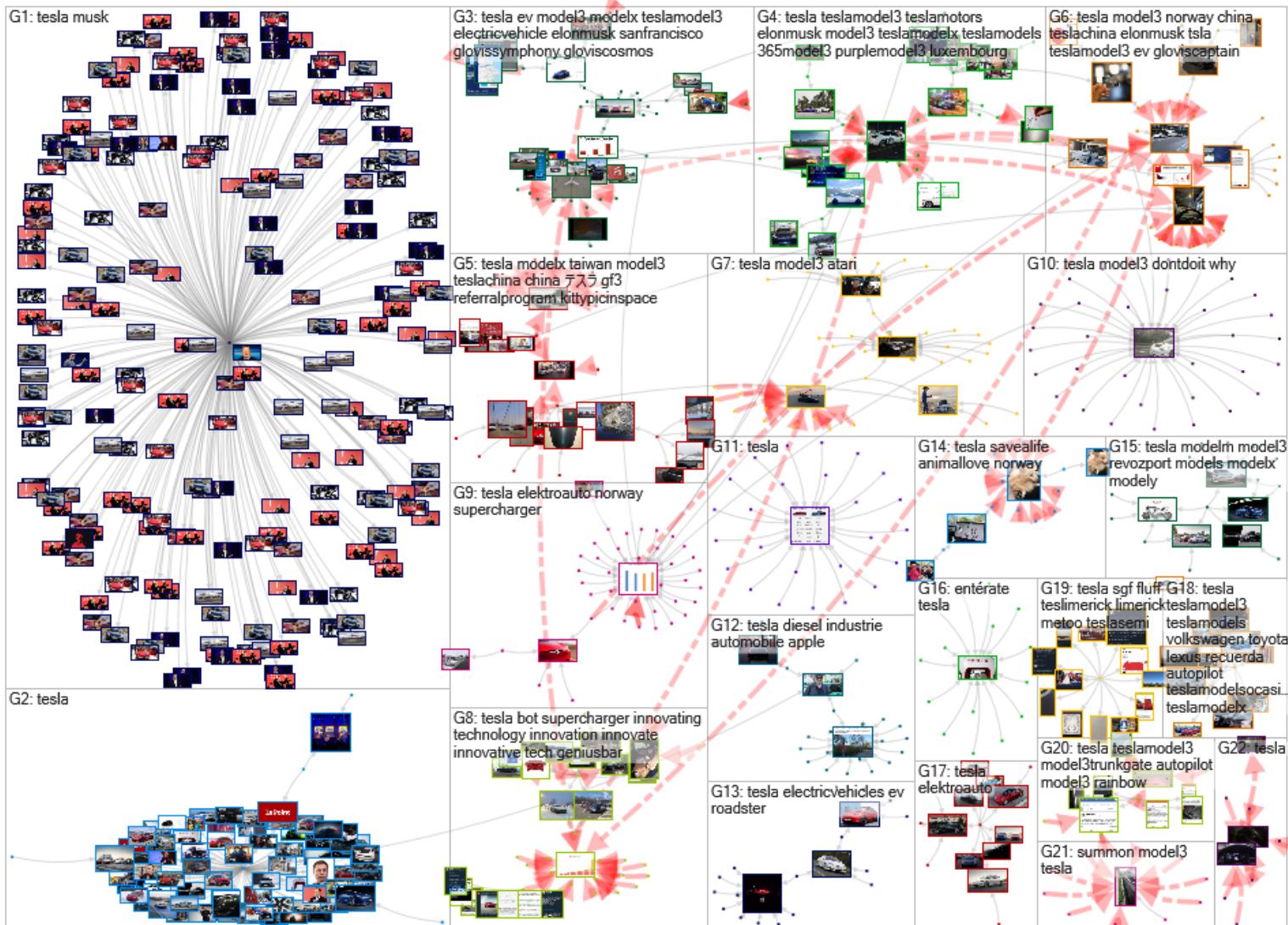
▼ Top Hashtags

Top Hashtags in Tweet in Entire Graph:

- [308] iot ↗
- [303] bigdata ↗
- [242] infographics ↗
- [242] internetofthings ↗
- [236] digitalmarketing ↗
- [236] datascience ↗
- [234] analytics ↗
- [234] datascientists ↗
- [234] socialnetworks ↗
- [232] rt ↗

MULTIMODAL NETWORKS: USER - MEDIA

43

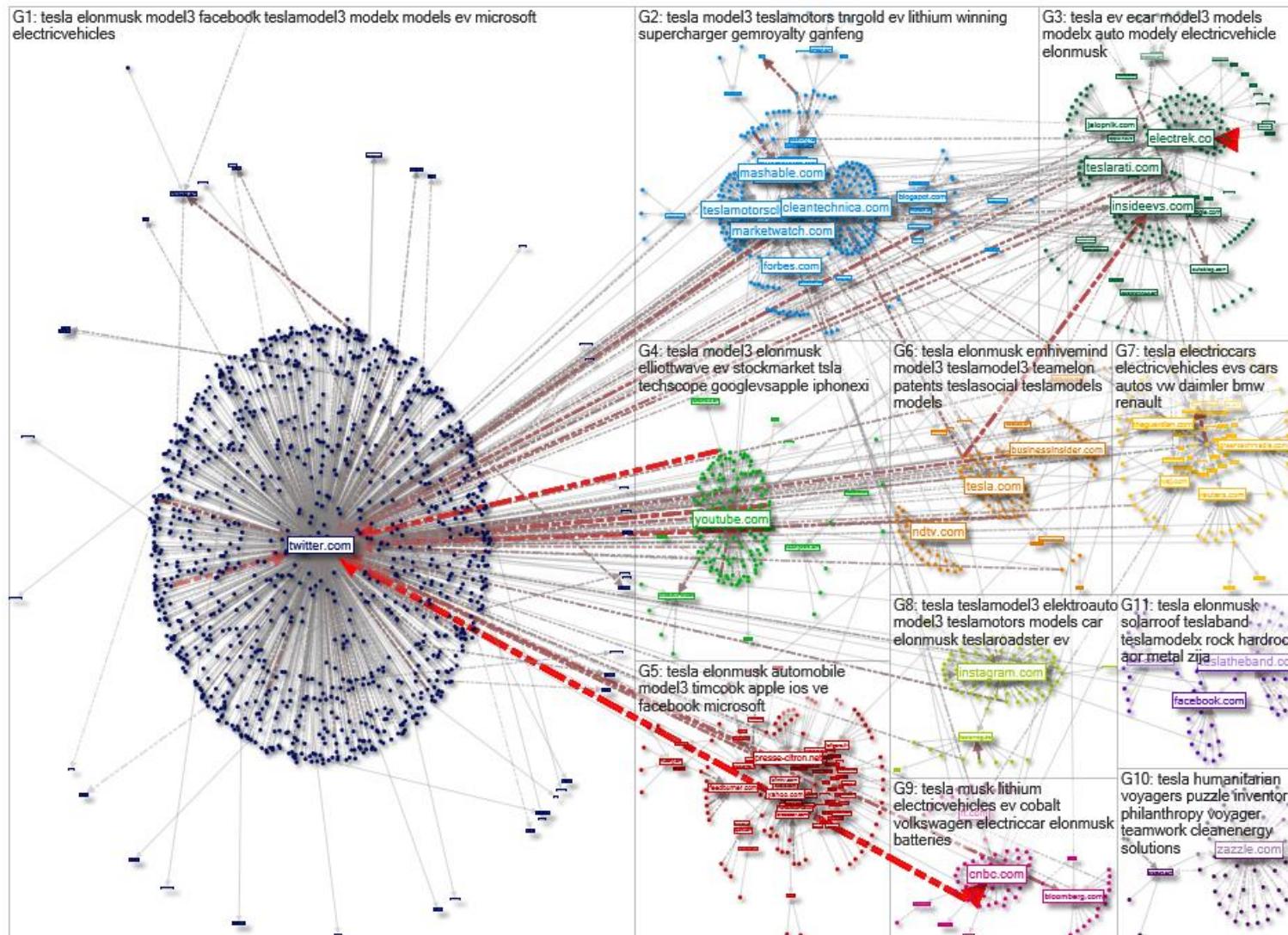


#Tesla Twitter User-to-Media File Network G1-G22 Monday, 04 February 2019

<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=185277>

MULTIMODAL NETWORKS: USER - DOMAIN

44

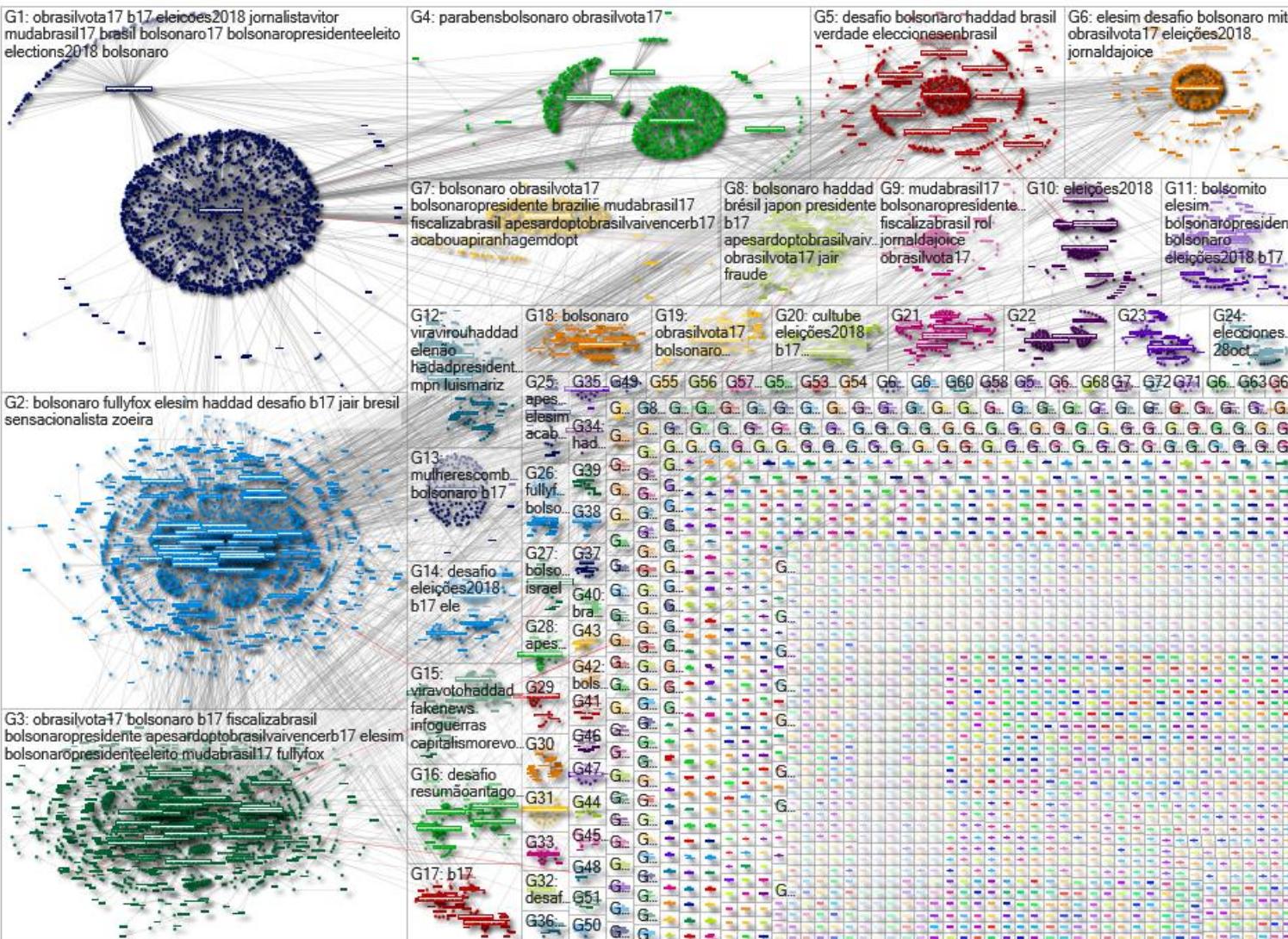


#Tesla Twitter User-to-Domain Network Report for Monday, 04 February 2019

<https://nodedxlgraphgallery.org/Pages/Graph.aspx?graphID=185264>

CROSS-PLATFORM ANALYSIS: TWITTER-YOUTUBE

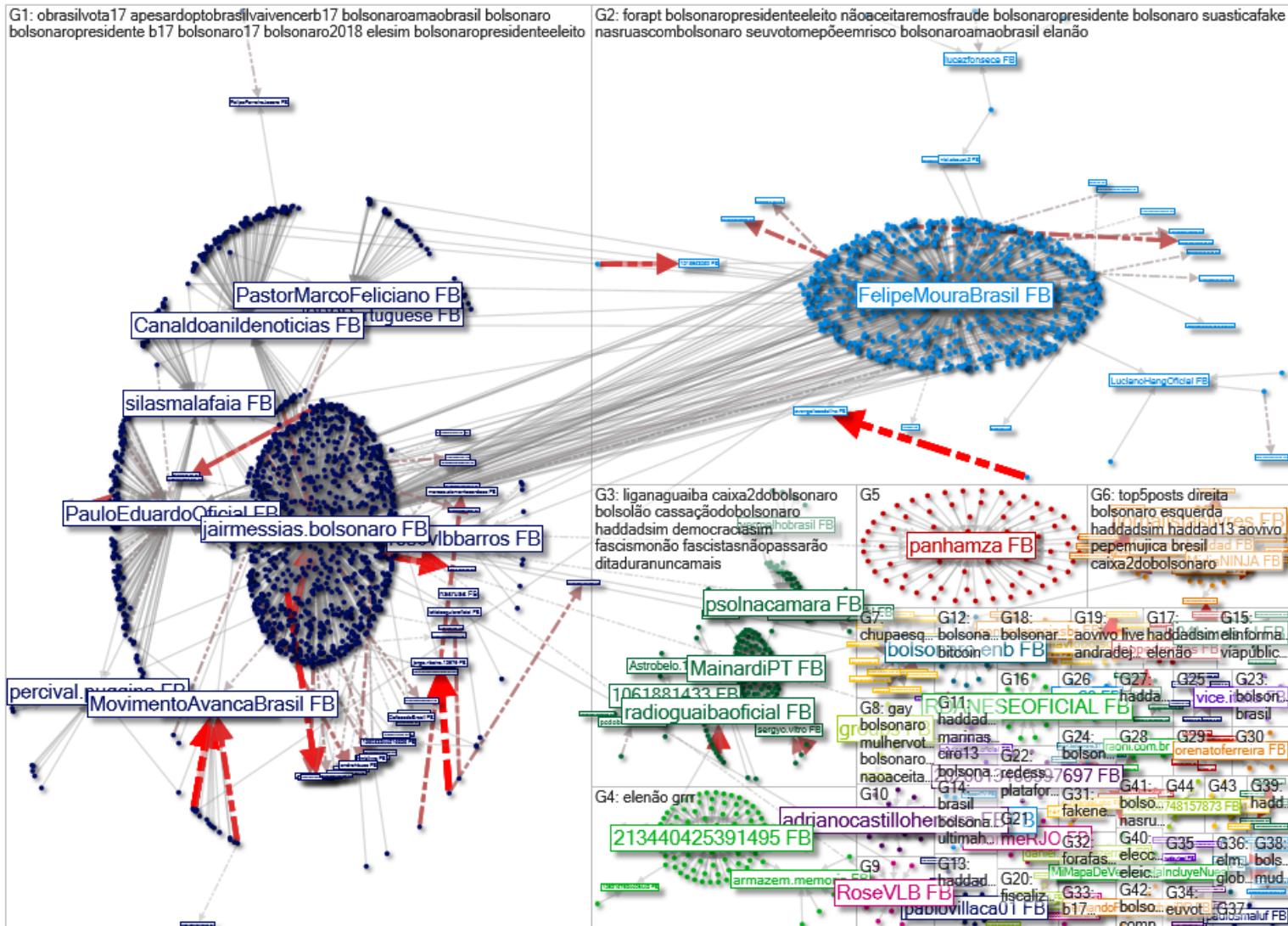
45



Bolsonaro (youtube OR youtube.com ORyoutu.be) user-url network until:2018-10-28

<https://nodeXLgraphgallery.org/Pages/Graph.aspx?graphID=185579>

CROSS-PLATFORM ANALYSIS: TWITTER-FACEBOOK

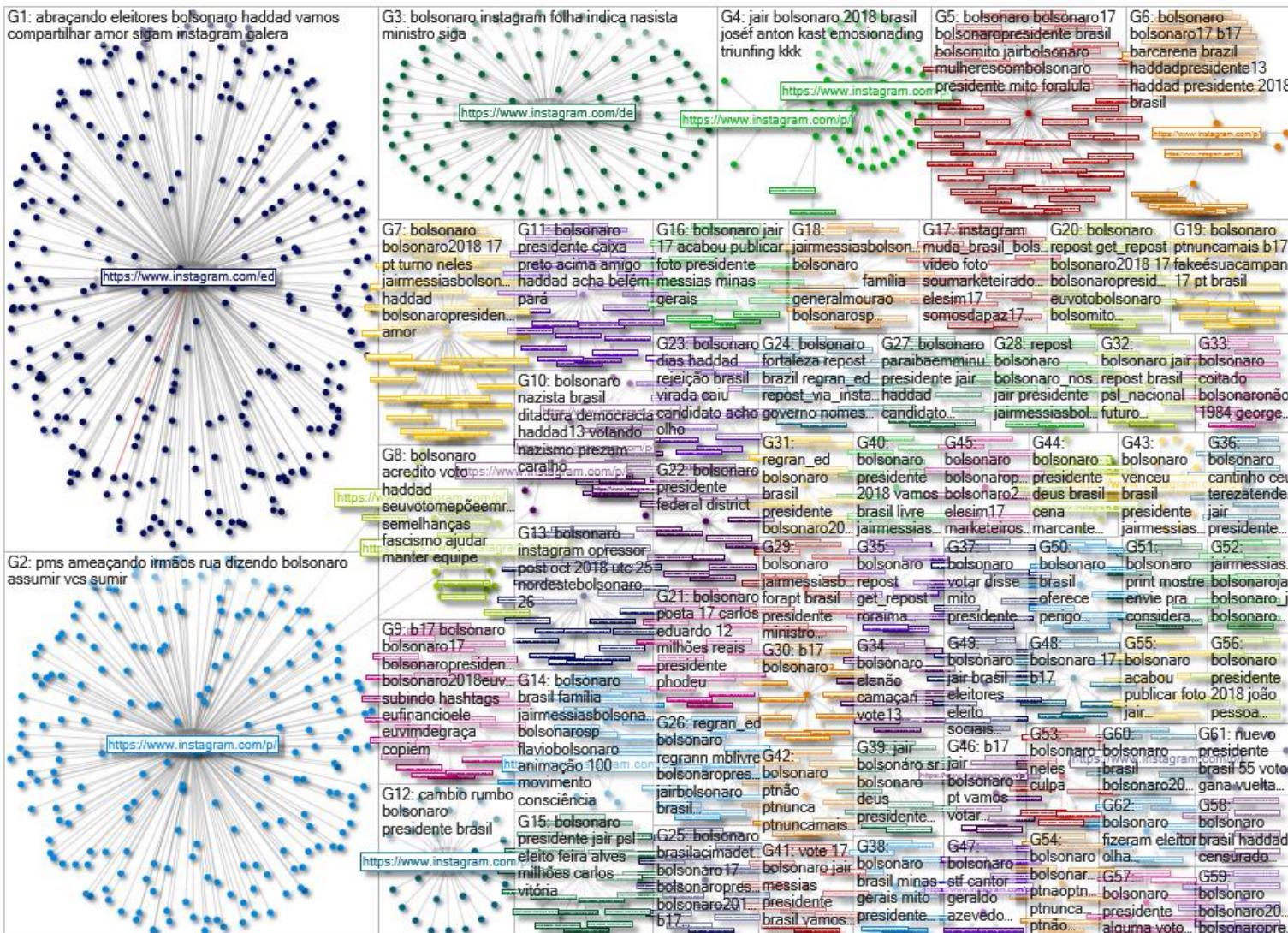


Bolsonaro (facebook.com OR fb.com OR fb.me) until:2018-10-22

<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=185533>

CROSS-PLATFORM ANALYSIS: TWITTER-INSTAGRAM

47

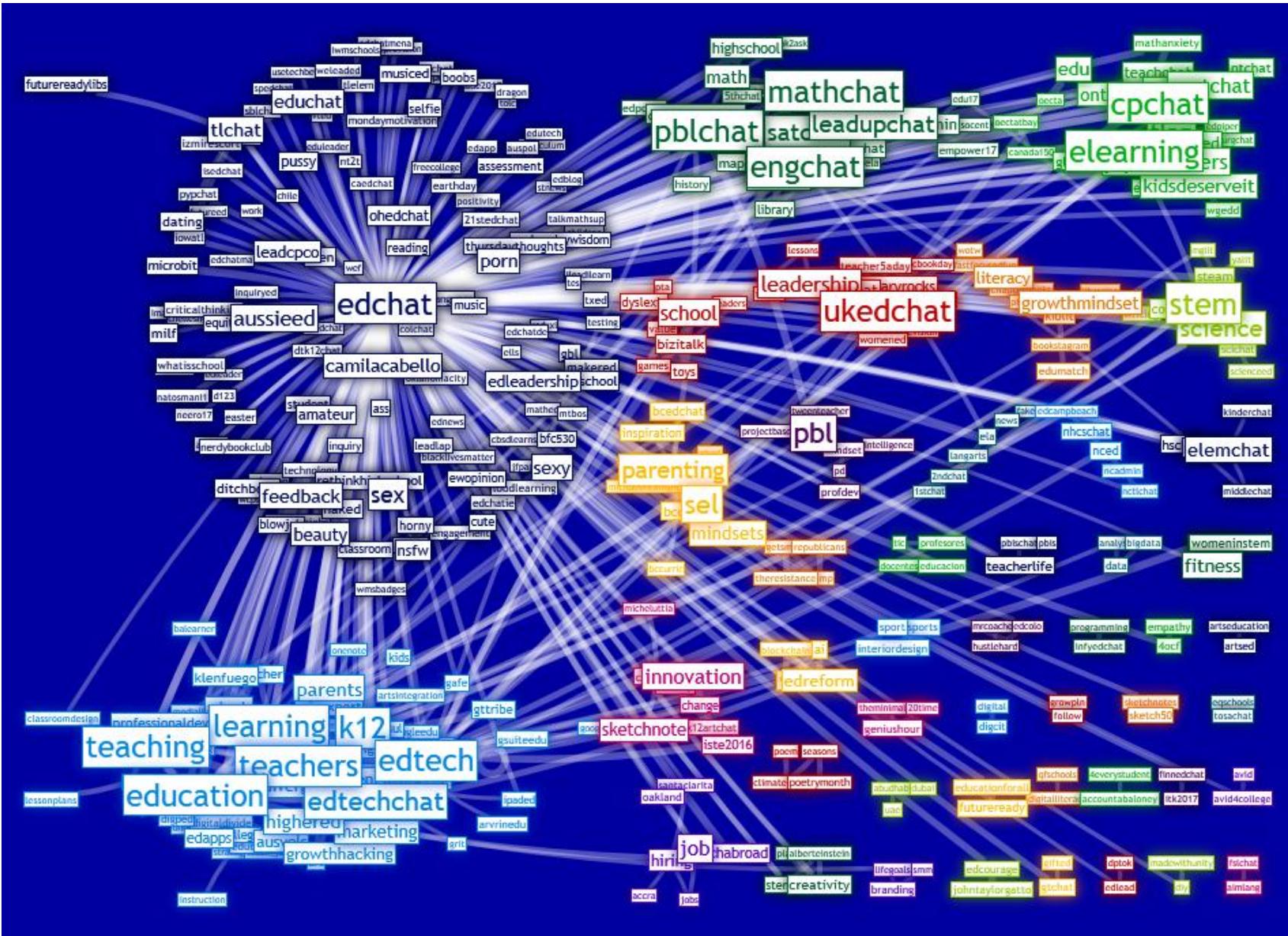


Bolsonaro Instagram until:2018-10-26

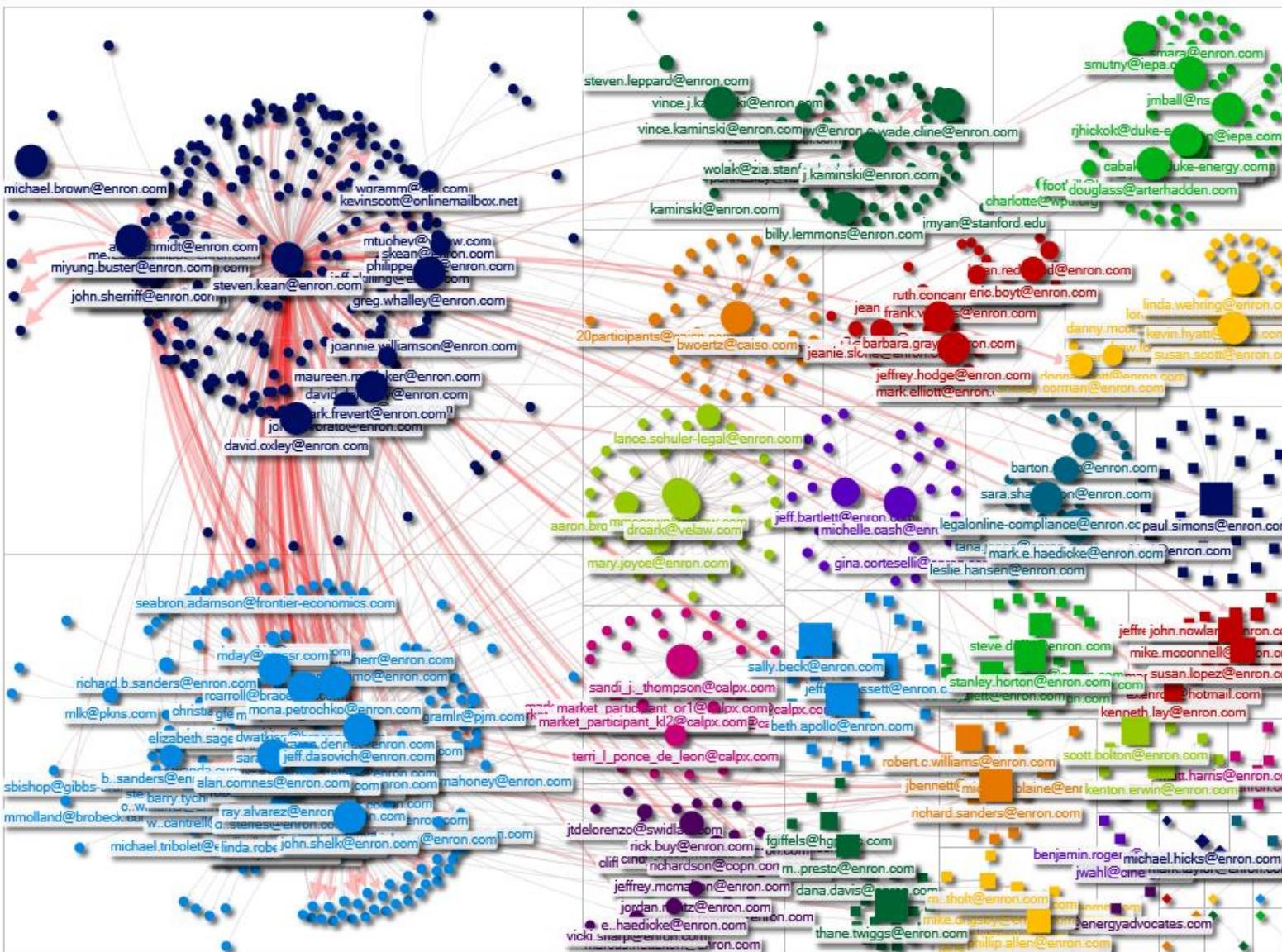
<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=188573>

HASHTAG NETWORK

48

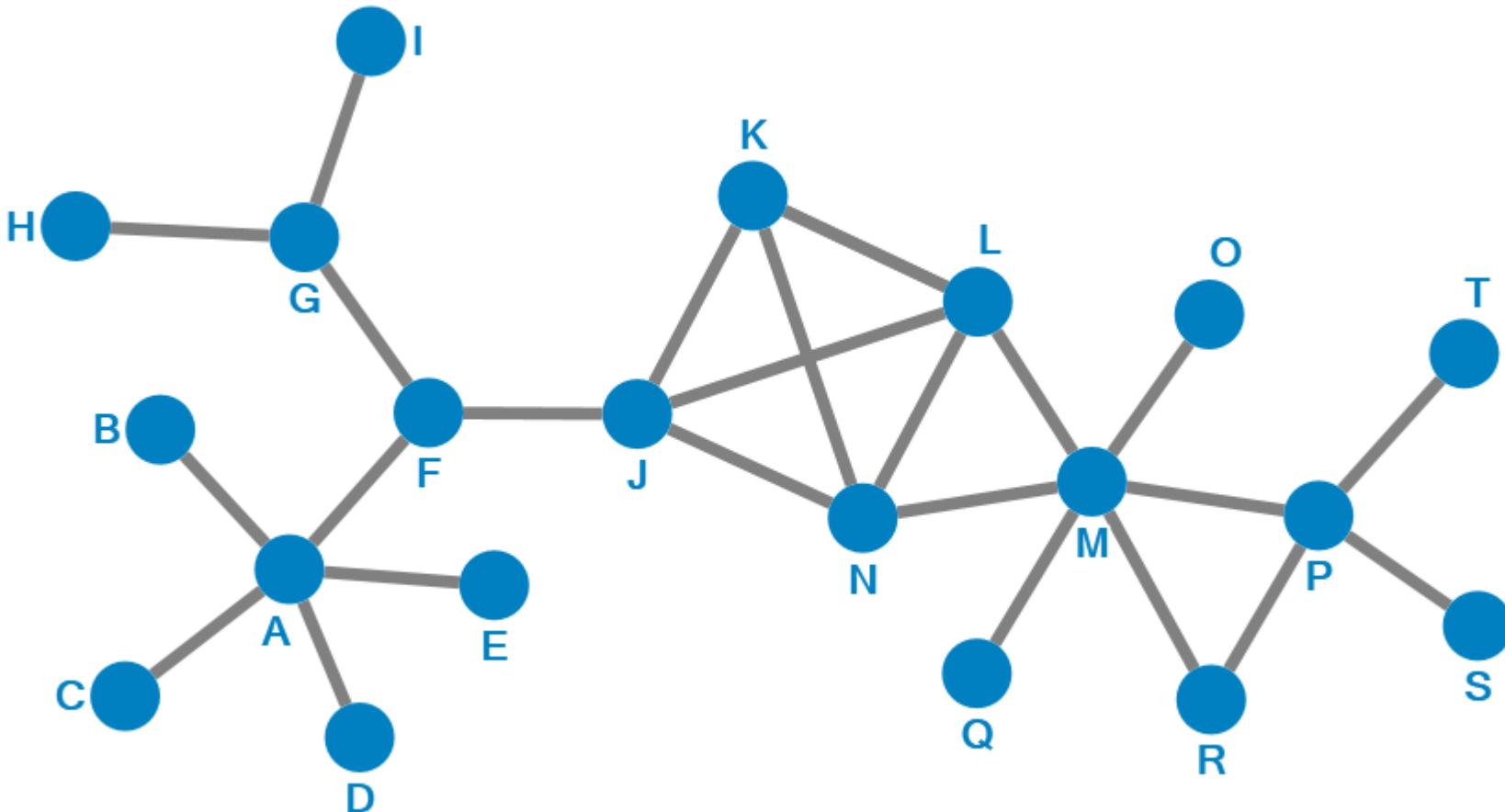


EMAIL NETWORKS



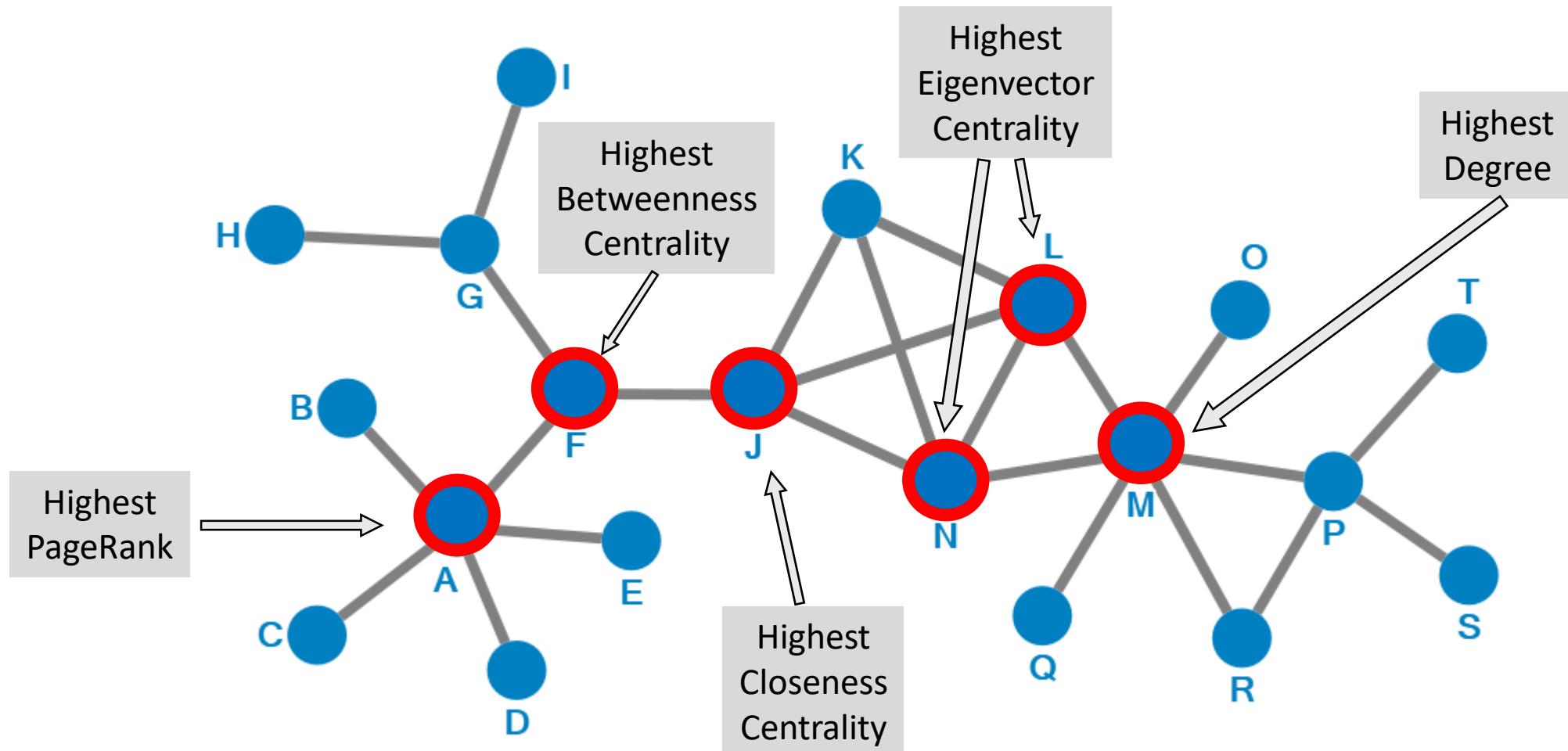
Enron Email Network

MEASURING INFLUENCE: VERTEX METRICS



Derived from Borgatti (2006)

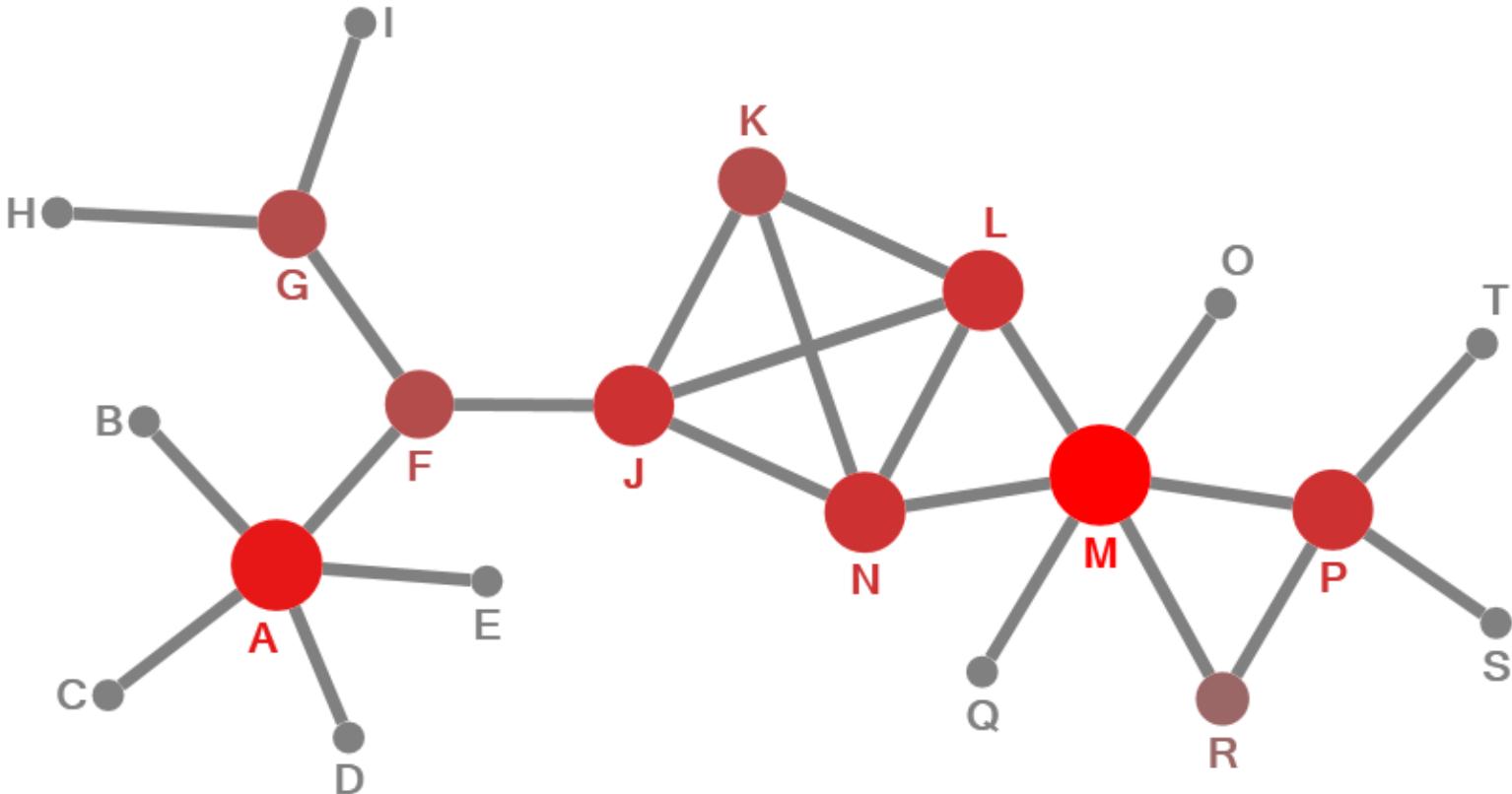
MEASURING INFLUENCE: VERTEX METRICS



Derived from Borgatti (2006)

DEGREE

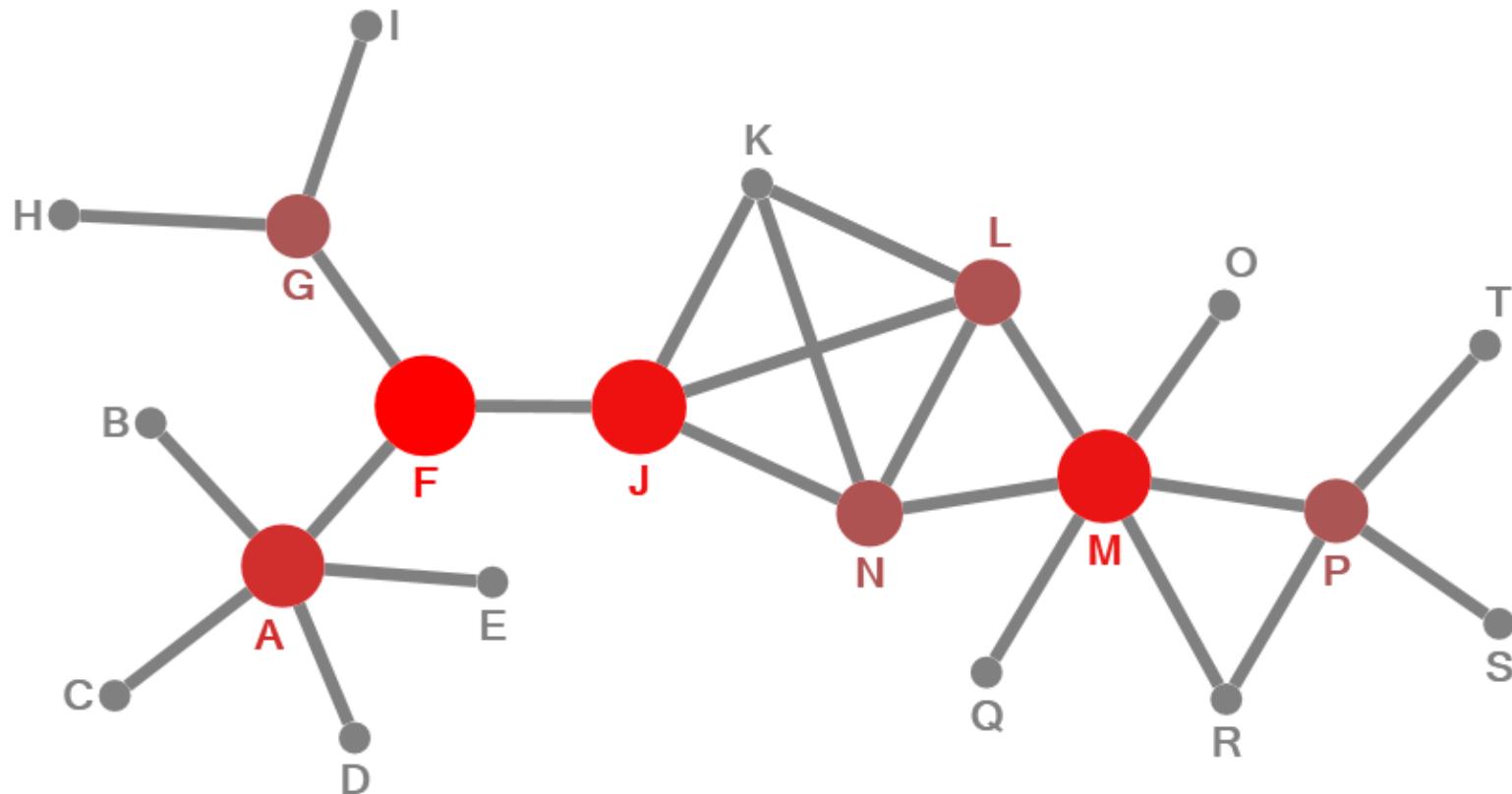
Vertex	Degree
M	6
A	5
L	4
N	4
J	4
P	4
K	3
G	3
F	3
R	2



Derived from Borgatti (2006)

BETWEENNESS CENTRALITY

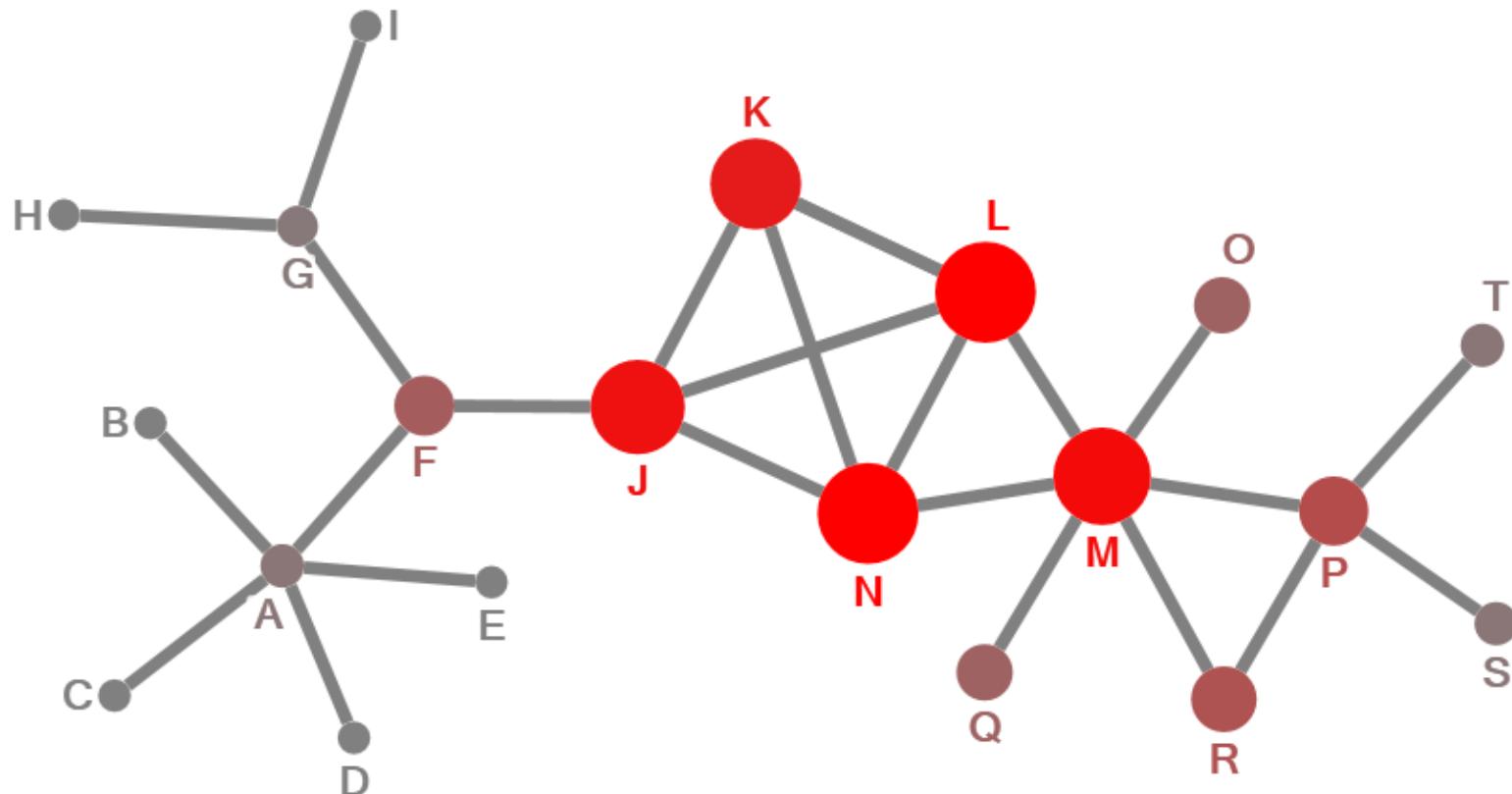
Vertex	Betweenness Centrality
F	103.000
J	90.000
M	87.000
A	66.000
L	38.500
N	38.500
P	35.000
G	35.000
K	0.000
R	0.000



Derived from Borgatti (2006)

EIGENVECTOR CENTRALITY

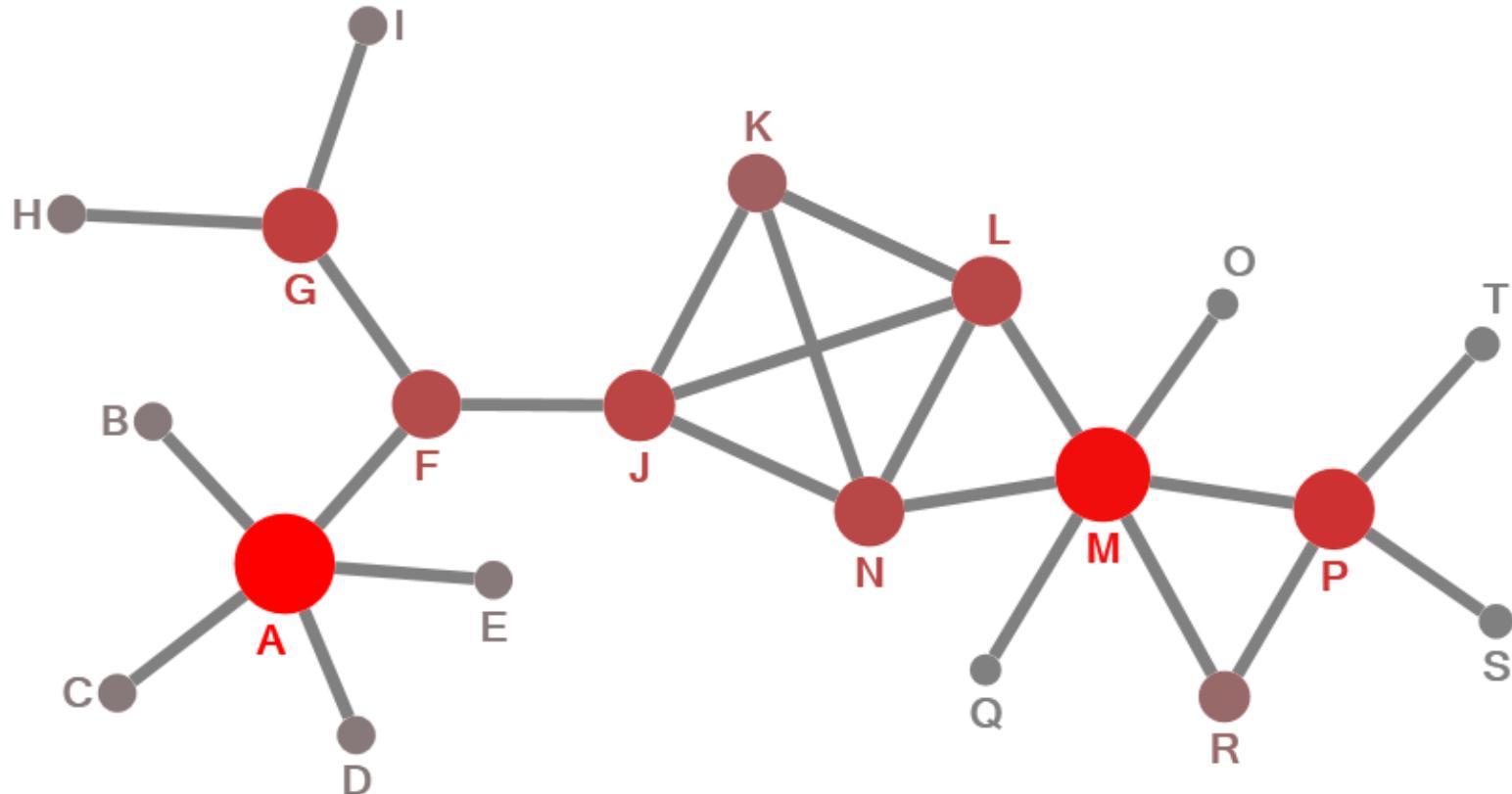
Vertex	Eigenvector Centrality
L	0.146
N	0.146
M	0.135
J	0.126
K	0.116
P	0.063
R	0.055
F	0.044
O	0.038
Q	0.038



Derived from Borgatti (2006)

PAGE RANK

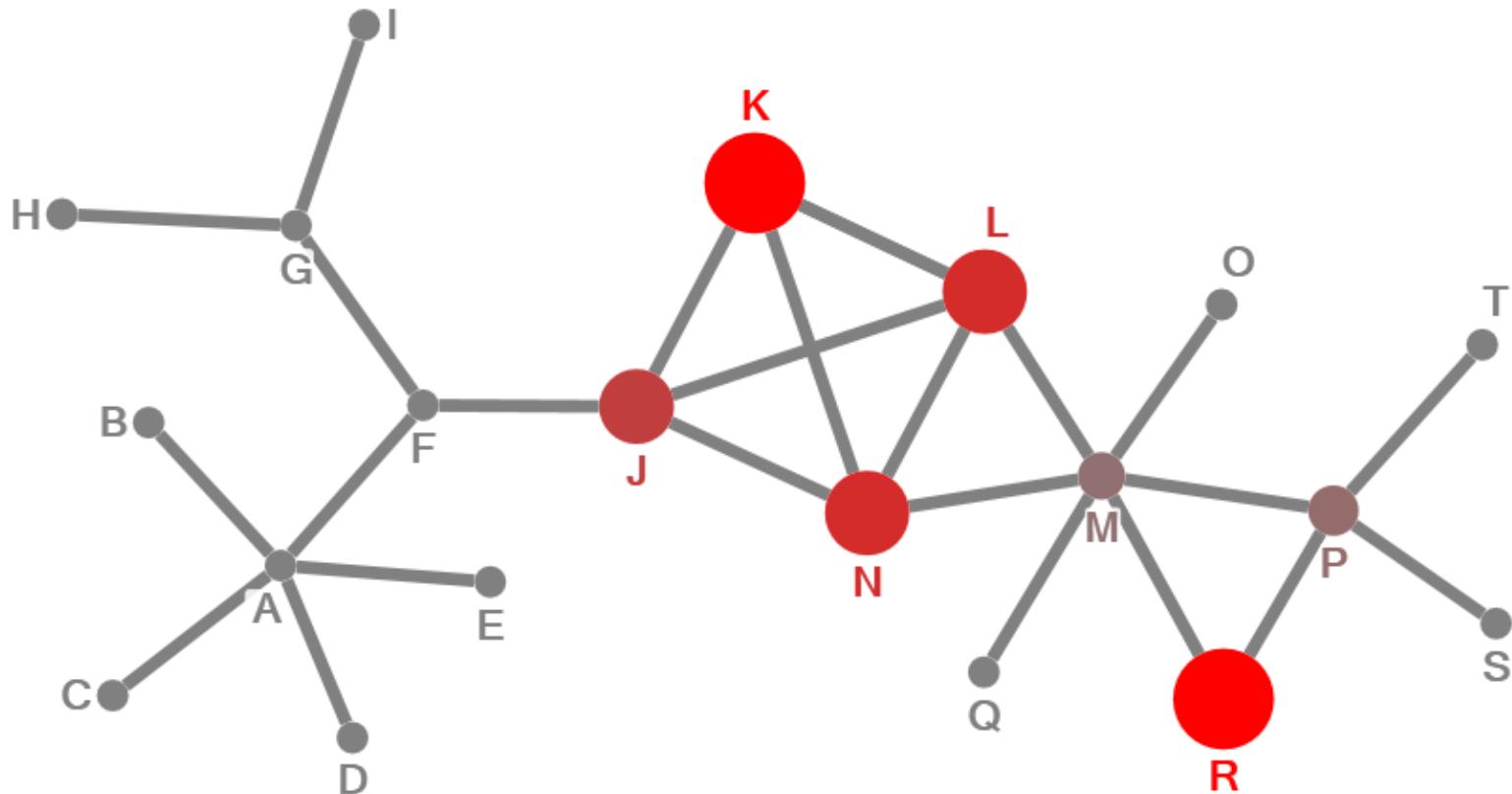
Vertex	PageRank
A	2.410
M	2.177
P	1.656
G	1.471
J	1.338
L	1.298
N	1.298
F	1.261
K	0.986
R	0.810



Derived from Borgatti (2006)

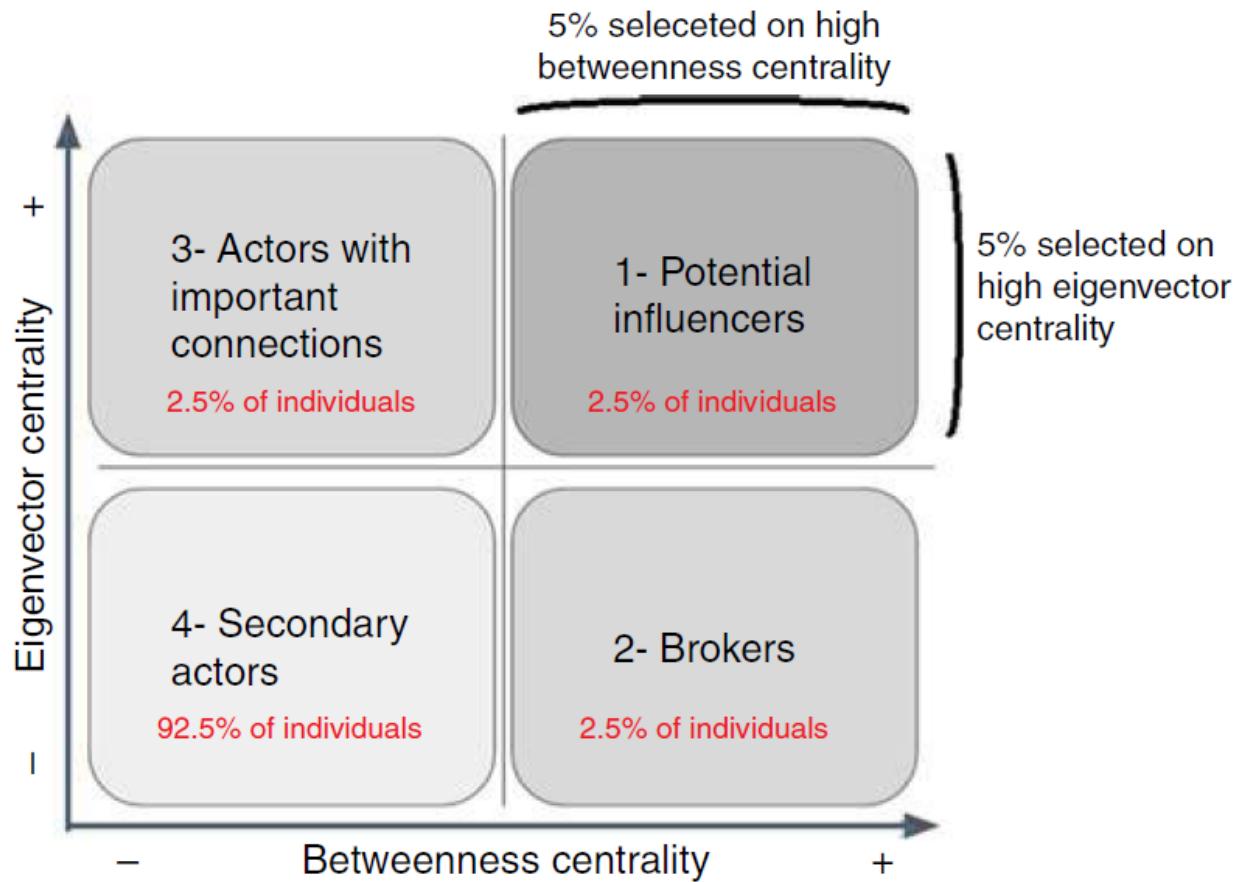
CLUSTERING COEFFICIENT

Vertex	Clustering Coefficient
K	1.000
R	1.000
L	0.667
N	0.667
J	0.500
P	0.167
M	0.133
A	0.000
G	0.000
F	0.000

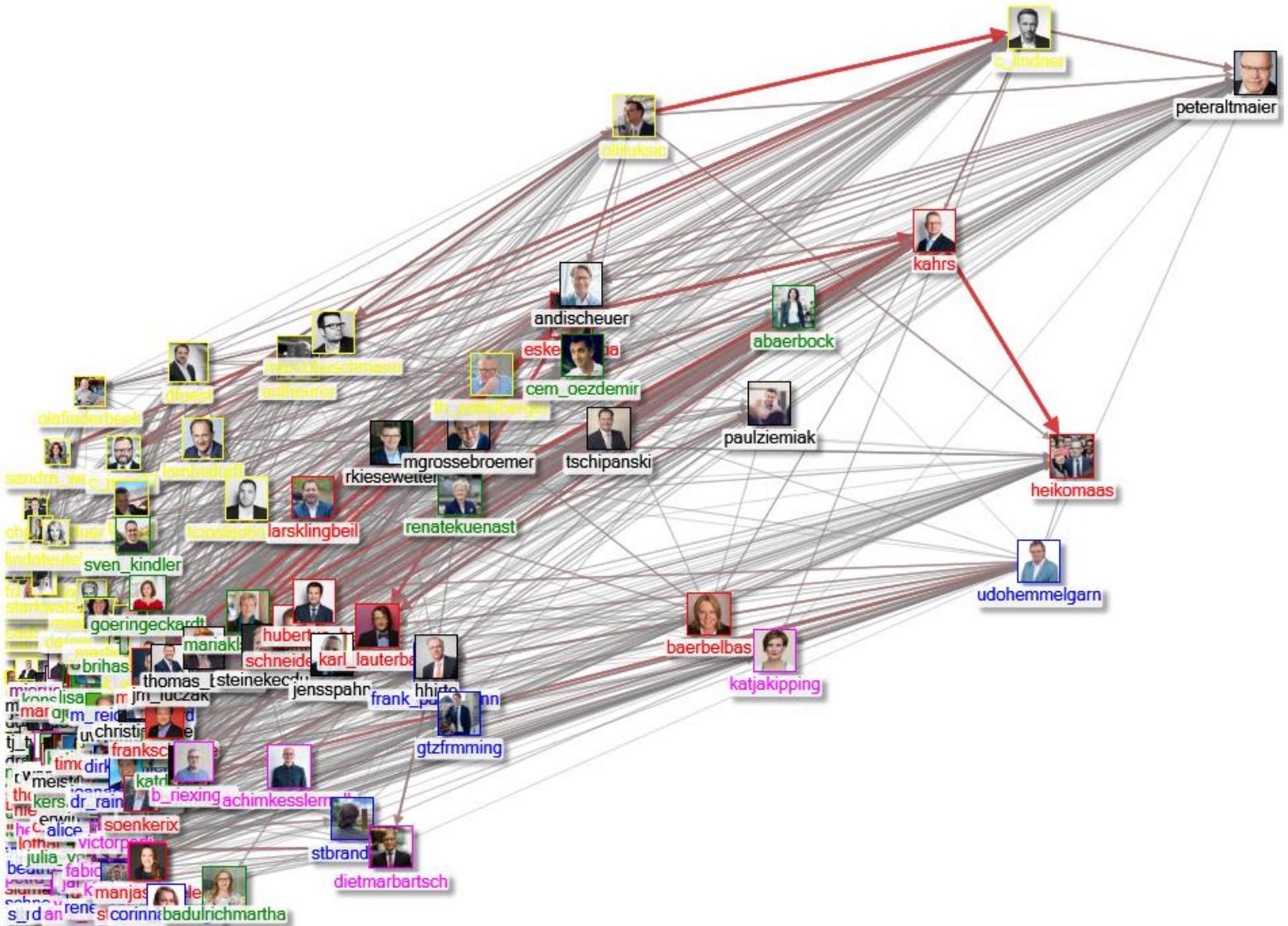
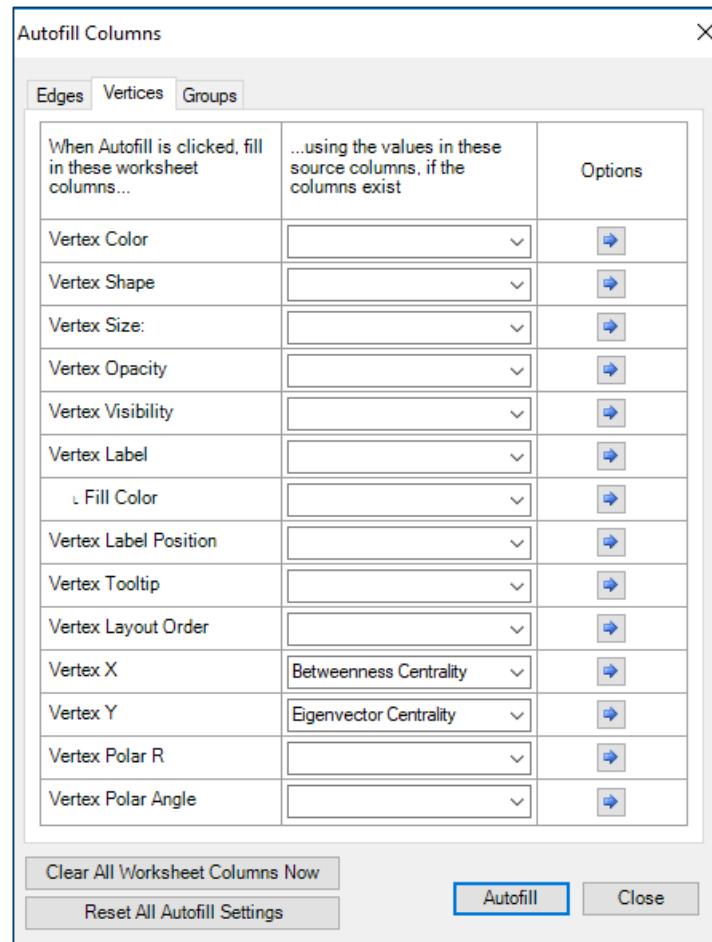


Derived from Borgatti (2006)

MEASURING INFLUENCE: VERTEX METRICS



MEASURING INFLUENCE: VERTEX METRICS



NODEXL GRAPH GALLERY

[NodeXLGraphGallery.org:](http://NodeXLGraphGallery.org)

NodeXL Pro network maps, reports and options

Create Account | Sign In | Get NodeXL | Renew NodeXL Pro | Donate

nxtls

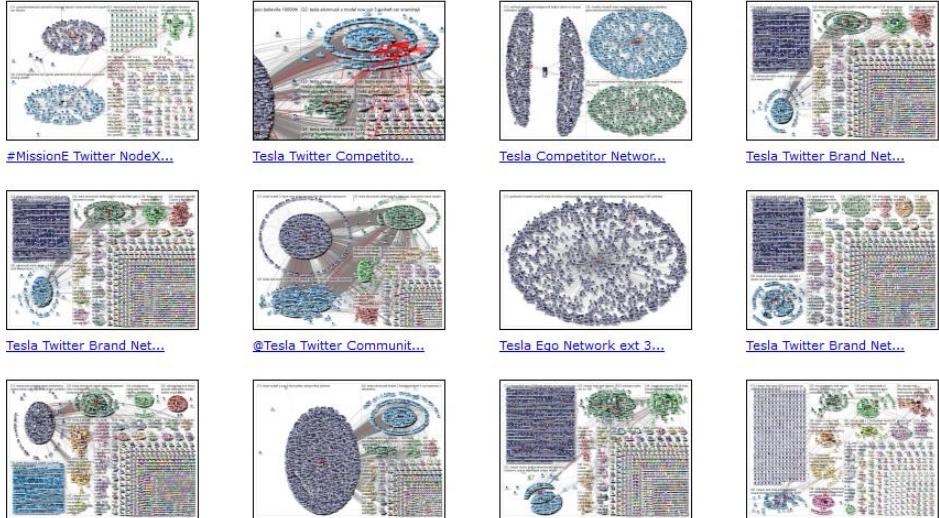
Search

NODEXL GRAPH GALLERY

A project from the  socialmedia RESEARCH FOUNDATION

These are [network graphs](#) created with [NodeXL](#), a template for graphing network data in [Microsoft Office Excel®](#).

× Graphs that mention "nxtls":



#MissionE Twitter NodeX...
Tesla Twitter Competitor...
Tesla Competitor Netw...
Tesla Twitter Brand Net...

Tesla Twitter Brand Net...
@Tesla Twitter Commun...
Tesla Ego Network ext 3...
Tesla Twitter Brand Net...

Tesla Twitter Brand Net...
@Tesla Twitter Commun...
nissan leaf Twitter Nod...
"Nissan Leaf" OR Nissan...

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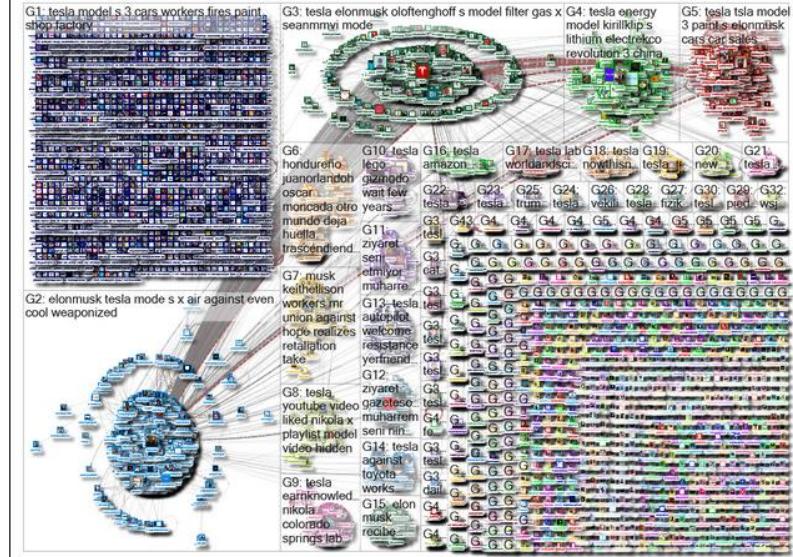
Search

NODEXL GRAPH GALLERY

A project from the  socialmedia RESEARCH FOUNDATION

FAQ | Problem?

Tweet | Share

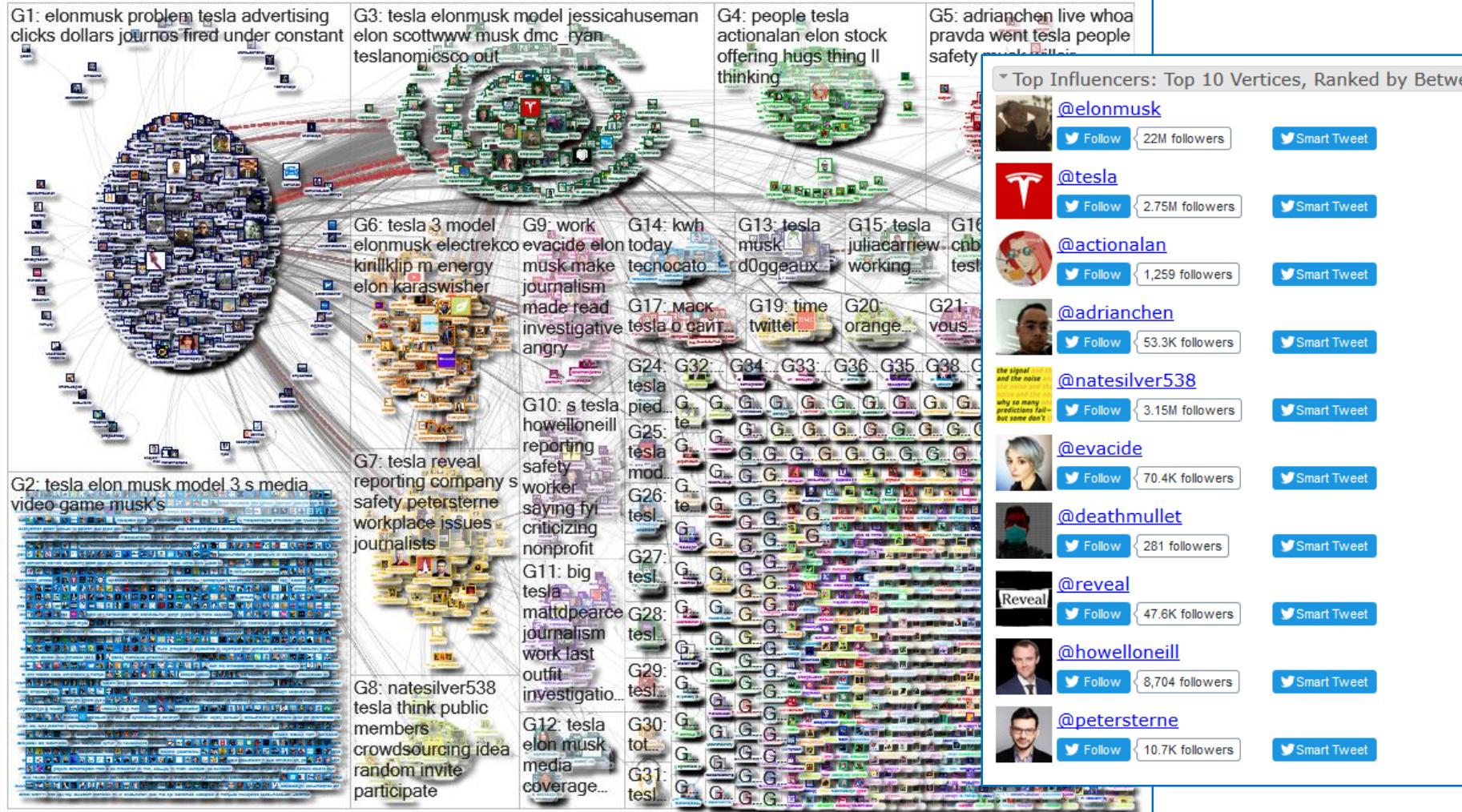


Tesla Twitter Brand Network 2018-06-01

[View an interactive version of this graph \(experimental\)](#)

From: SMRFoundation
Uploaded on: June 12, 2018
Short: Tesla via NodeXL <http://bit.ly/2JF00kA>
Description: @elonmusk
@tesla
@keithellison
@worldandscience
@zerqddt
@gazetesozcu
@mucahidakinci
@youtube
@hoaxeye
@earnknowledge

NODEXL GRAPH GALLERY



Top Influencers: Top 10 Vertices, Ranked by Betweenness Centrality

	@elonmusk		22M followers	
	@tesla		2.75M followers	
	@actionalan		1,259 followers	
	@adrianchen		53.3K followers	
	@natesilver538		3.15M followers	
	@evacutee		70.4K followers	
	@deathmullet		281 followers	
	@reveal		47.6K followers	
	@howelloneill		8,704 followers	
	@petersterne		10.7K followers	

Top Hashtags

Top Hashtags in Tweet in Entire Graph:

- [485] tesla
- [249] model3
- [95] energy
- [65] revolution
- [60] copper
- [59] lithium
- [59] elonmusk
- [58] kirillklip
- [53] tnrgold
- [50] gemroyalty

Tweet

Top Hashtags in Tweet in G1:

- [191] model3
- [42] tesla
- [18] fakenews
- [11] blockchain
- [8] elonmusk
- [6] santamonica
- [3] spacex
- [3] press
- [3] splatoon2
- [3] nintendoswitch

Top Hashtags in Tweet in G2:

- [84] tesla
- [16] news
- [13] tech
- [12] elonmusk
- [9] cars
- [7] musk
- [7] celebridades
- [7] supercars
- [7] luxurycars
- [7] motor

Top Hashtags in Tweet in G3:

- [47] tesla
- [21] model3

LITERATURE / LINKS

Social Media Research Foundation and NodeXL

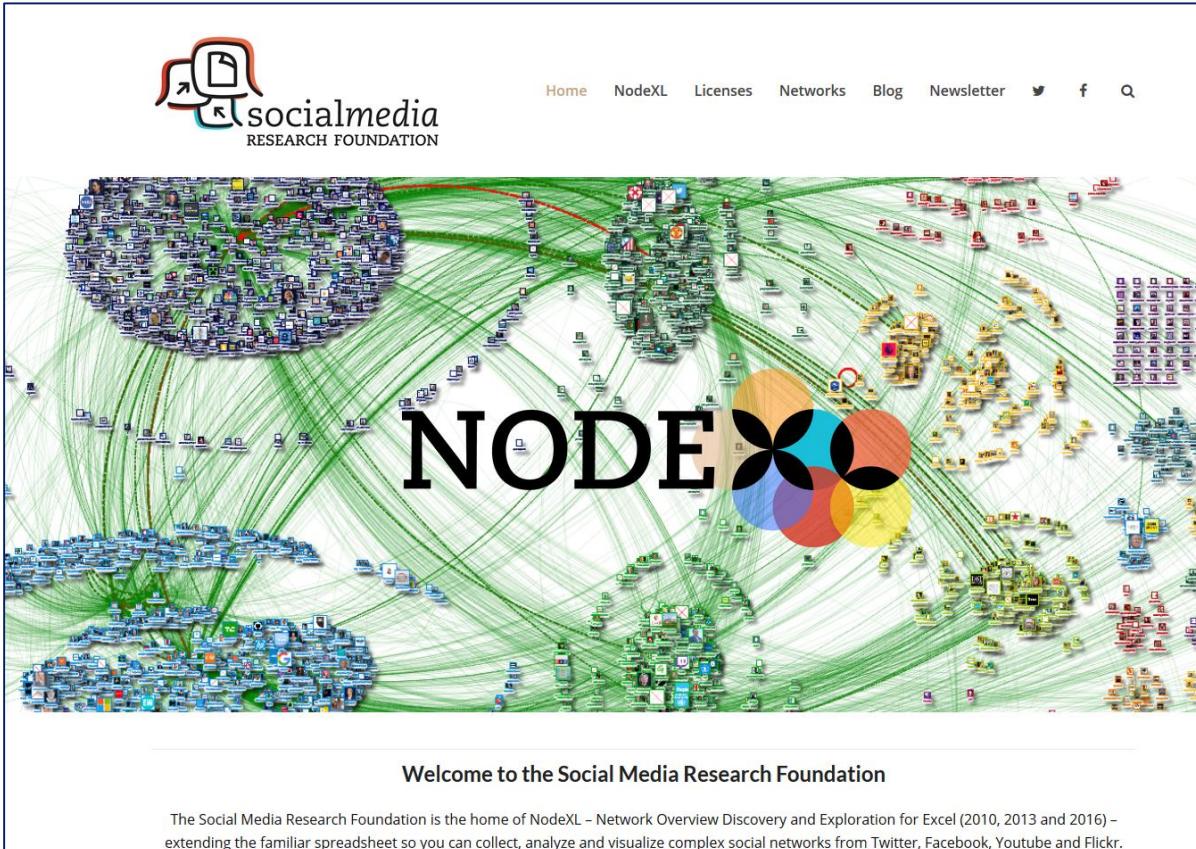
- Social Media Research Foundation: <http://www.smrfoundation.org/>
- NodeXL Graph Gallery: <https://nodexlgraphgallery.org/>
- Marc Smith | Network Mapping the Ecosystem: <https://www.youtube.com/watch?v=kDiGI-2m868>
- How to Automate NodeXL Pro: <https://www.youtube.com/watch?v=mjAq8eA7uOM>
- Eduarda Mendes Rodrigues, Natasa Milic-Frayling, Marc Smith, Ben Shneiderman, Derek Hansen (2011): Group-in-a-box Layout for Multi-faceted Analysis of Communities. In: IEEE Third International Conference on Social Computing, October 9-11, 2011. Boston, MA: <https://www.cs.umd.edu/hcil/trs/2011-24/2011-24.pdf>
- Smith, Marc A., Lee Rainie, Ben Shneiderman and Itai Himelboim (2014): Mapping Twitter Topic Networks: From Polarized Crowds to Community Clusters. PEW Research Report: <https://www.pewinternet.org/2014/02/20/mapping-twitter-topic-networks-from-polarized-crowds-to-community-clusters/>
- Derek Hansen, Ben Shneiderman and Marc Smith (2009): Analyzing Social Media Networks with NodeXL: <https://www.elsevier.com/books/analyzing-social-media-networks-with-nodexl/hansen/978-0-12-382229-1>
- Itai Himelboim, Marc A. Smith, Lee Rainie, Ben Shneiderman and Camila Espina: Classifying Twitter Topic-Networks Using Social Network Analysis. In: Social Media + Society (January-March 2017: 1 –13). <https://journals.sagepub.com/doi/full/10.1177/2056305117691545>

LITERATURE / LINKS

- Borgatti, Stephen P. (2006): Identifying sets of key players in a social network. In: Comput Math Organiz Theor (2006) 12: 21–34 [DOI 10.1007/s10588-006-7084-x]
- Castells, Manuel (1996): The Rise of the Network Society, Malden: Blackwell Publishers.
- Aaron Clauset, M. E. J. Newman, and Christopher Moore (2004): Finding community structure in very large networks. In: Phys. Rev. E 70.
- Dicken, Peter (2011): Global Shift – Mapping the Changing Contours of the World Economy (6th edition). Sage Publications.
- Litterio, Arnaldo M., et. al. (2017): "Marketing and social networks: a criterion for detecting opinion leaders", European Journal of Management and Business Economics, Vol. 26 Issue: 3, pp.347-366, <https://doi.org/10.1108/EJMBE-10-2017-020>
- Frank W. Takes, Eelke M. Heemskerk (2016): Centrality in the global network of corporate control. Social Network Analysis and Mining, December 2016, 6:97). Online unter: <https://link.springer.com/article/10.1007/s13278-016-0402-5>
- Tingting Yan, Thomas Y. Choi, Yusoon Kim, Yang Yang (2015): A Theory of the Nexus Supplier: A Critical Supplier From A Network Perspective. Journal of Supply Chain Management, 51-1 pp: 3-92. Online unter: <https://onlinelibrary.wiley.com/doi/abs/10.1111/jscm.12070>

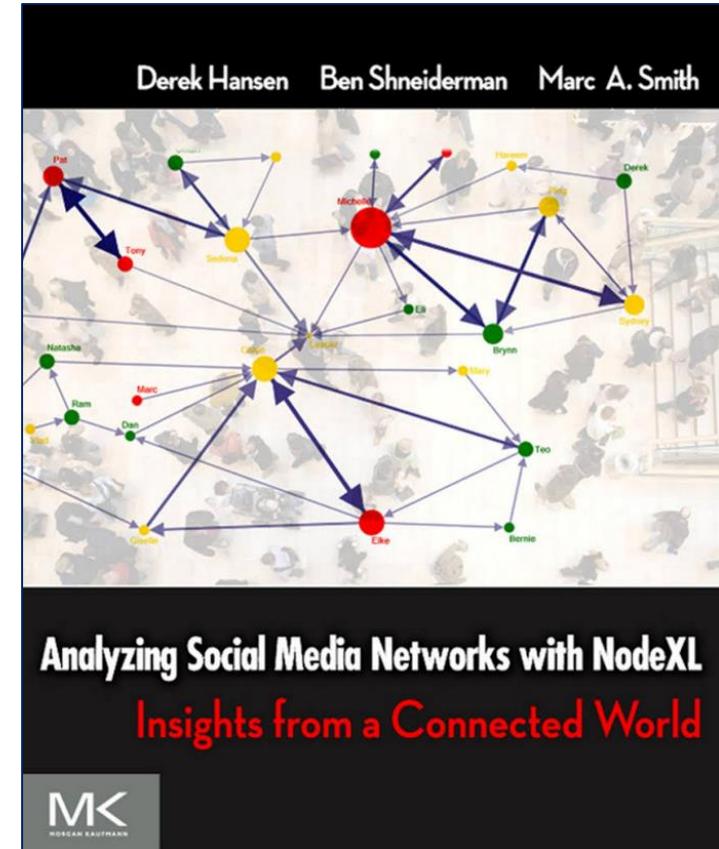
SOCIAL MEDIA RESEARCH FOUNDATION

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<https://www.smrfoundation.org/>

<https://www.nodexlgraphgallery.org/>



Book: Derek Hansen, Ben Shneiderman and Marc Smith (2020): Analyzing Social Media Networks with NodeXL:
<https://www.elsevier.com/books/analyzing-social-media-networks-with-nodexl/hansen/978-0-12-817756-3>