

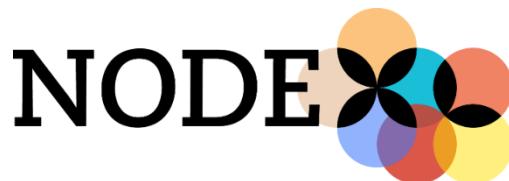
# GIJC19 - NODEXL TUTORIAL (SESSION 1)

## Introduction to Social Network Analysis with NodeXL Pro

Tutorial materials: [bit.ly/nxlgijs](https://bit.ly/nxlgijs)

Harald Meier [harald@smrfoundation.org](mailto:harald@smrfoundation.org)

Hamburg – September 27th, 2019



A project from the



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

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

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](mailto: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**

Edges Vertices Groups Group Vertices Overall Met ...

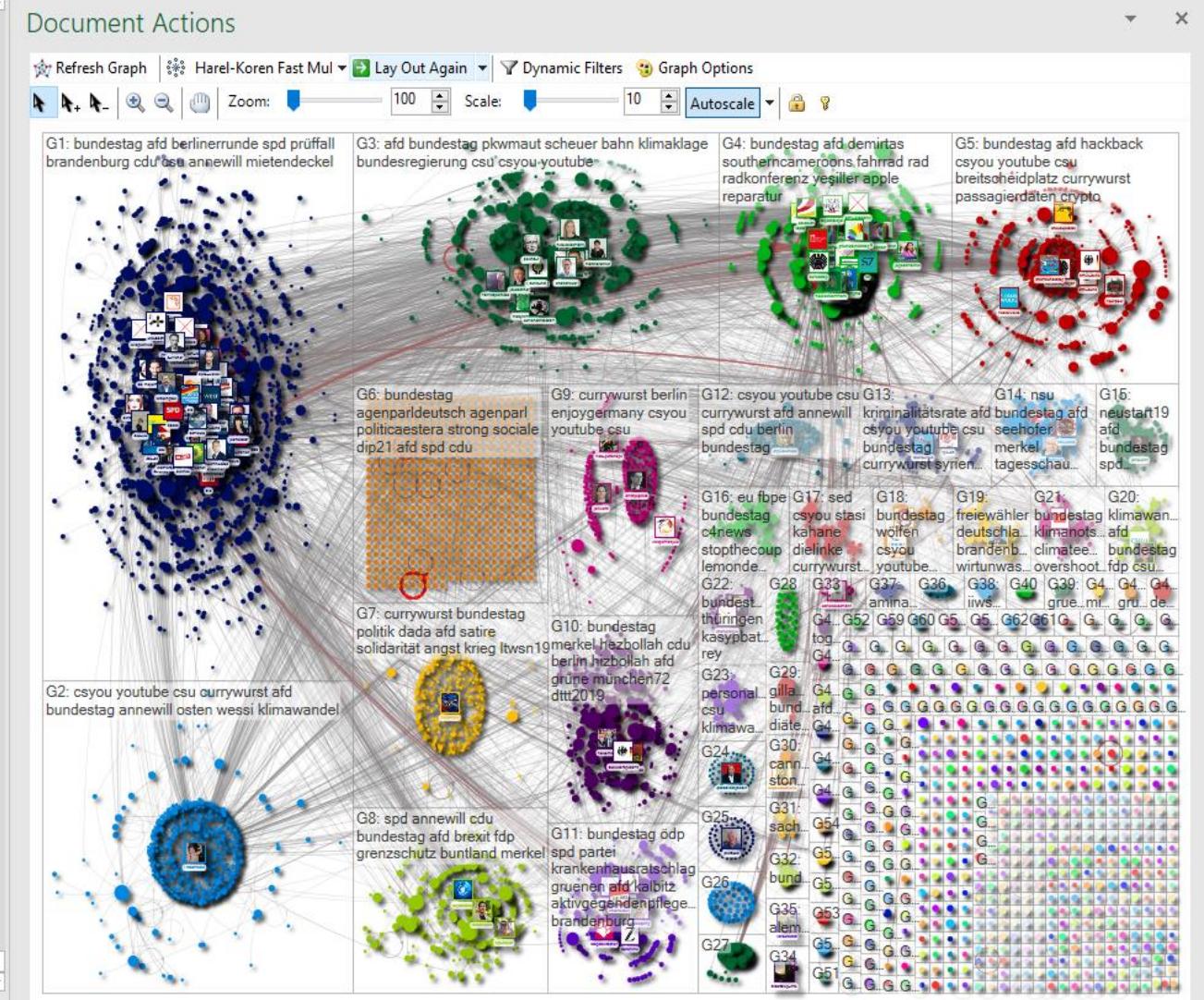
120%

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

Import Export Prepare Data Data Graph Visual Properties Analysis Options Show/Hide Help

A2 Vertex 1

	A	B	K	N	O	P	Q	R
1			Graph Metrics	Other Columns				
2	Vertex 1	Vertex 2	Reciprocated?	Add Your Own Columns Here	Relationship	Date (UTC)	Tweet	URLs
36045	andreasand	andreasand	No		Tweet	9/4/2019 13:15	Im Kampf gegen de <a href="#">https://t.co/...</a>	
36046	andreasand	andreasand	No		Tweet	9/4/2019 13:16	Sofortige Freilassur <a href="#">https://t.co/...</a>	
36047	andreasand	andreasand	No		Tweet	9/4/2019 13:16	Dialog und Deeskal: <a href="#">https://t.co/...</a>	
36048	andreasand	andreasand	No		Retweet	9/4/2019 13:20	Dialog und Deeskal: <a href="#">https://t.co/...</a>	
36049	andreasand	andreasand	No		Retweet	9/4/2019 13:20	Sofortige Freilassur <a href="#">https://t.co/...</a>	
36050	andreasand	andreasand	No		Retweet	9/4/2019 13:20	Im Kampf gegen den Klima <a href="#">https://t.co/...</a>	
36051	andreasand	andreasand	No		Retweet	9/4/2019 13:20	Katastrophe Zust: <a href="#">https://t.co/...</a>	
36052	andreasand	andreasand	No		Retweet	9/4/2019 13:20	Cum-Ex-Prozess: G <a href="#">https://t.co/...</a>	
36053	andreasand	andreasand	No		Retweet	9/4/2019 13:20	Neue Besen kehren <a href="#">https://t.co/...</a>	
36054	tumalwas	andreasand	No		Retweet	8/29/2019 13:49	Grundlegender Kurswechs <a href="#">https://t.co/...</a>	
36055	jagodamari	jagodamari	No		Tweet	8/29/2019 12:39	In Deutschland ist n <a href="#">https://t.co/...</a>	
36056	jagodamari	jagodamari	No		Tweet	9/1/2019 20:42	Herr Gauland, fühlen Sie s <a href="#">https://t.co/...</a>	
36057	tumalwas	jagodamari	No		Retweet	8/29/2019 16:02	In Deutschland ist noch so <a href="#">https://t.co/...</a>	
36058	watch_unic	watch_unic	No		Tweet	8/23/2019 18:18	Ziemlich krass. Die : <a href="#">https://t.co/...</a>	
36059	watch_unic	watch_unic	No		Tweet	8/26/2019 14:29	In den #USA würden wir d <a href="#">https://t.co/...</a>	
36060	watch_unic	watch_unic	No		Tweet	8/30/2019 8:58	"Allein in der verga <a href="#">https://t.co/...</a>	
36061	watch_unic	watch_unic	No		Tweet	8/31/2019 12:44	Weil wahrscheinlich einig <a href="#">https://t.co/...</a>	
36062	watch_unic	watch_unic	No		Retweet	8/31/2019 19:49	Nicht nur bei #YouTube ü <a href="#">https://t.co/...</a>	
36063	tumalwas	watch_unic	No		Retweet	8/30/2019 9:03	"Allein in der vergangener <a href="#">https://t.co/...</a>	
36064	tumalwas	korallenher	No		Mentions	9/1/2019 13:47	@elgrunwald @Korallenher <a href="#">https://t.co/...</a>	
36065	tumalwas	elgrunwald	No		Replies to	9/1/2019 13:47	@elgrunwald @Korallenher <a href="#">https://t.co/...</a>	
36066	franzi_chule	franzi_chule	No		Tweet	9/1/2019 16:42	Ralf Brinkhaus (Fraktions <a href="#">https://t.co/...</a>	
36067	tumalwas	franzi_chule	No		Retweet	9/1/2019 16:49	Ralf Brinkhaus (Fraktions <a href="#">https://t.co/...</a>	
36068	suse1603	cdcsubt	No		Mentions	9/1/2019 18:12	Gerade eben #ARD #Afd <a href="#">https://t.co/...</a>	
36069	tumalwas	suse1603	No		Retweet	9/1/2019 18:26	Gerade eben #ARD #Afd <a href="#">https://t.co/...</a>	
36070	tumalwas	cdcsubt	No		Mentions	9/1/2019 18:26	Gerade eben #ARD #Afd <a href="#">https://t.co/...</a>	
36071	isegrimm_6	fdp	No		Mentions	9/4/2019 15:17	Ist das @fdp ... unc <a href="#">https://t.co/...</a>	
36072	tumalwas	isegrimm_6	No		Retweet	9/4/2019 15:24	Ist das @fdp ... und kann <a href="#">https://t.co/...</a>	
36073	tumalwas	fdp	No		Mentions	8/27/2019 12:14	Immobilien-Lobbyisten ha <a href="#">https://t.co/...</a>	



# NETWORKS AND SOCIAL NETWORK ANALYSIS

4

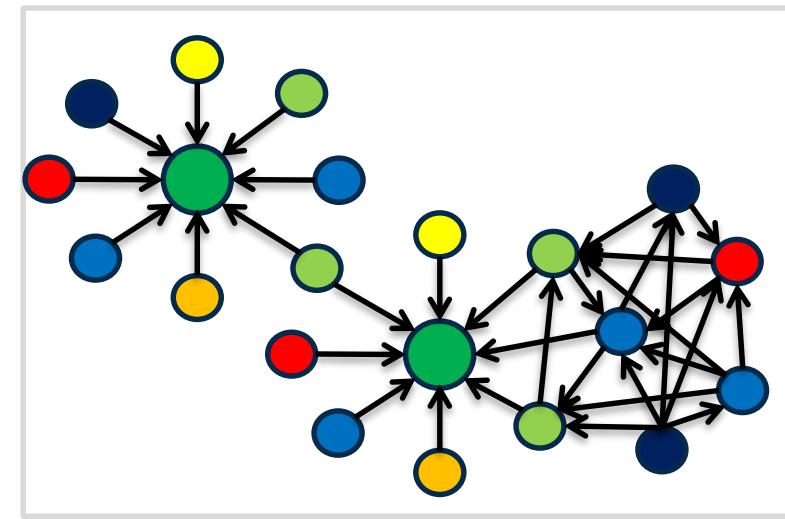
## Network

A network consists of **VERTICES** and **EDGES**.

An **EDGE** is a connection between two **VERTICES**.

## Social Network Analysis (SNA)

- Measuring and mapping collections of connections
- Describing the position of an individual within a network



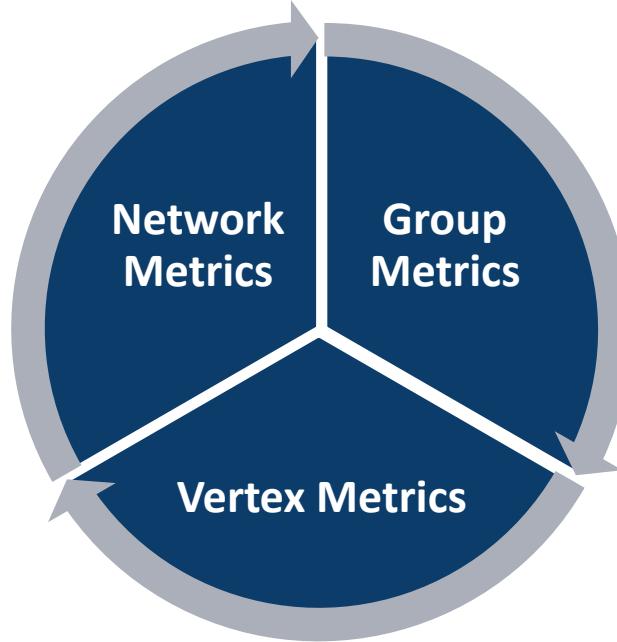
## Twitter Network

**VERTEX**  Twitter User

**EDGE**  tweet, retweet, mention, reply, favourite, follow

# KEY FEATURES OF NODEXL PRO

## 2. Network Analysis



## 3. Content Analysis

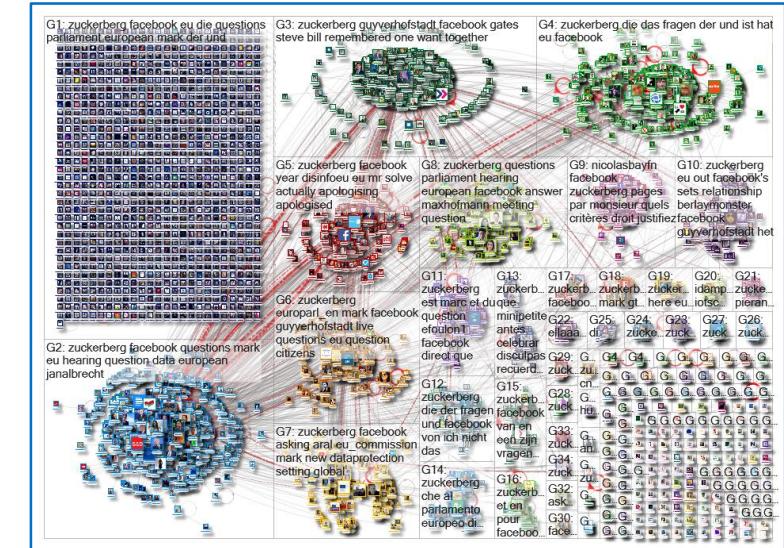
Text Analysis

Top Contents Analysis

Sentiment Analysis

Time Series Analysis

## 4. Visualization



## 1. Data Import

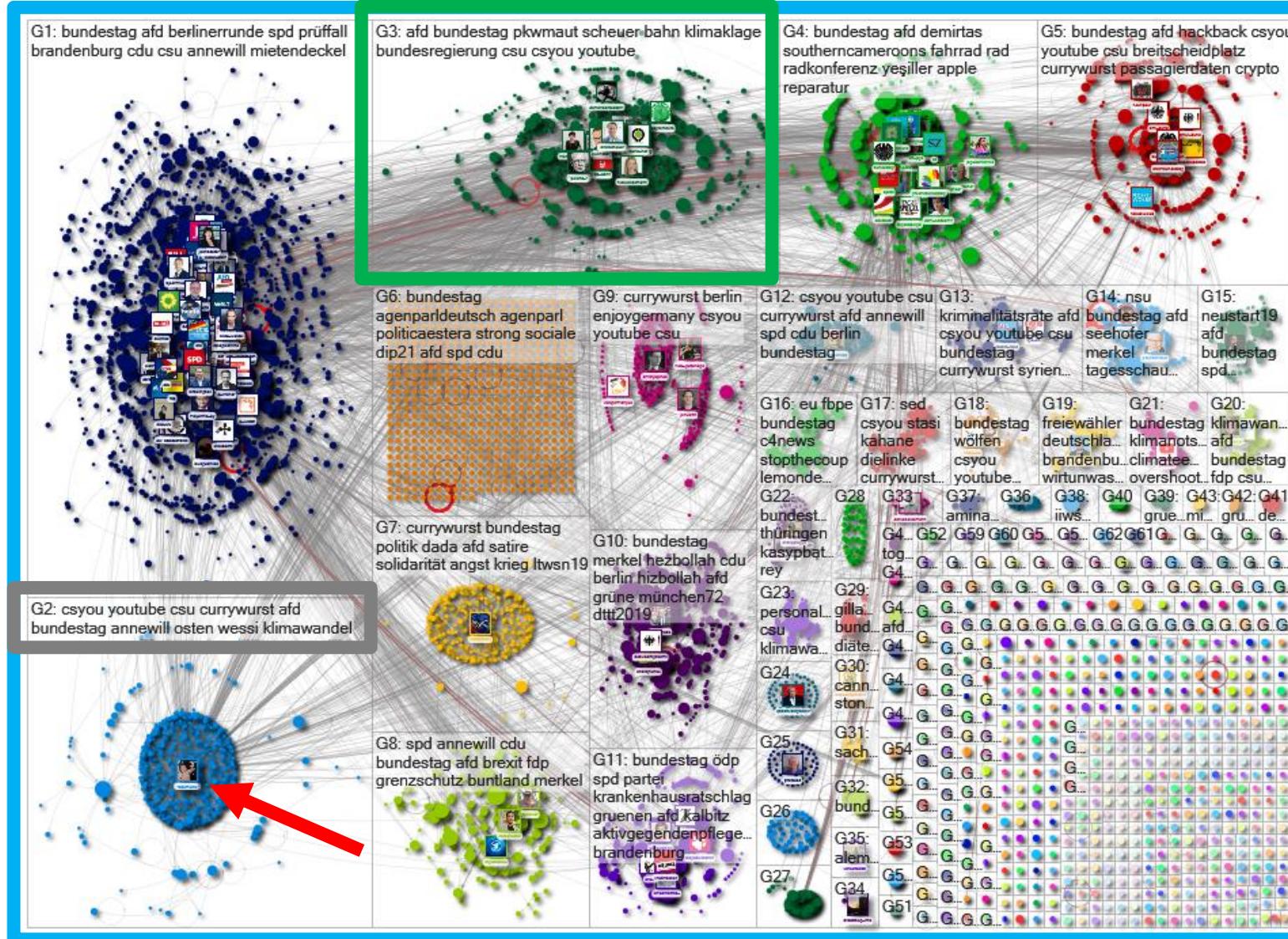


## 6. Automation with Data Recipes

## 5. Publish



# SOCIAL NETWORK ANALYSIS



## Network Overview

- Density / Modularity

## Group Analysis

- Cluster Algorithm
- Density

## Vertex Metrics

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

## Content Analysis

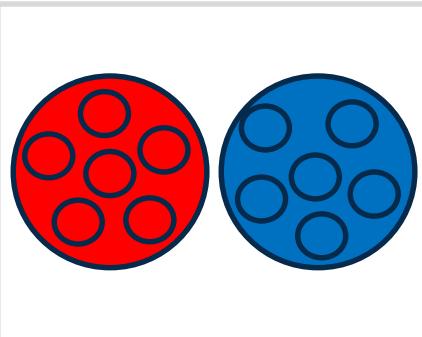
- Top hashtags, words, URLs, ...
- Sentiment, time series

## Layout Algorithms

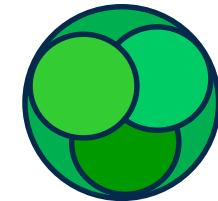
- Group-In-A-Box: Treemap
- Harel-Koren Fast Multiscale

# NETWORK SHAPES

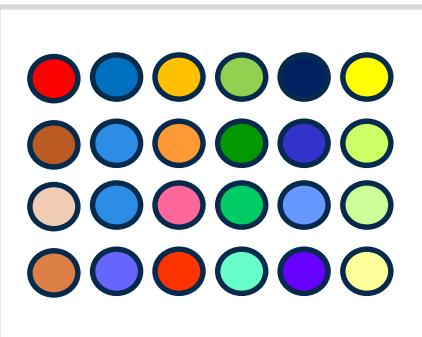
[Divided]  
*Polarized Crowds*



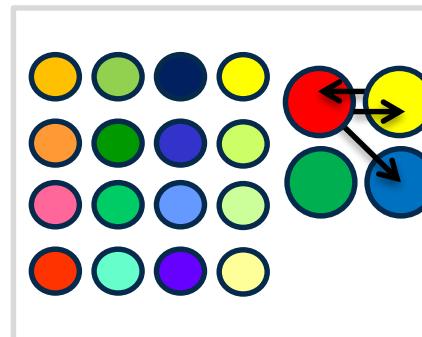
[Unified]  
*Tight Crowd*



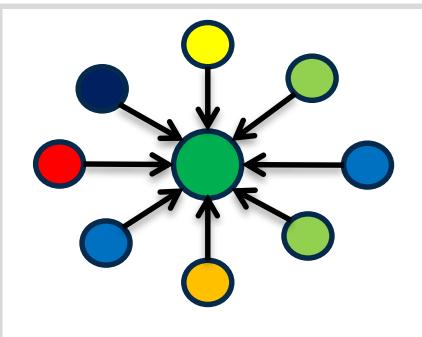
[Fragmented]  
*Brand Clusters*



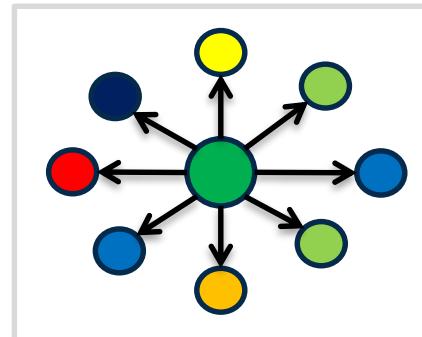
[Clustered]  
*Community Clusters*



[In-Hub & Spoke]  
*Broadcast Network*



[Out-Hub & Spoke]  
*Support Network*



# NETWORK SHAPES

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

f t x e +

## Mapping Twitter Topic Networks: From Polarized Crowds to Community Clusters

BY MARC A. SMITH, LEE RAINIE, BEN SCHNEIDERMAN 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.

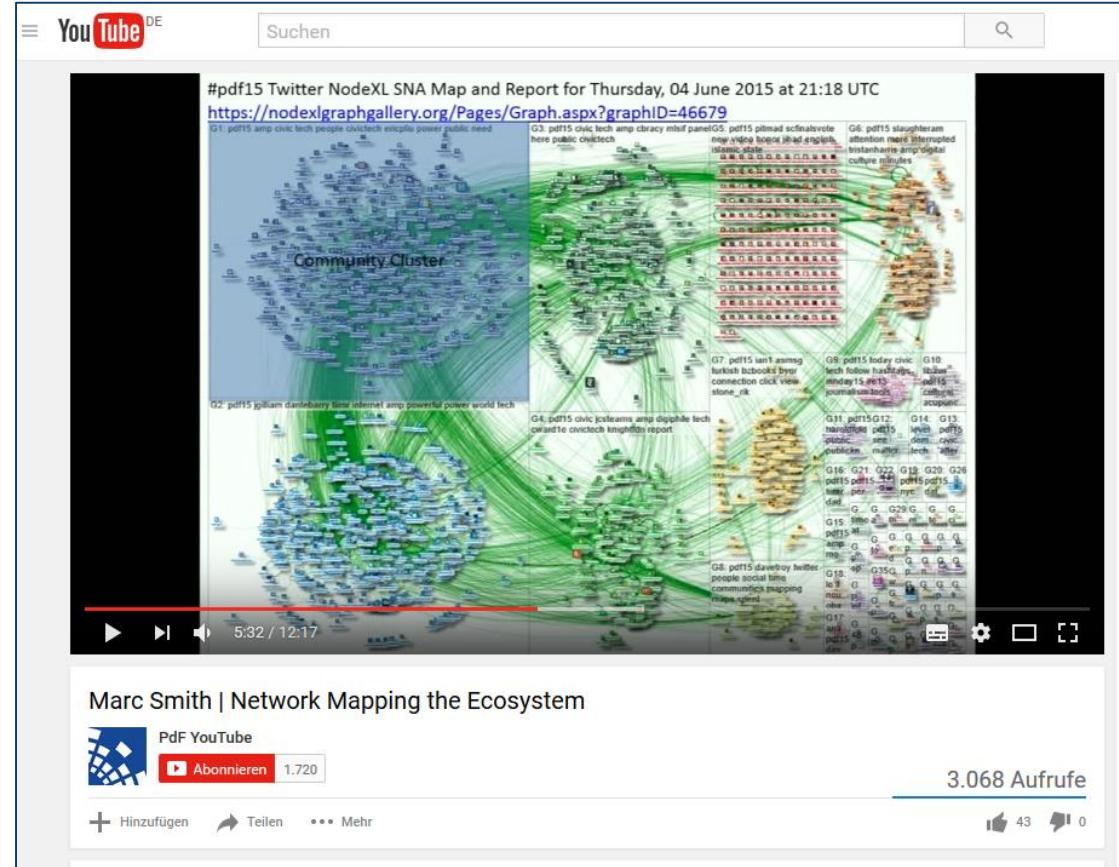
If a topic is political, it is common to see two separate, polarized crowds take shape. They form two distinct discussion groups that mostly do not interact with each other. Frequently these are recognizably liberal or conservative groups. The participants within each separate group commonly mention 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

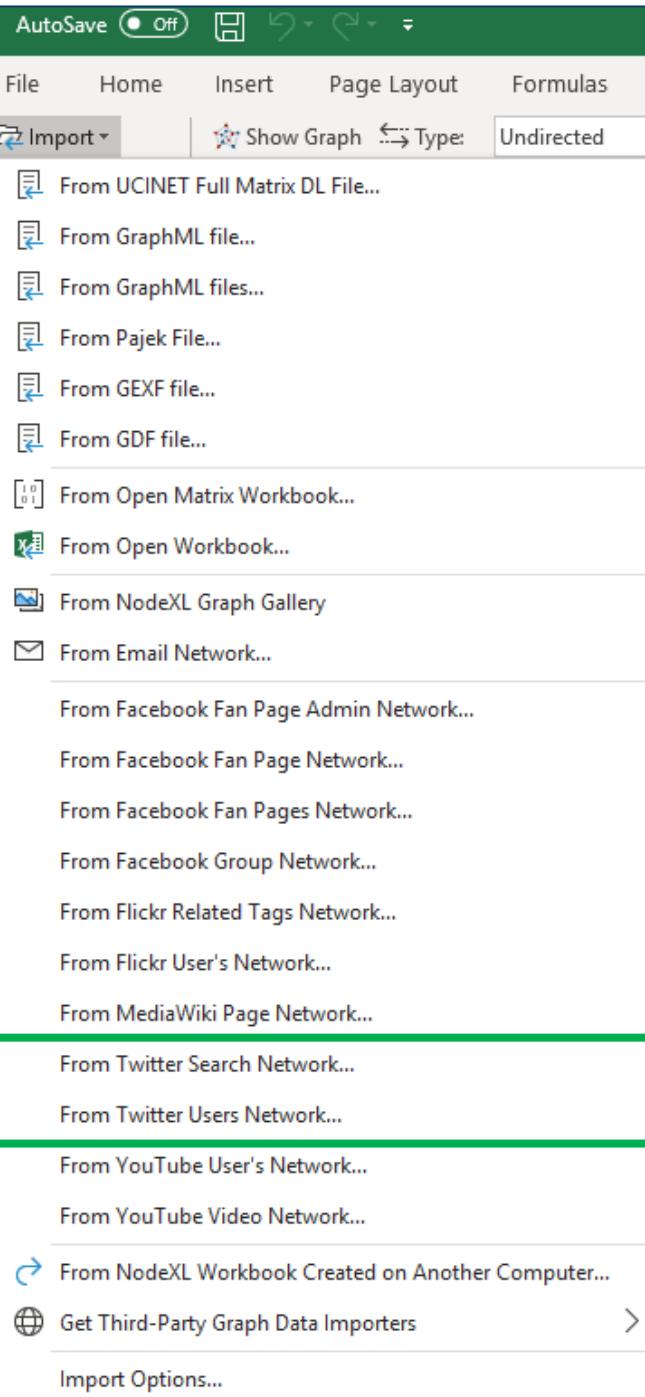
TABLE OF CONTENTS

- 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 DATA IMPORTERS

## From Twitter Search Network...

- max. 18,000 tweets per search
- past max. 9-10 days from date of query
- Reduced data volumes for trending topics

## From Twitter Users Network...

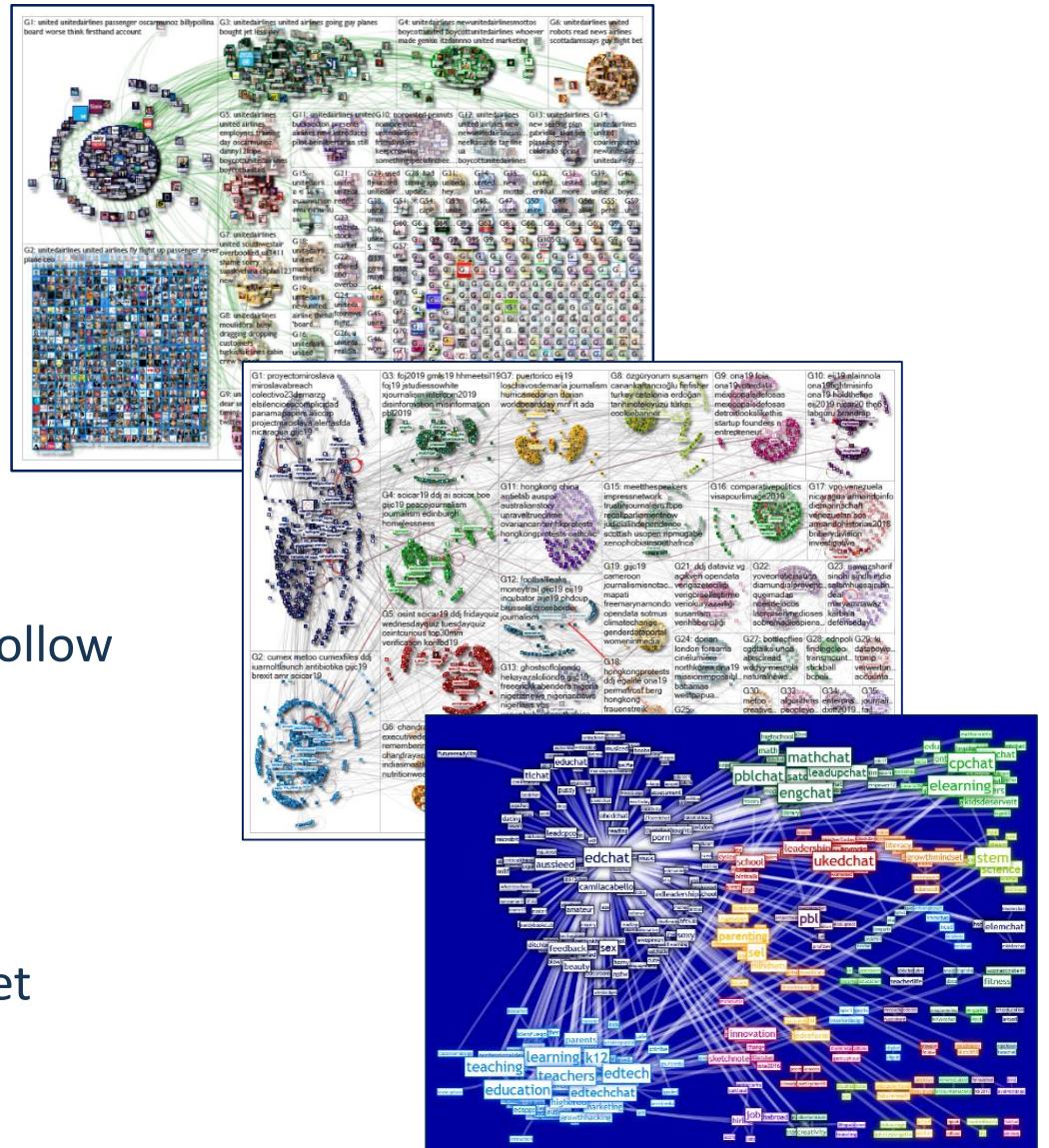
- max. 3,200 tweets per user
- Going backwards in time, no time limit
- Time limit for large data downloads (15-minute intervals pause-and-resume)

→ Combine both importers for deep insights

# TWITTER NETWORKS

## Twitter Search Network

- Vertex: Twitter User
  - Edge creation: Tweet/Retweet/Mention/Reply



# YOUTUBE NETWORKS

## Video network

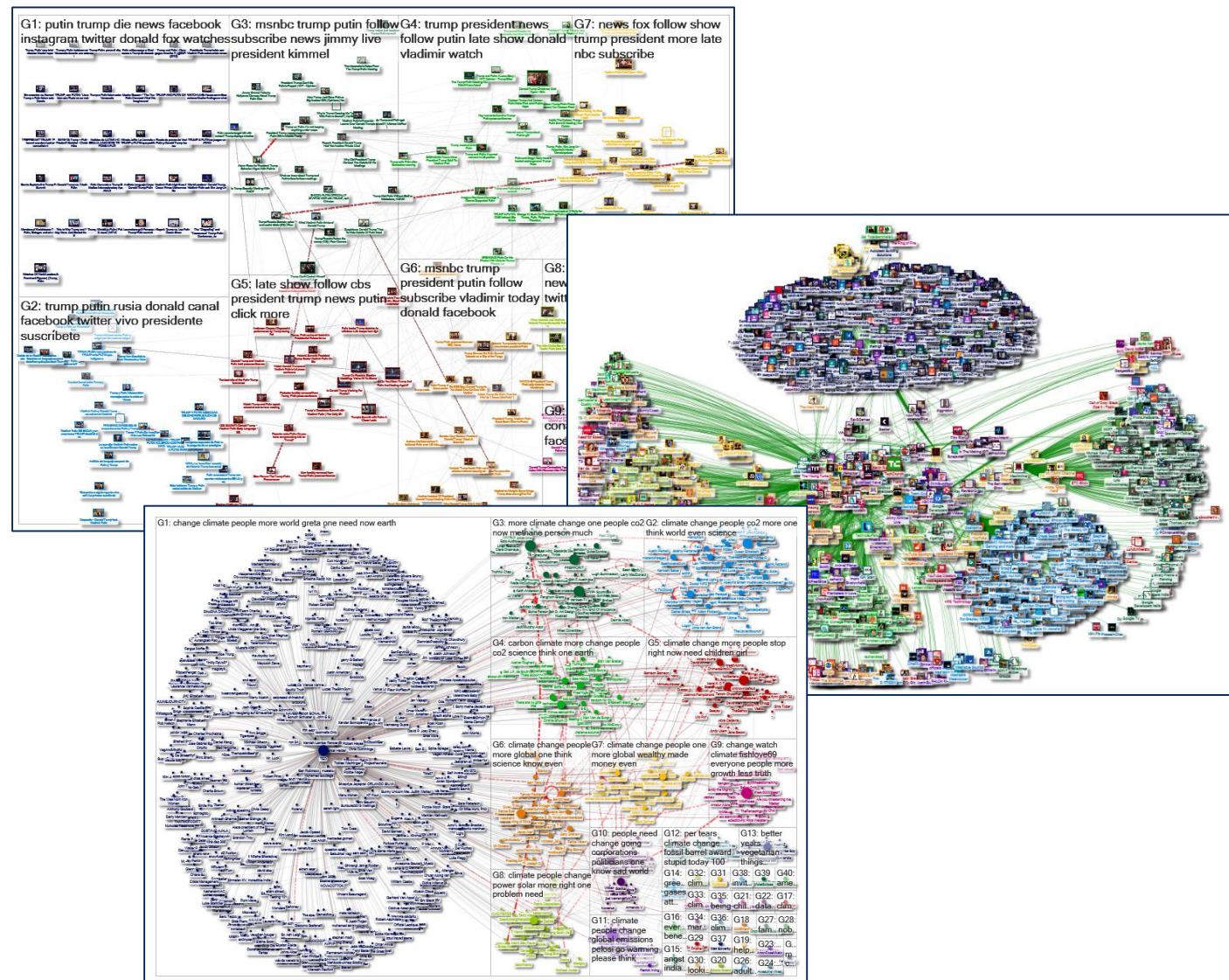
- Vertex: Video
  - Edge creation: same commenter

## User network

- Vertex: Youtube User
  - Edge creation: subscribed to

## User network (Netlytic data)

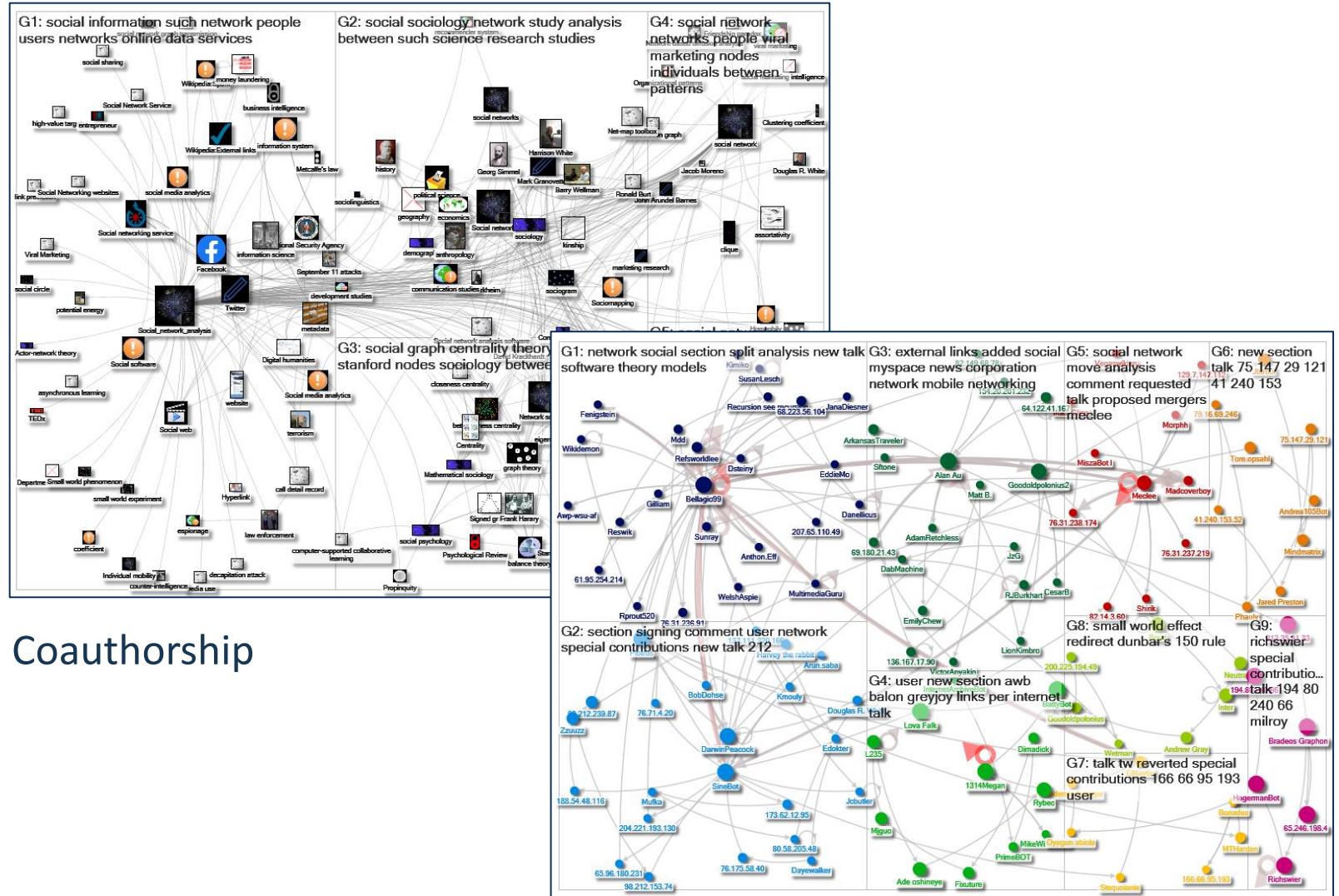
- Vertex: Youtube User
  - Edge creation: comment, reply



# WIKIPEDIA NETWORKS

## Page network

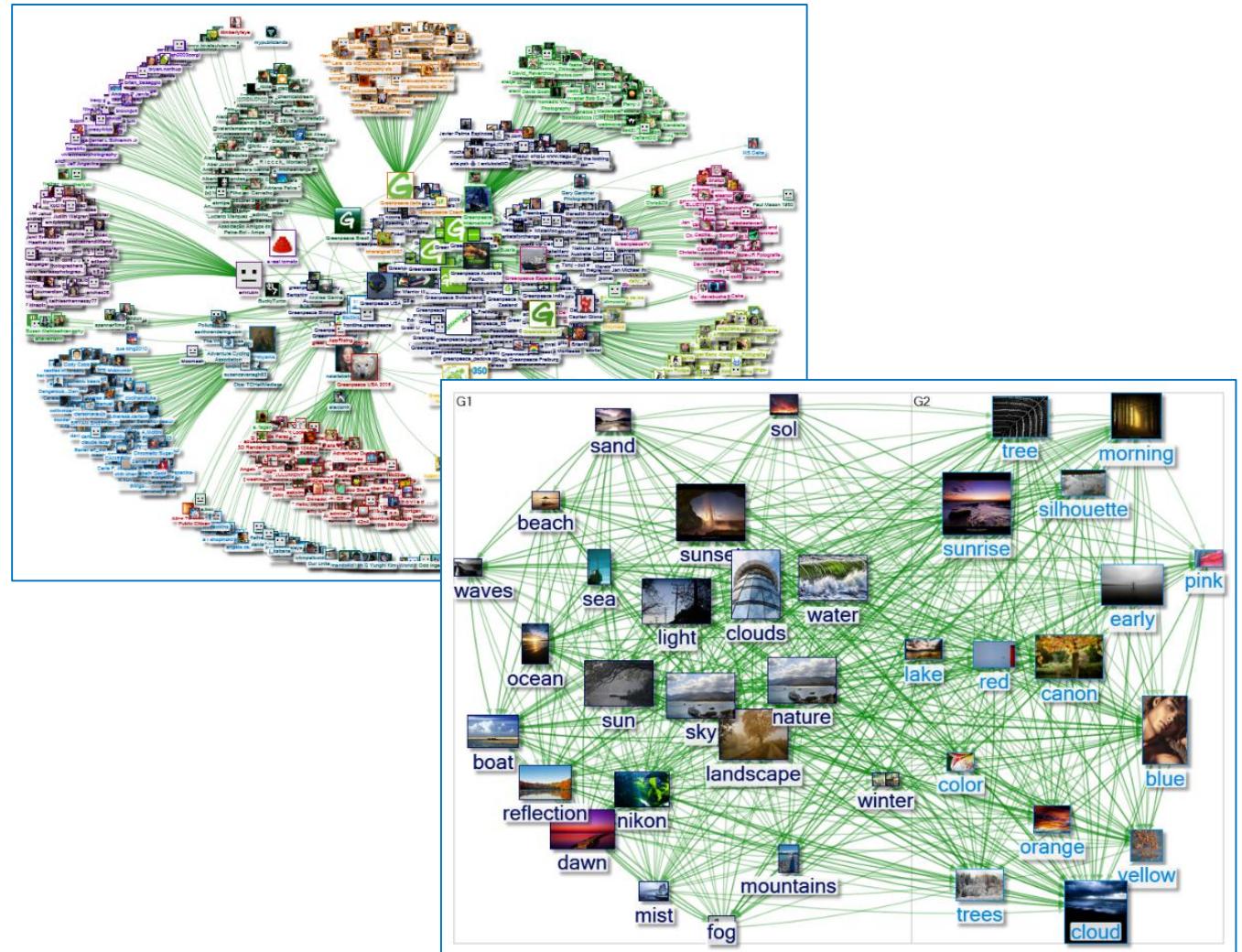
- Vertex: Page
- Edge creation: page link



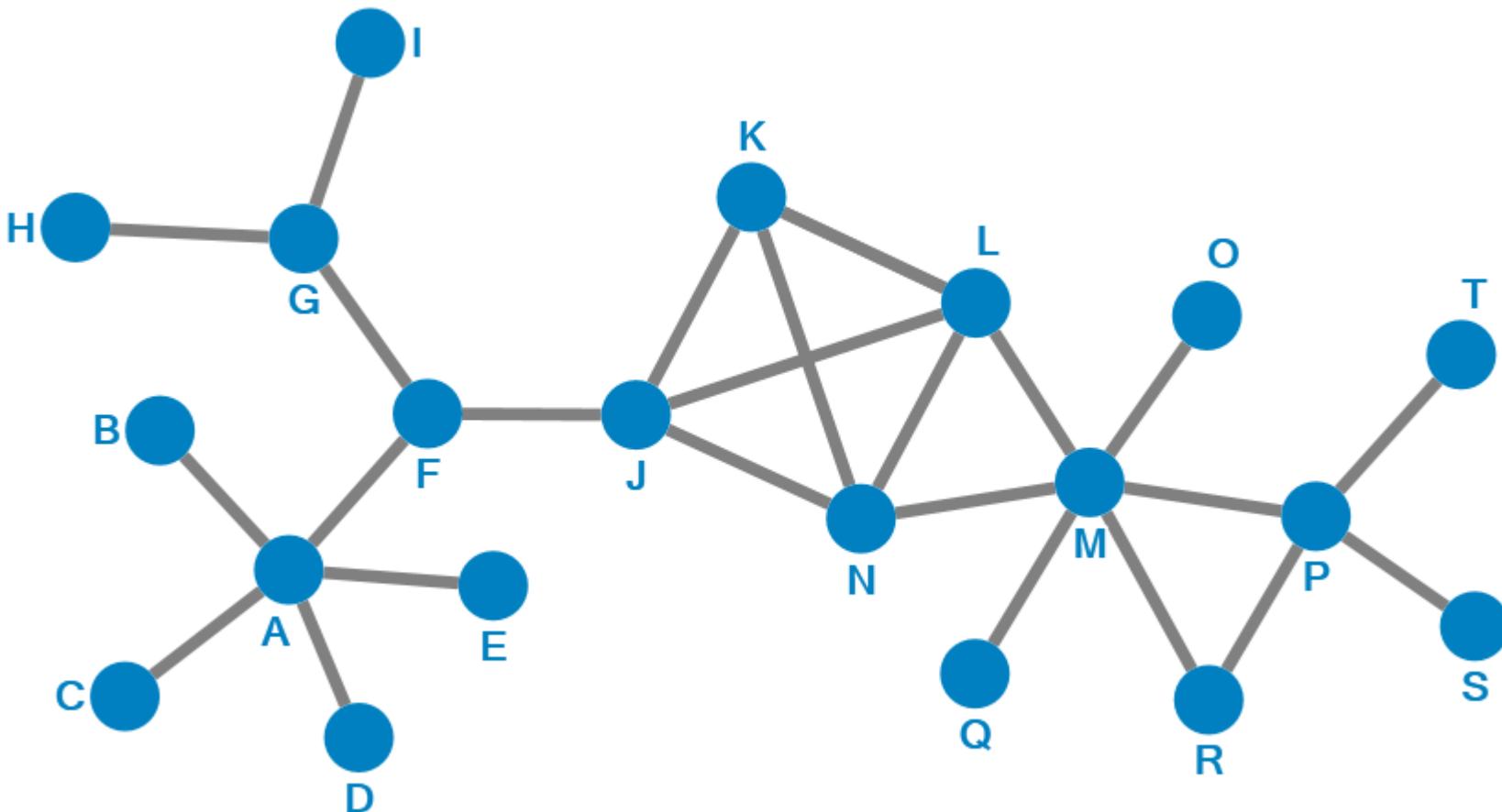
# FLICKR NETWORKS

## User network

- Vertex: Flickr User
- Edge creation: contact, comment

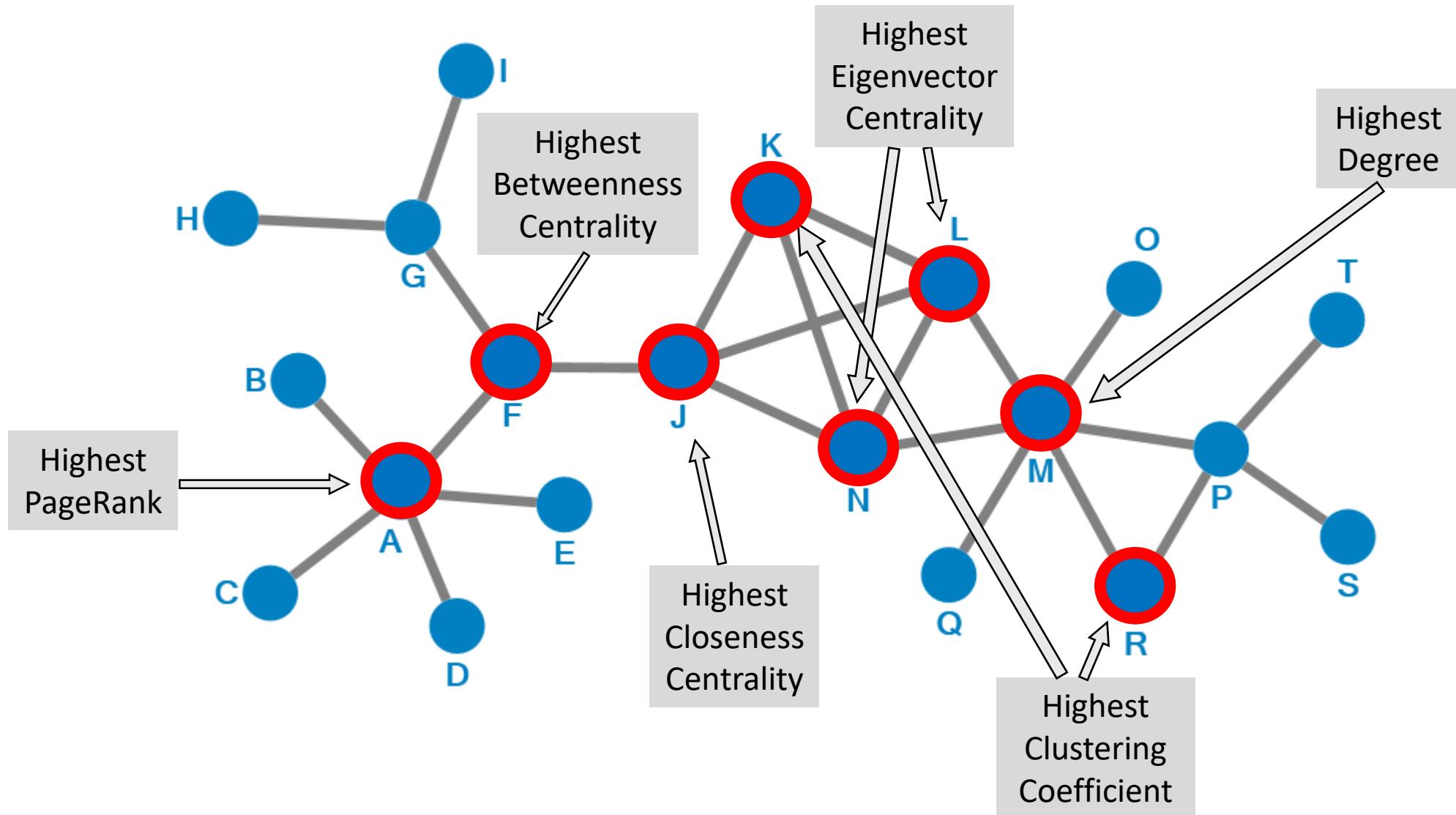


# MEASURING INFLUENCE: VERTEX METRICS



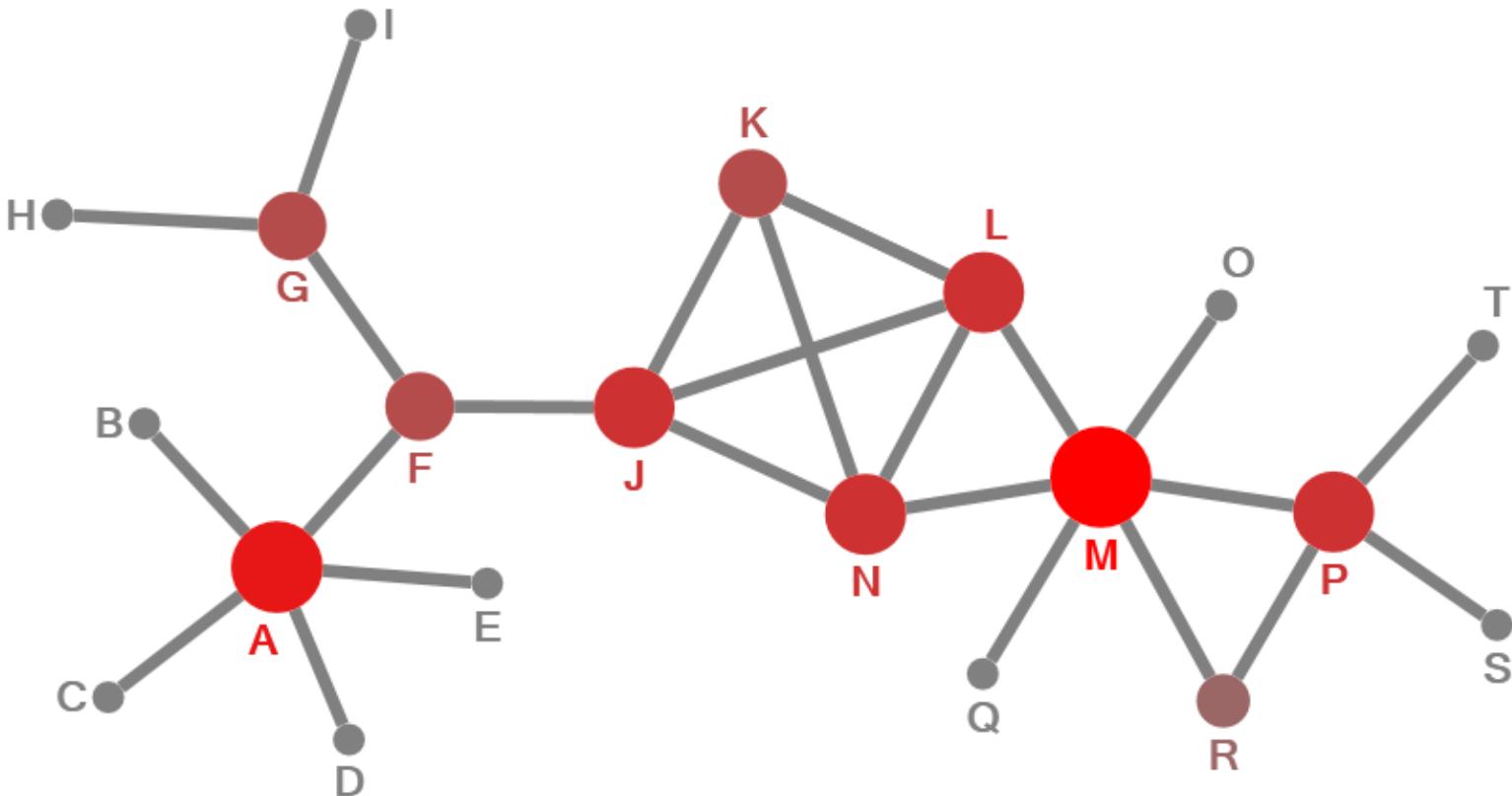
Derived from Borgatti (2006)

# MEASURING INFLUENCE: VERTEX METRICS



# DEGREE

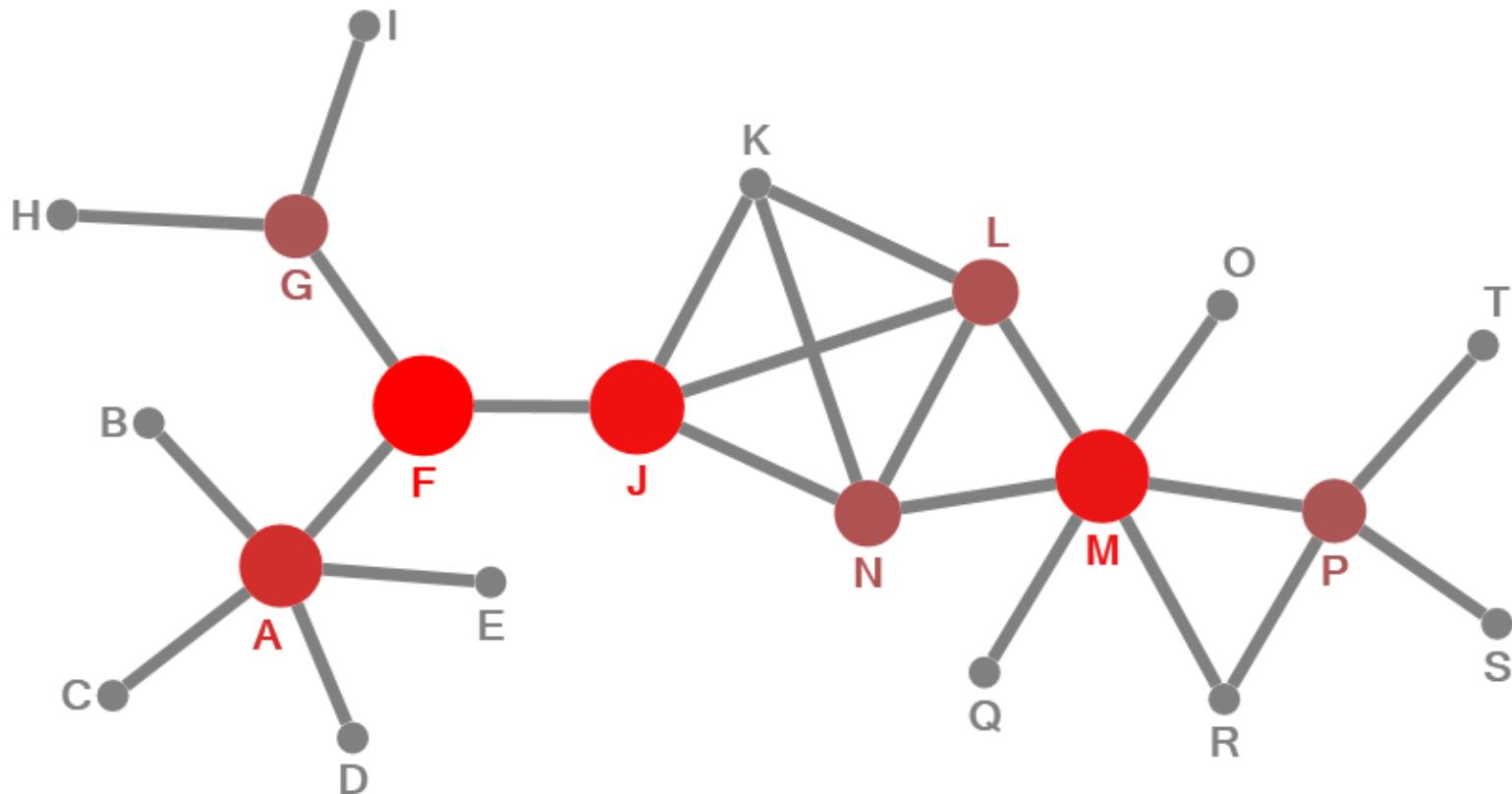
Vertex	Degree
M	6
A	5
L	4
N	4
J	4
P	4
K	3
G	3
F	3
R	2



Derived from Borgatti (2006)

# BETWEENNESS CENTRALITY

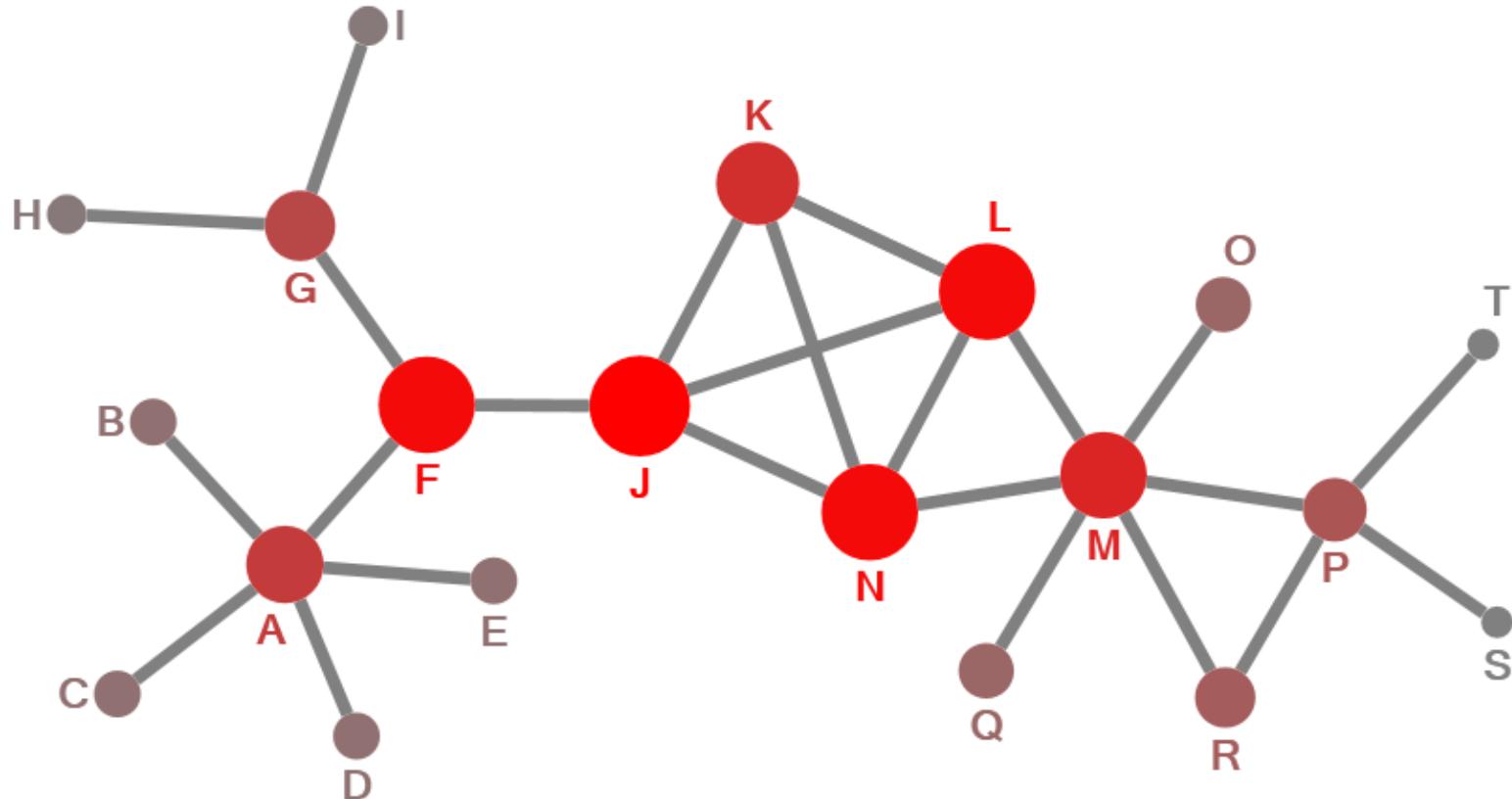
Vertex	Betweenness Centrality
F	103.000
J	90.000
M	87.000
A	66.000
L	38.500
N	38.500
P	35.000
G	35.000
K	0.000
R	0.000



Derived from Borgatti (2006)

# CLOSENESS CENTRALITY

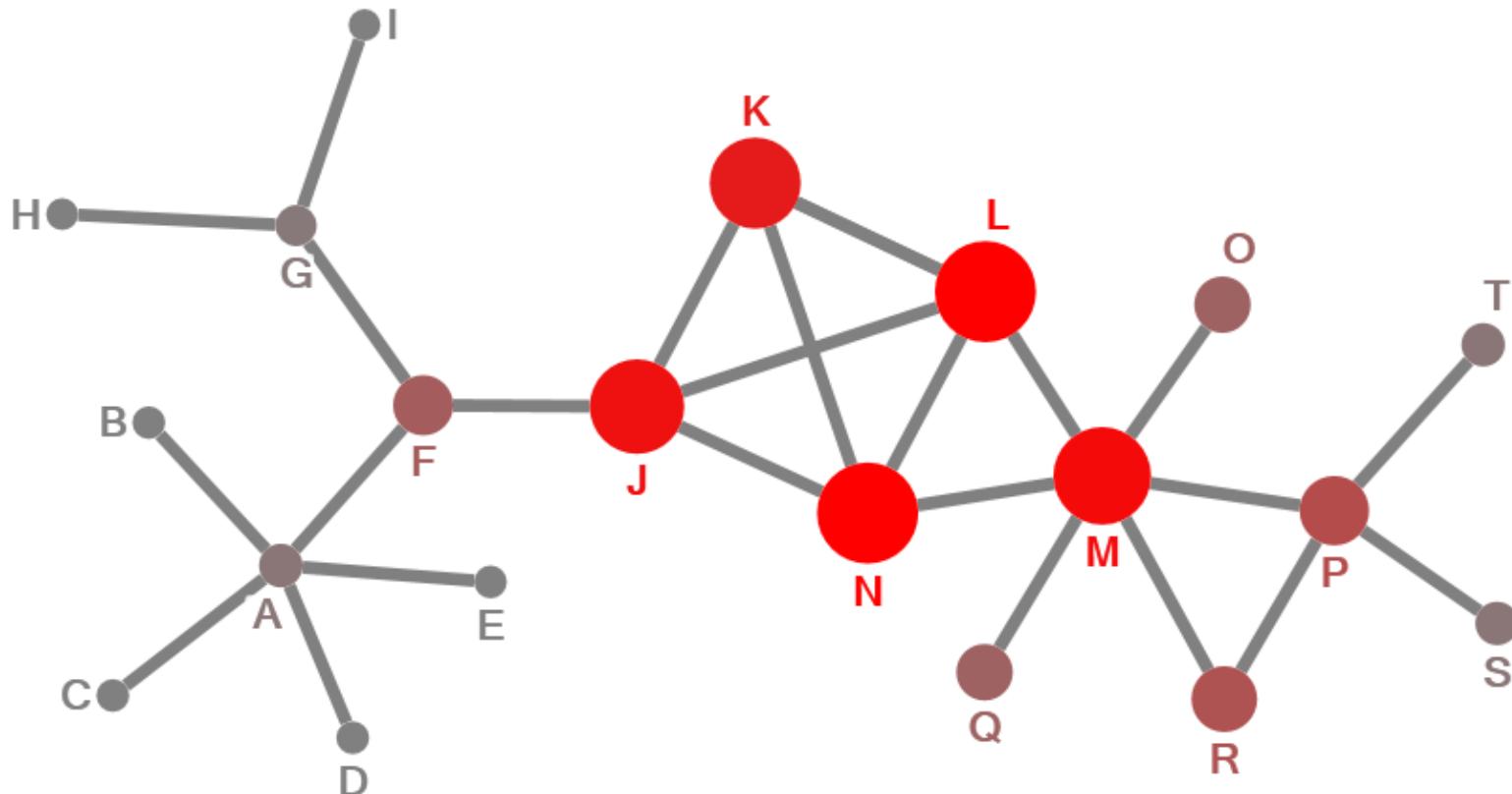
Vertex	Closeness Centrality
J	0.021
F	0.020
L	0.020
N	0.020
M	0.018
K	0.018
A	0.017
G	0.016
P	0.015
R	0.014



Derived from Borgatti (2006)

# EIGENVECTOR CENTRALITY

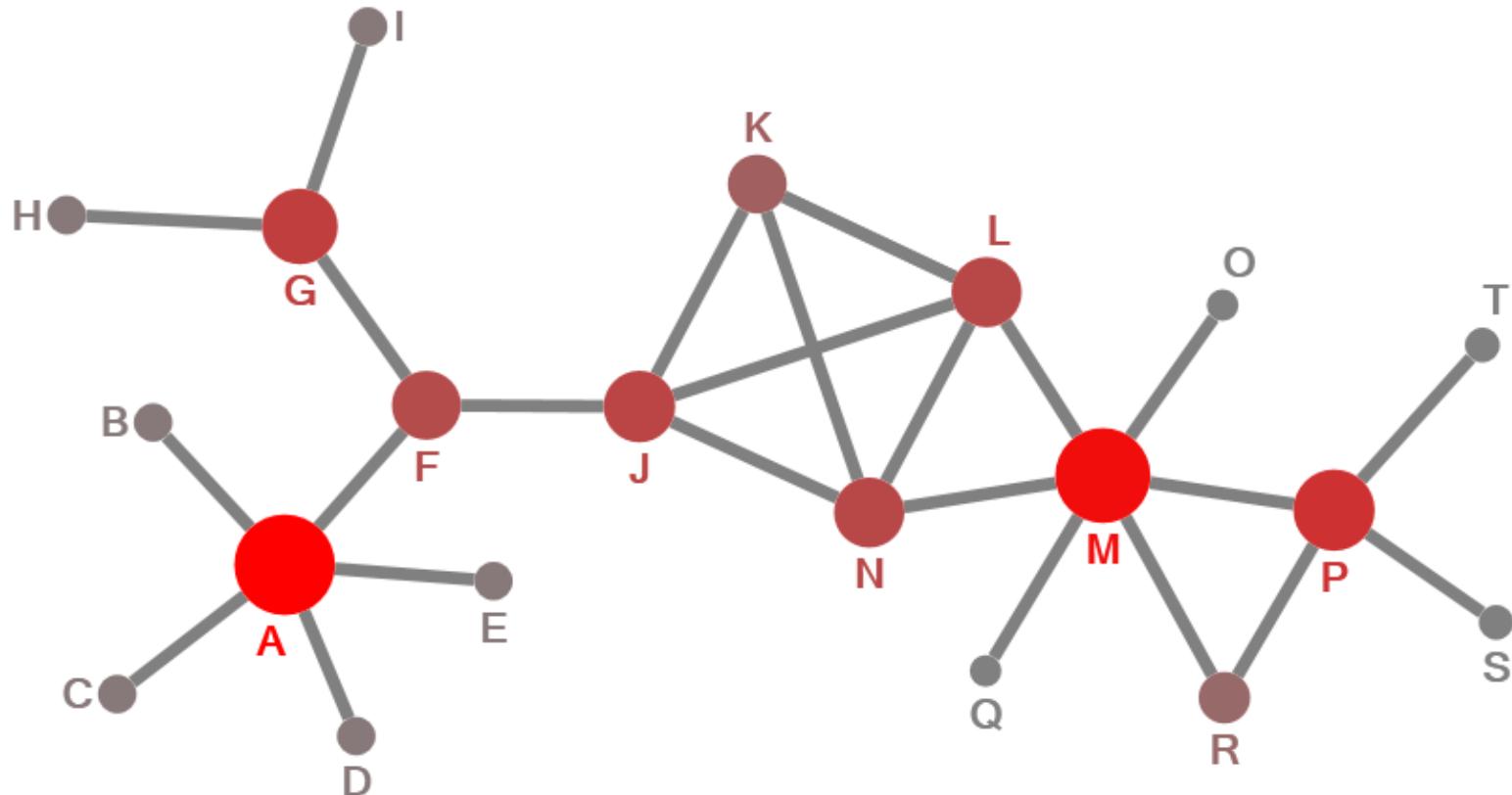
Vertex	Eigenvector Centrality
L	0.146
N	0.146
M	0.135
J	0.126
K	0.116
P	0.063
R	0.055
F	0.044
O	0.038
Q	0.038



Derived from Borgatti (2006)

# PAGE RANK

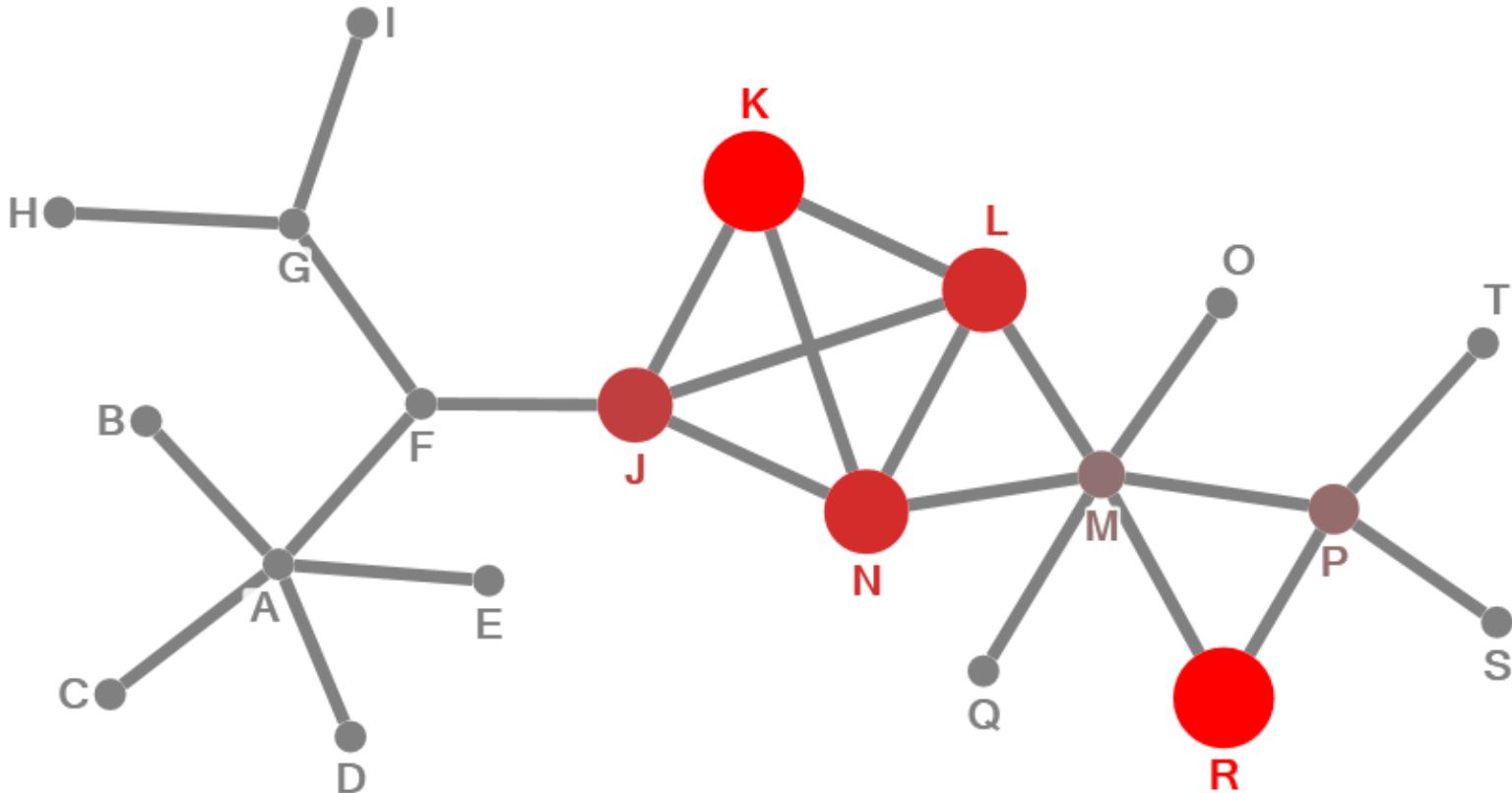
Vertex	PageRank
A	2.410
M	2.177
P	1.656
G	1.471
J	1.338
L	1.298
N	1.298
F	1.261
K	0.986
R	0.810



Derived from Borgatti (2006)

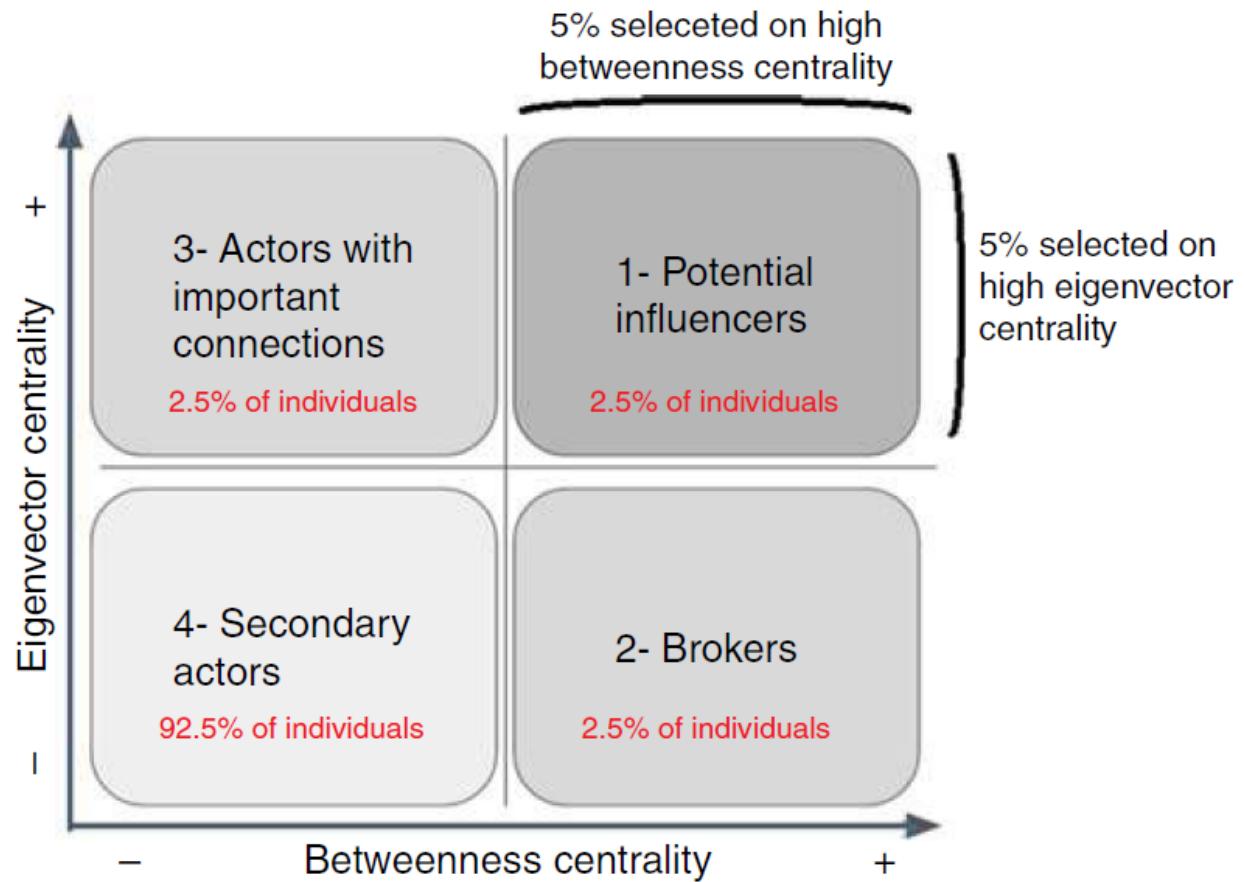
# CLUSTERING COEFFICIENT

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

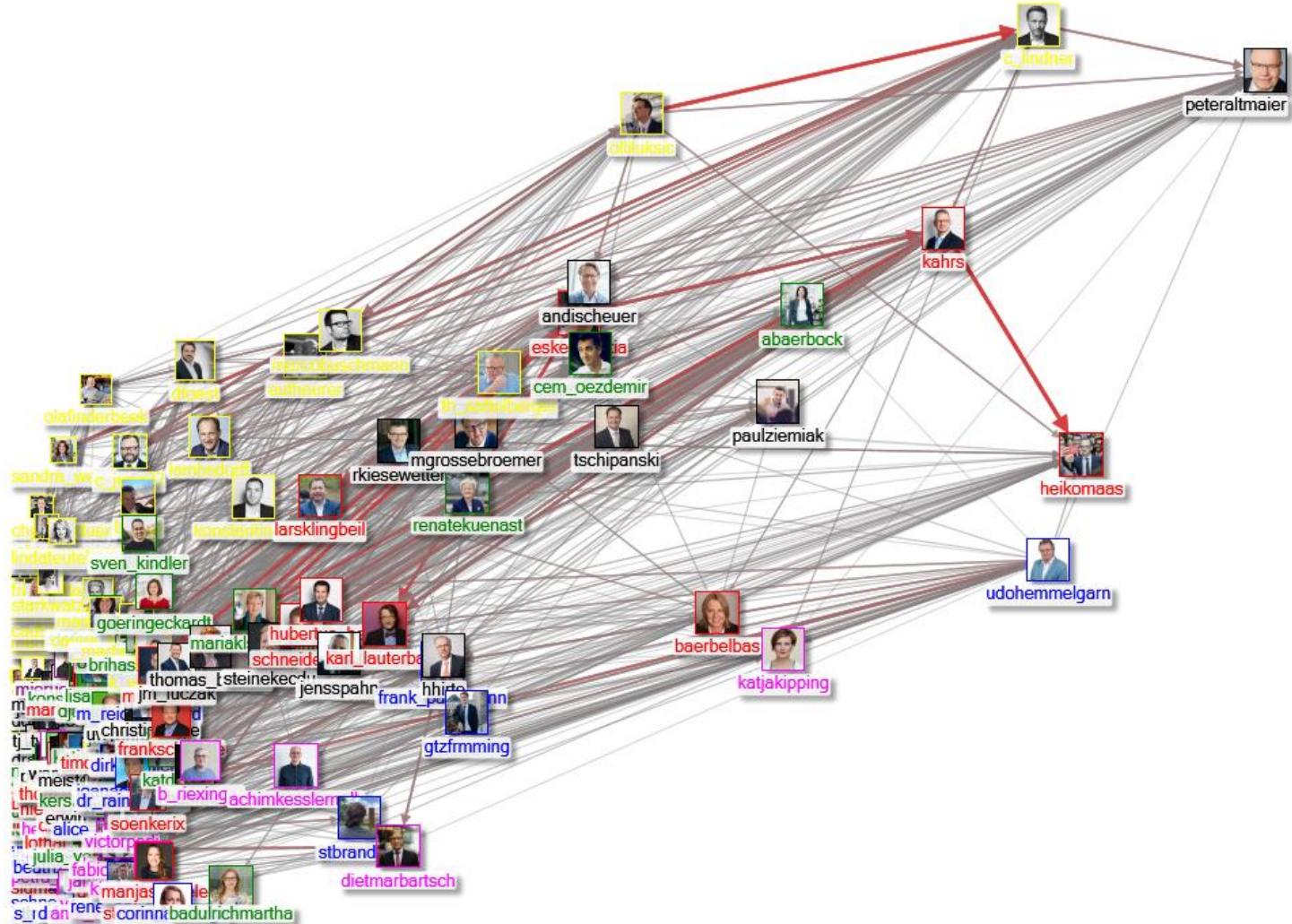
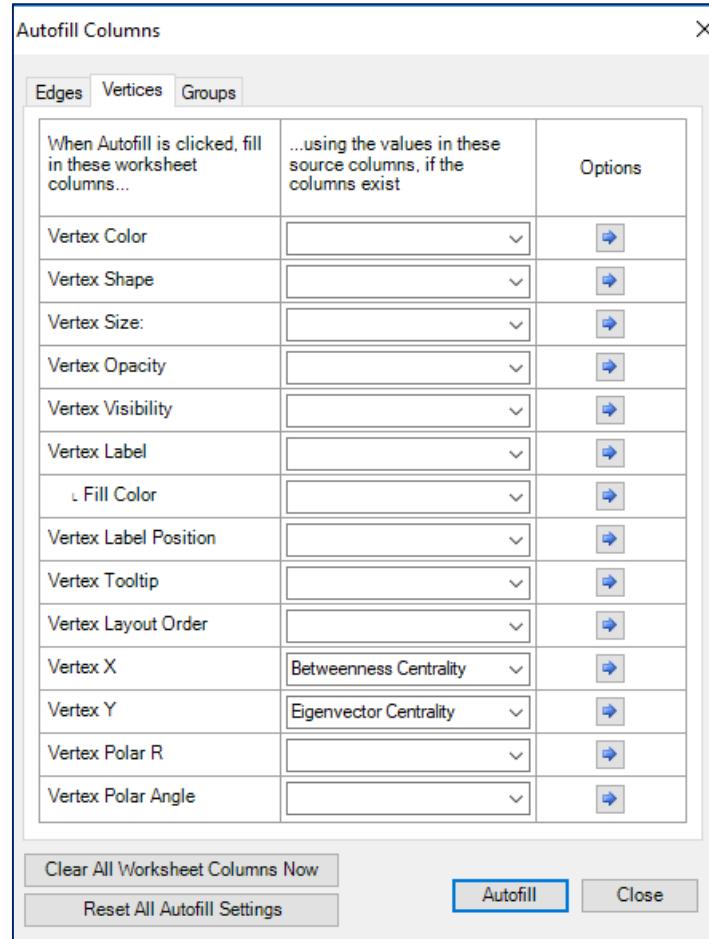


Derived from Borgatti (2006)

# MEASURING INFLUENCE: VERTEX METRICS

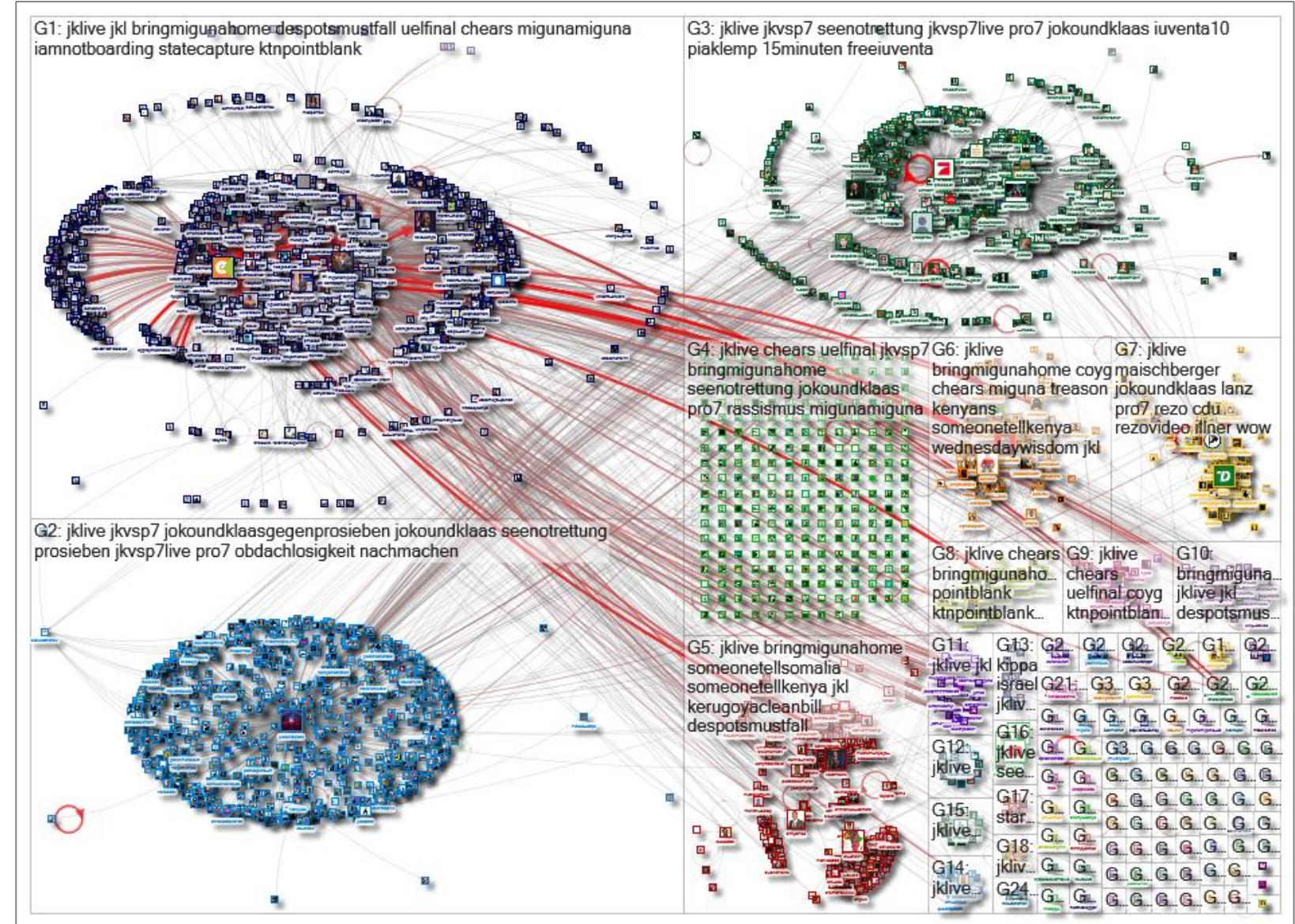
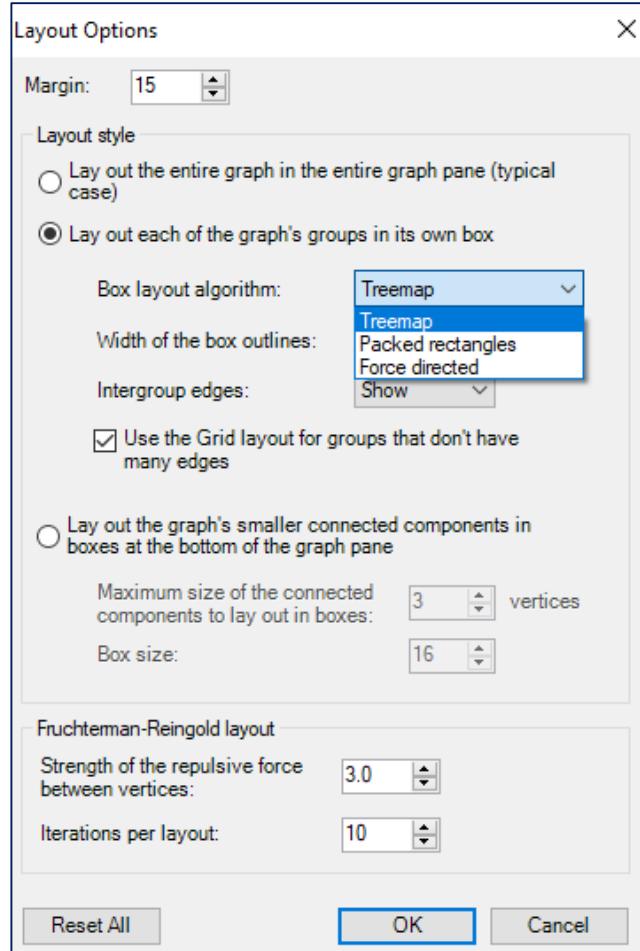


# MEASURING INFLUENCE: VERTEX METRICS

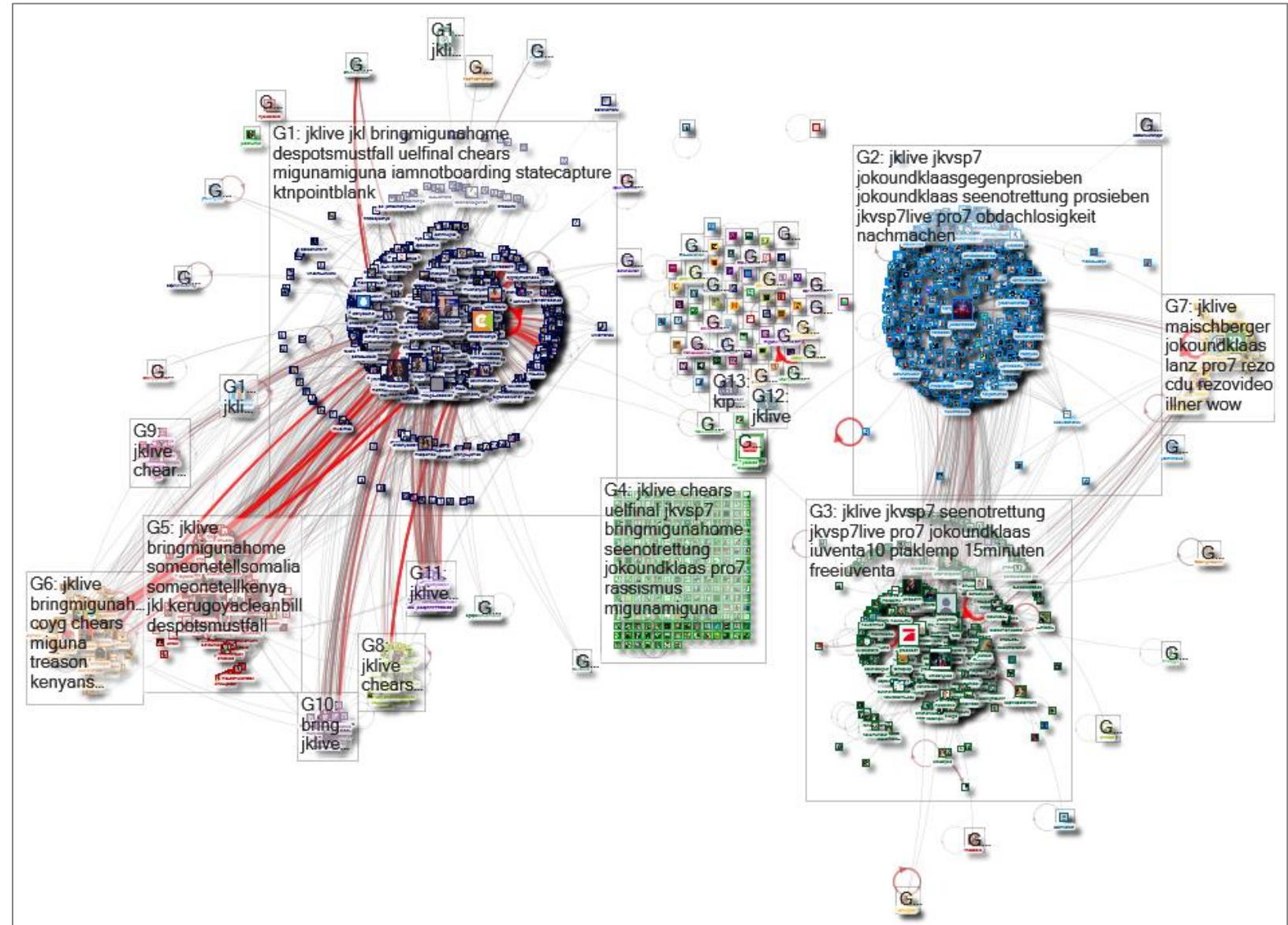
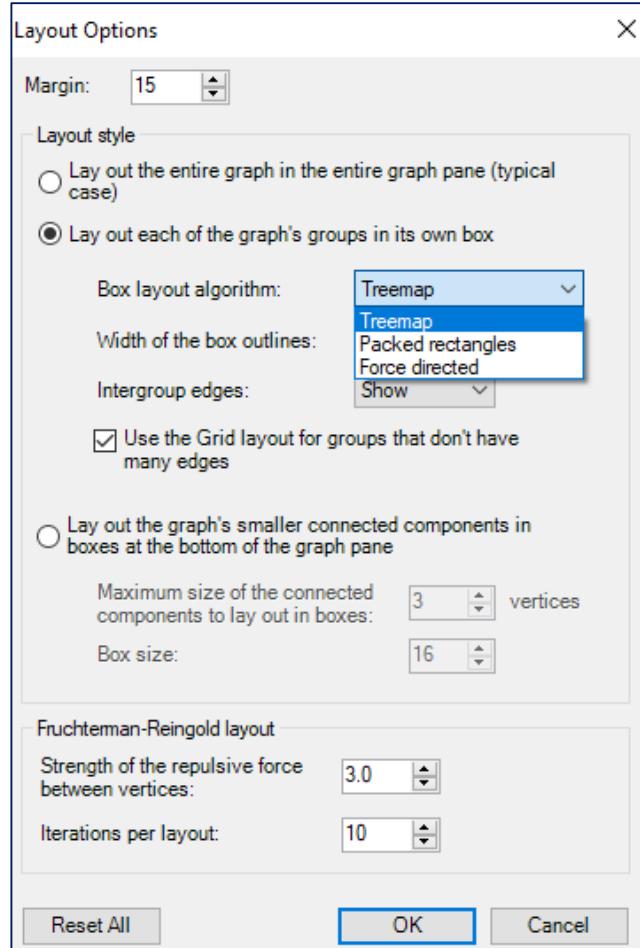


MdB Influencer Layout August 2019: <https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=209098>

# VISUALIZATION: GROUP-IN-A-BOX



# VISUALIZATION: GROUP-IN-A-BOX



# DATA EXPORT

1

# [NodeXLGraphGallery.org](#):

## NodeXL Pro network maps, reports and options

[Create Account](#) | [Sign In](#) | [Get NodeXL](#) | [Renew NodeXL Pro](#) | [Donate](#)

nxlts

Search

# NODEXL GRAPH GALLERY

A project from the  social media  
RESEARCH FOUNDATION

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

## Graphs that mention "nxlts":



[#MissionE Twitter NodeX...](#)



[Tesla Twitter Competitor...](#)



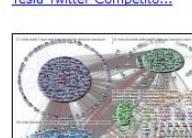
[Tesla Competitor Network...](#)



[Tesla Twitter Brand Net...](#)



[Tesla Twitter Brand Net...](#)



[@Tesla Twitter Community...](#)



[Tesla Ego Network ext 3...](#)



[Tesla Twitter Brand Net...](#)



[Tesla Twitter Brand Net...](#)



[@Tesla Twitter Community...](#)

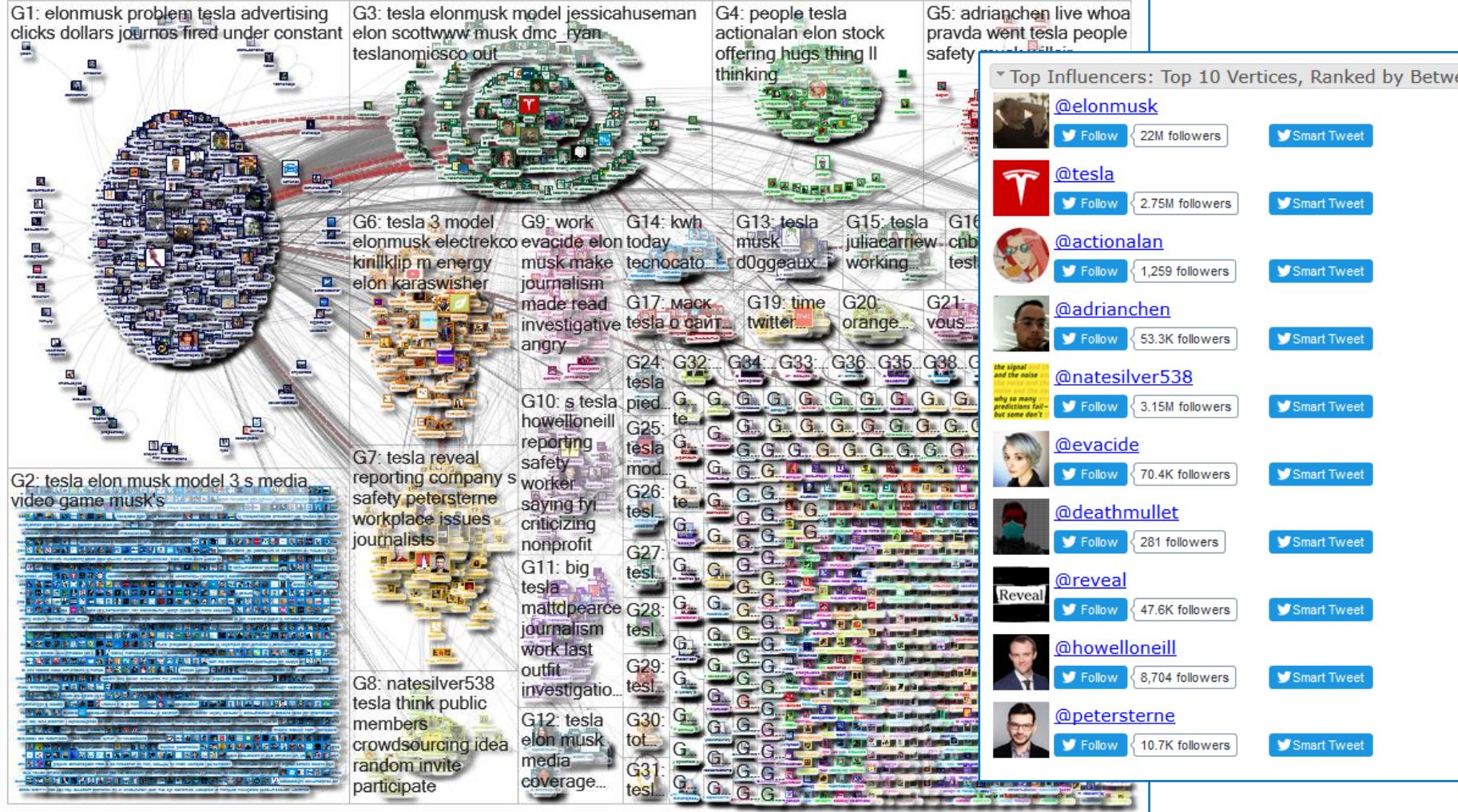


[nissan leaf Twitter Nod...](#)



[\"Nissan Leaf\" OR Nissan...](#)

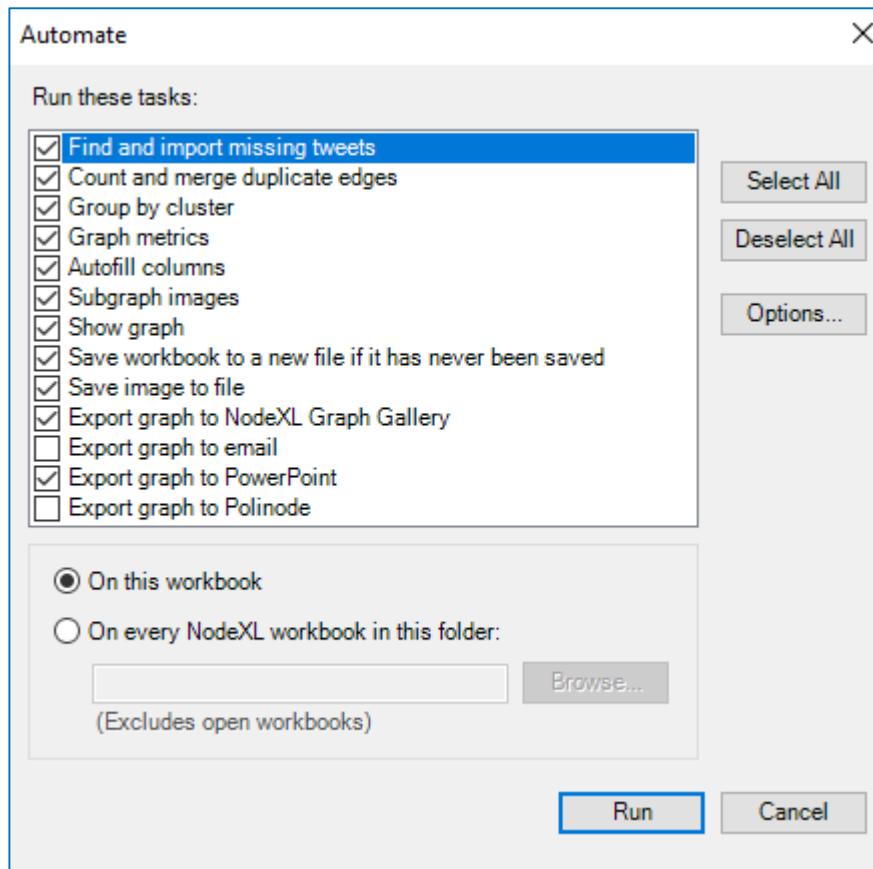
# NODEXL GRAPH GALLERY



- 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
- 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

# KEY FEATURE: AUTOMATION

28



The screenshot shows a YouTube video player with the following details:

- Title: NodeXL Pro Quick Start Guide: How to do a Twitter search network analysis
- Thumbnail: The NodeXL logo.
- Uploader: NodeXL
- Date: Am 06.07.2017 veröffentlicht
- Views: 383 Aufrufe
- Engagement: 4 likes, 0 dislikes, 1 share, 1 comment
- Subscription: ABONNIEREN 4

The video content itself displays the title "NodeXL Pro Quick Start Guide" and the subtitle "How to do a Twitter search network analysis".

<https://www.youtube.com/watch?v=mjAq8eA7uOM>

# EXAMPLE: USER ACCOUNT ANALYSIS

**Donald J. Trump**

@realDonaldTrump

45th President of the United States of America

Washington, DC

[Instagram.com/realDonaldTrump](https://Instagram.com/realDonaldTrump)

Joined March 2009

Tweets 38K Following 46 Follower 53M Likes 25 Moments 6

**Follow**

**Ronna McDaniel**

@GOPChairwoman

GOP Chairwoman | Wife, mother of two

**Follow**

**Brad Parscale**

@parscale

Campaign Manager for @realdonaldtrump 2020 Presidential Campaign.

**Follow**

**Tucker Carlson**

@TuckerCarlson

Host of "Tucker Carlson Tonight", weeknights at 8 PM ET @FoxNews. My new book #ShipOfFools is available for preorder below! Re-tweets are...

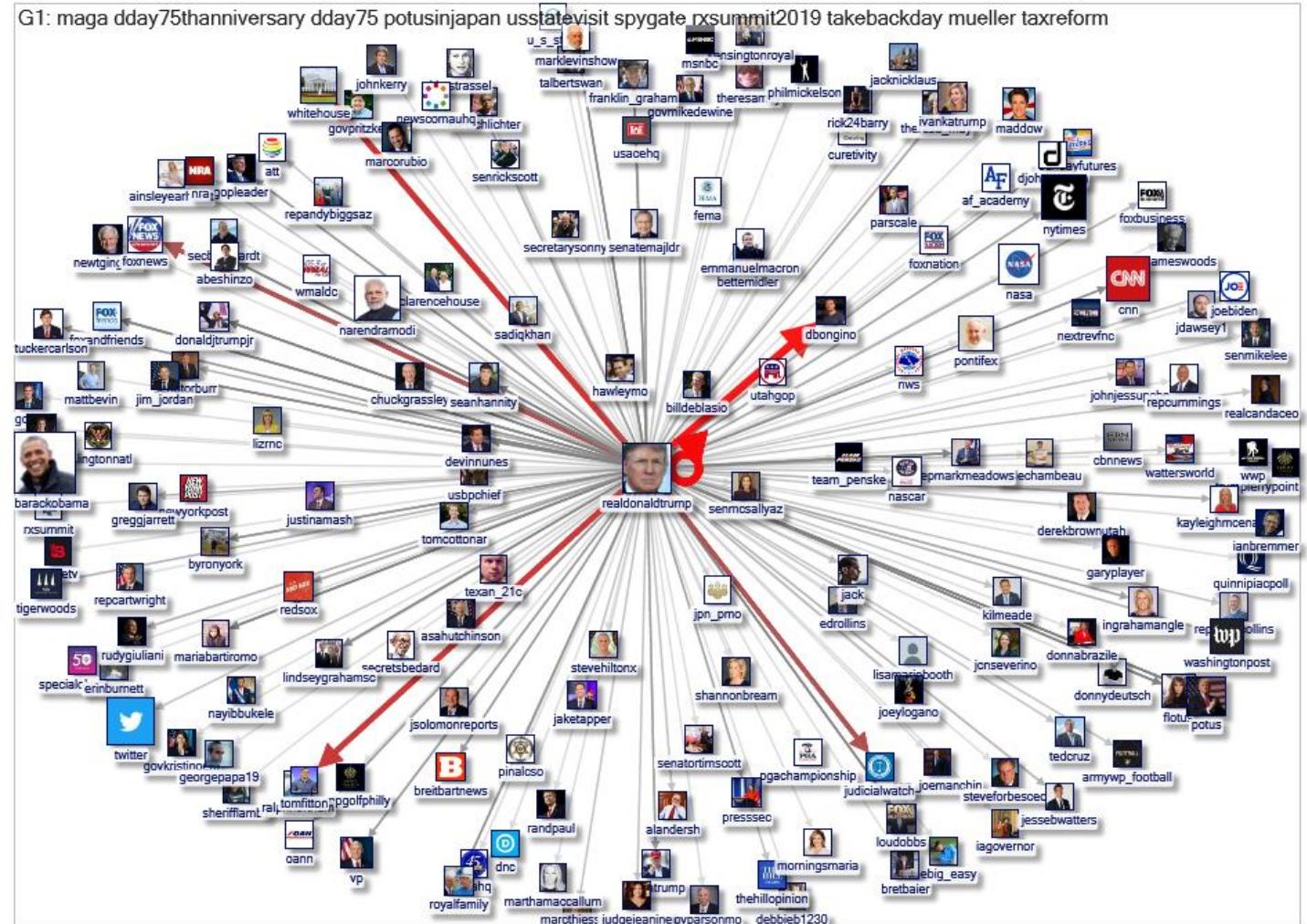
**Follow**

**Jesse Watters**

@JesseBWatters

Co-Host of "The Five" & Host of "Watters' World" on Fox News Channel. Speaking engagements here [premierespeakers.com/jesse\\_watters/...](http://premierespeakers.com/jesse_watters/)

**Follow**



**realdonaldtrump Userlist 1000 2019-06-09**

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

# EXAMPLE: USER ACCOUNT ANALYSIS

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**Donald J. Trump** • @realDonaldTrump  
45th President of the United States of America  
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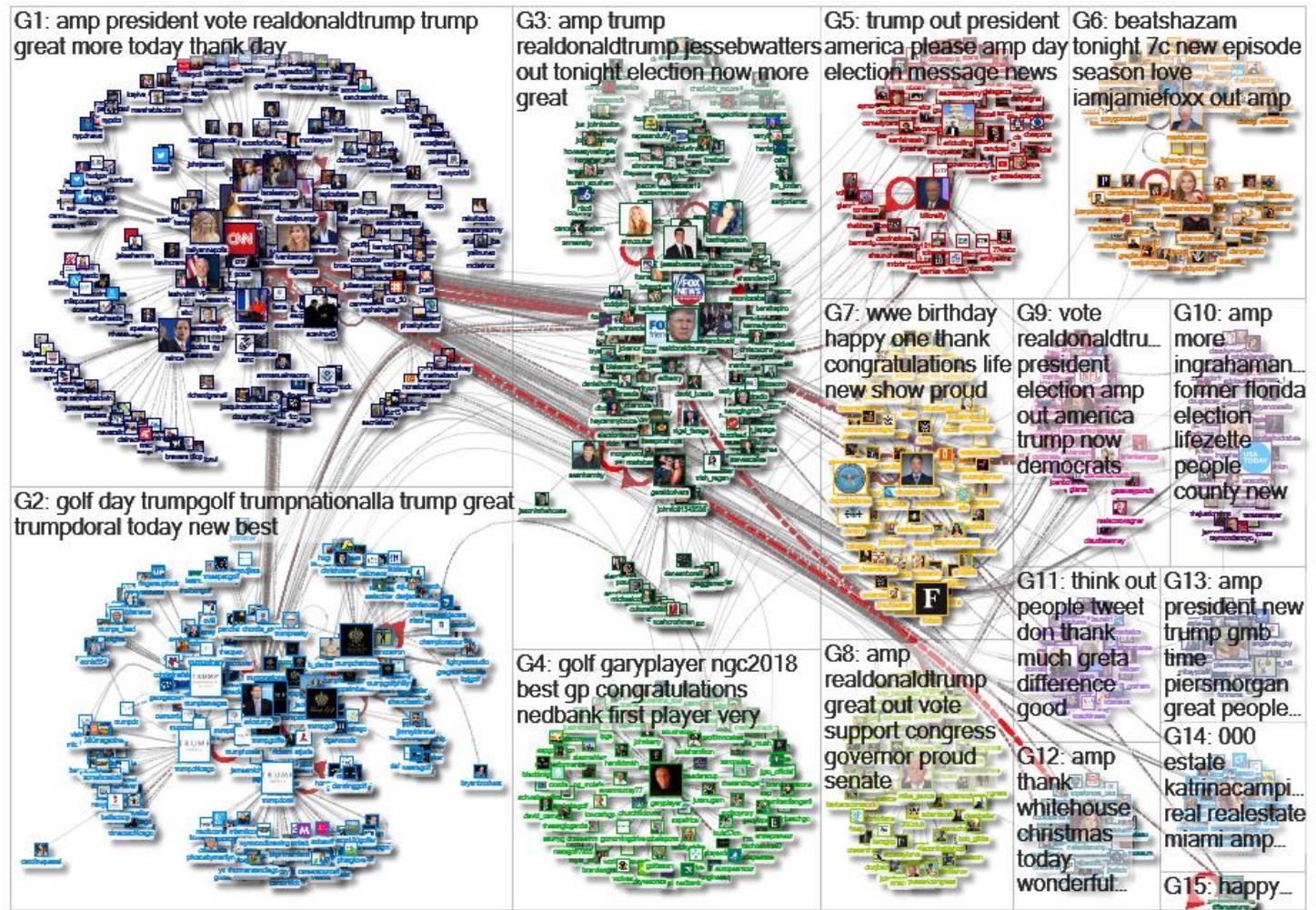
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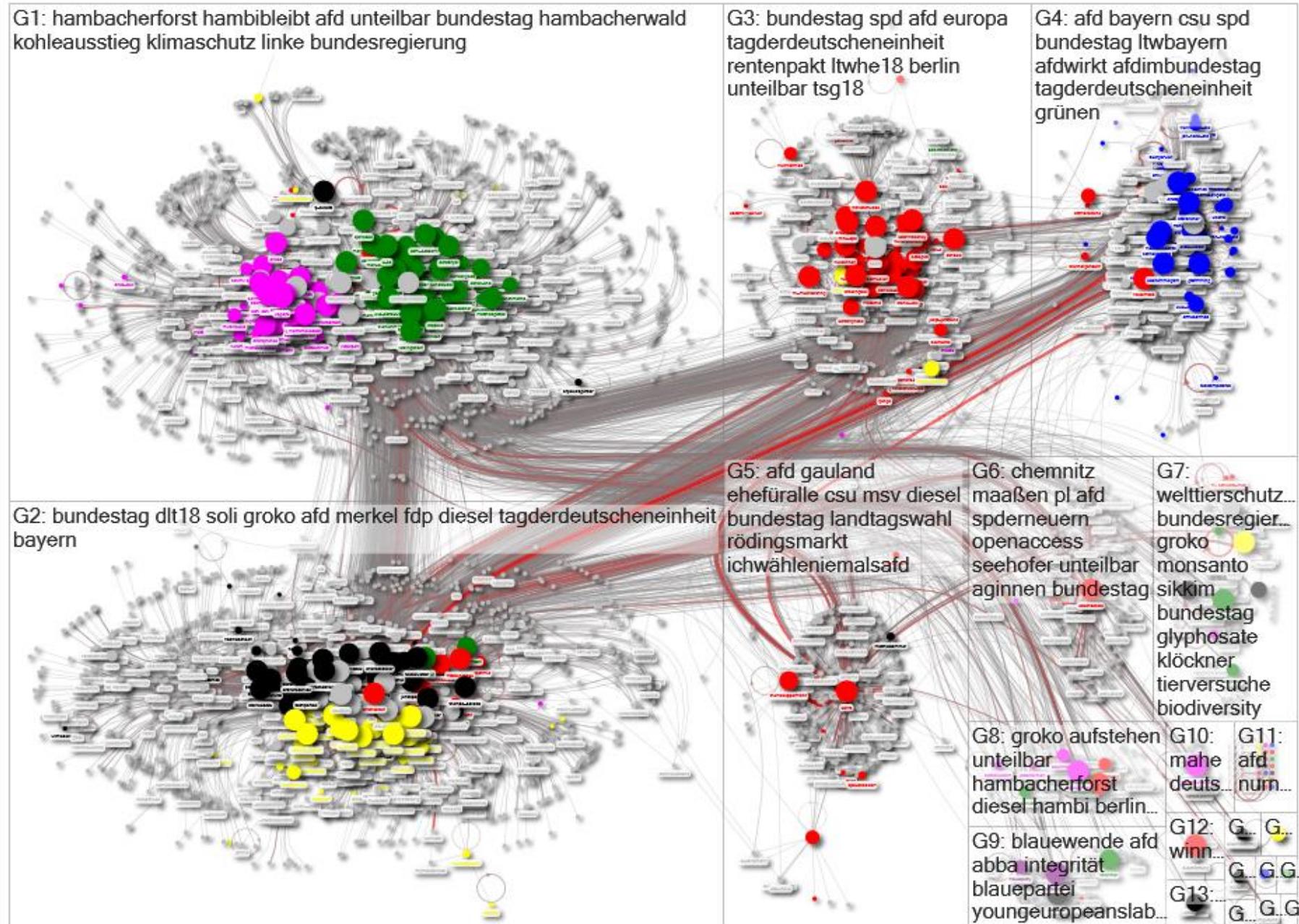
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Based on Twitter users followed by @realdonaldtrump  
<https://nodexlgraphgallery.org/Pages/Graph.aspx?graphID=174922>



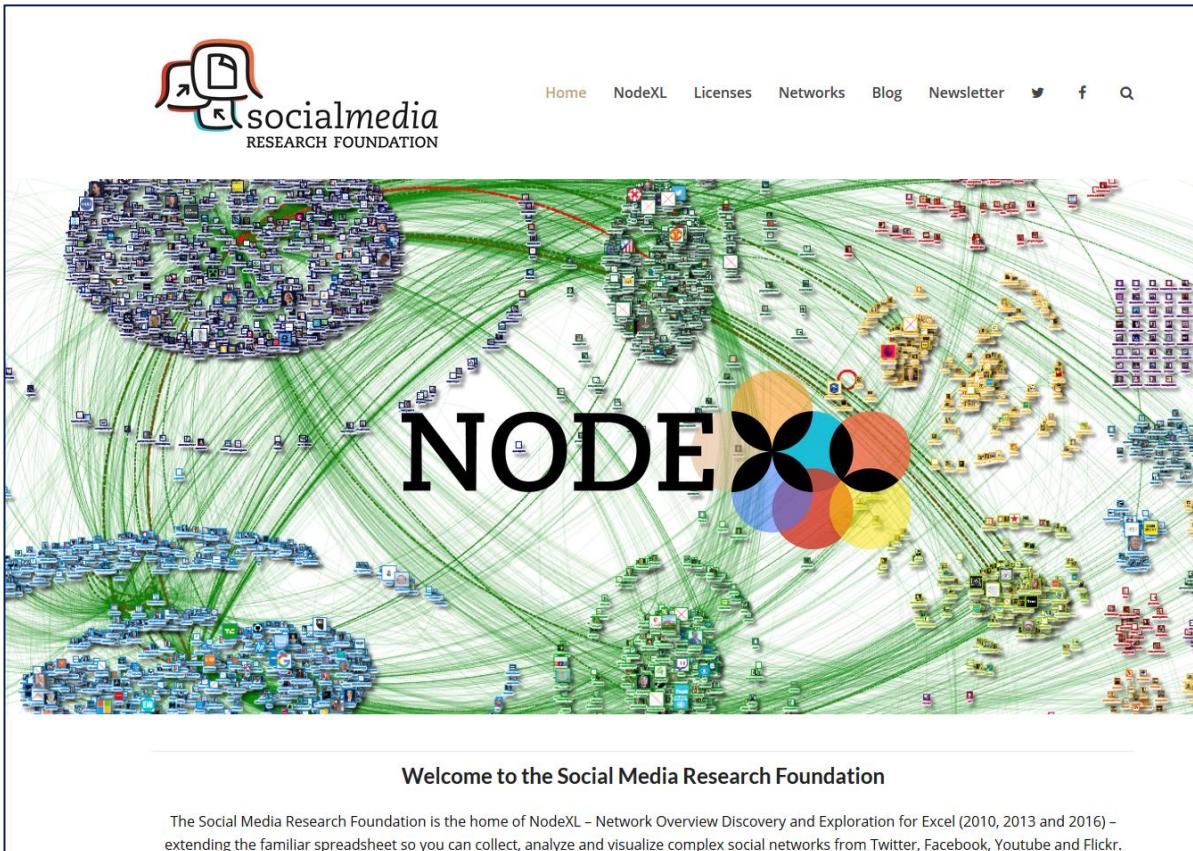
**Example**  
**Userlist Analysis**  
**Deutscher Bundestag**  
**Oct-12-2018**  
**Full Network**



Example  
Userlist Analysis  
Bot Network  
#Natgas

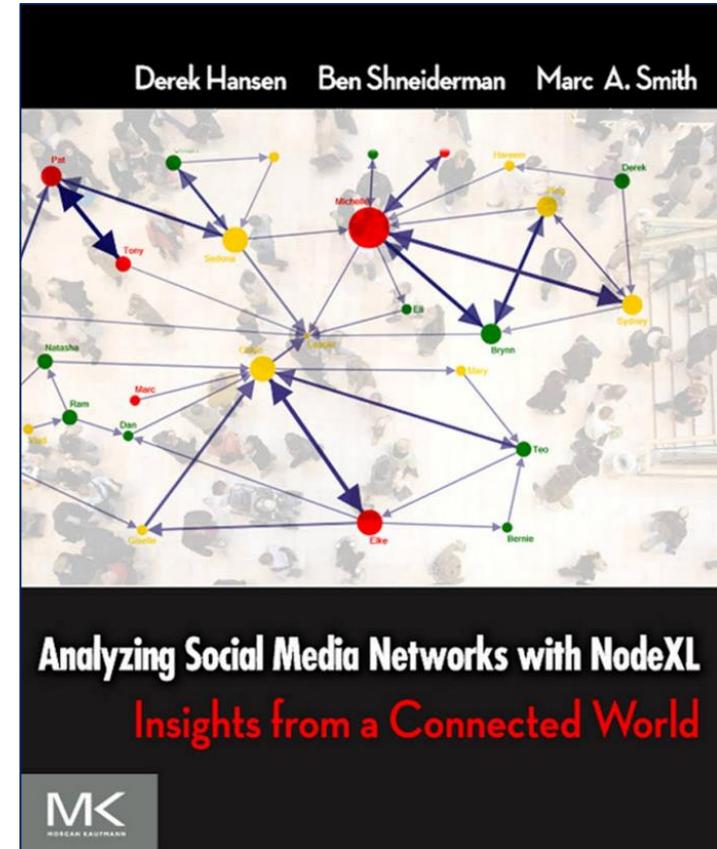
# SOCIAL MEDIA RESEARCH FOUNDATION

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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>

# LITERATURE / LINKS

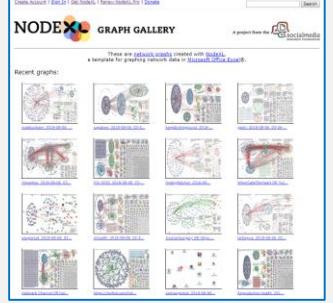
## Social Media Research Foundation and NodeXL

- 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>
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- 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>

# KEY FEATURES OF NODEXL PRO

Data Import	Network Analysis	Content Analysis	Visualization	Data Export
<b>Data formats</b> Excel/UCINET/GraphML/ Pajek/GEFX/GDF  <b>Social media data</b>    <b>YouTube</b>  <b>Flickr</b>	<b>Network Overview</b> Network size and composition Graph density, modularity  <b>Group Analysis</b> Group by cluster e.g. Clauset-Newman-Moore Group metrics  <b>Vertex metrics</b> Degree/In-/OutDegree Betweenness/Closeness/ Eigenvector/ PageRank  <b>Path Analysis</b>	<b>Text Analysis</b> Words and word pairs from Tweets, Posts, Replies, ...  <b>Sentiment Analysis</b> Positive/Negative Sentiment Your list of Keywords  <b>Top Content Summary</b> By entire network / by group Top hashtags, URLs, domains Top words and word pairs  <b>Time Series Analysis</b> By minute/hour/day/... By hashtag/word/language/...	<b>Customize</b> Shape, size, color, label of vertices, edges and groups  <b>Autofill Columns</b>  <b>Graph Layout</b> Various layout algorithms e.g. Harel-Koren Fast Multiscale  <b>Group-In-a-Box Layout</b> Treemap Force-directed Packed rectangles	<b>Data formats</b> Excel/UCINET/GraphML/ Pajek/GEFX/GDF  <b>Publish to the web</b> NodeXL Graph Gallery   <b>Export to Powerpoint</b> <b>Export to Polinode</b>
<b>Automate Key Features with NodeXL Data Recipes</b>				