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Express your feelings and connect with people who care

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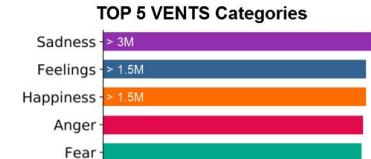
Data-Driven Social Analytics | March 2020

Jonatan Koren

# The Paper

Nikolaos Lykousas, Costantinos Patsakis, Andreas Kaltenbrunner, Vicenç Gómez (2019) [[pdf](#)]  
Sharing emotions at scale: The Vent dataset. International AAAI Conference on Web and Social Media

- The paper highlighted several key points:
  - ➡ The largest annotated dataset of text, emotions, and social connections to date (24.03.19)
  - ➡ The benefits of emotion analysis beside sentiment analysis
  - ➡ Ethical considerations after data collection and analysis
  - ➡ Methods to infer emotion networks based on the user activity



# The Data

## ● **emotions.csv** [ 705 x 4 ]

- id (string)
- emotion\_category\_id (string)
- name (string)
- enabled (boolean)

## ● **vents\_metadata.csv.csv** [ 33.6M x 4 ]

- emotion\_id (string)
- user\_id (string)
- created\_at (string YYYY:MM:DD hh:mm:ss.sss)
- enabled (boolean)

## ● **emotions\_categories.csv** [ 63 x 2 ]

- id (string)
- emotion\_category\_id (string)
- name (string)
- enabled (boolean)

## ● **edges** [ 13.6M x 2 ]

- source (string)
- target (string)

→ 700,052 Nodes, 13.6M Edges

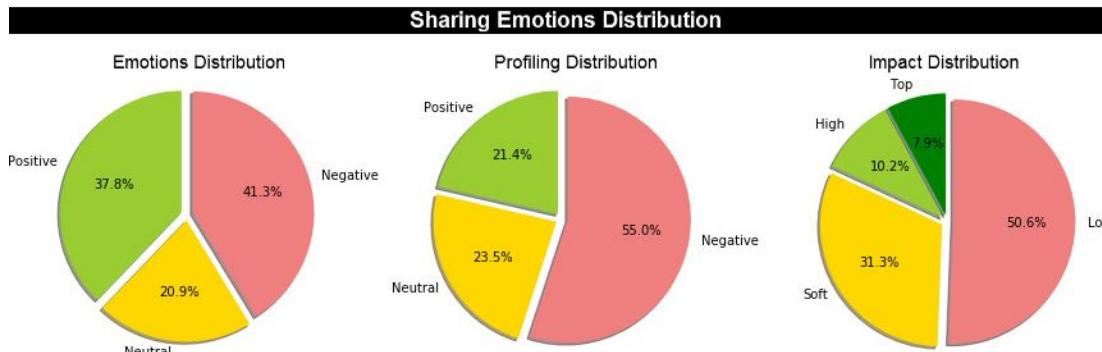
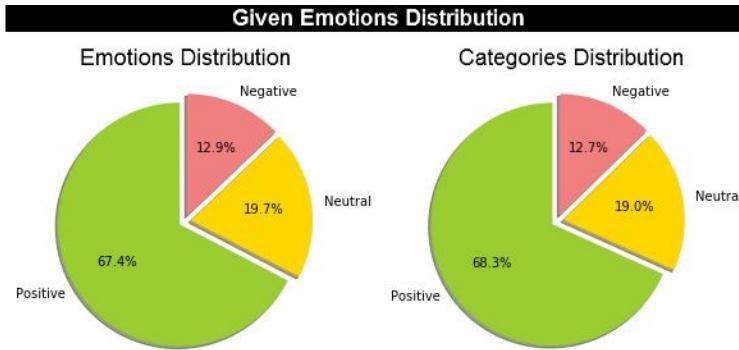
# Thought

- User Profiling:
  - Categorize manually emotions to positive (+1), neutral (0) and negative (-1)
  - Aggregating data and giving scores to nodes according to the mean profile score:
    - **positive**:  $x > 0.2$
    - **neutral**:  $-0.2 < x < 0.2$
    - **negative**:  $x < -0.2$

# Thought

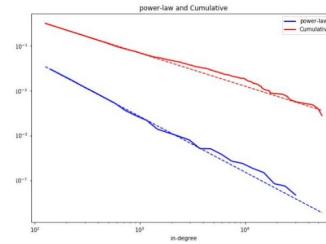
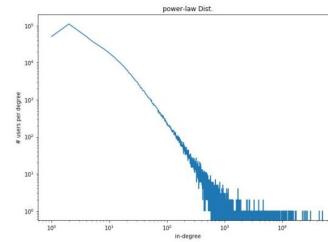
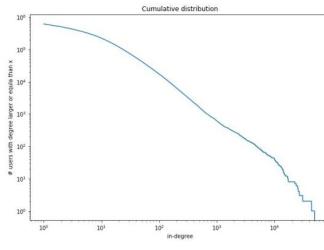
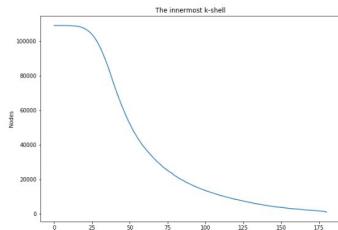
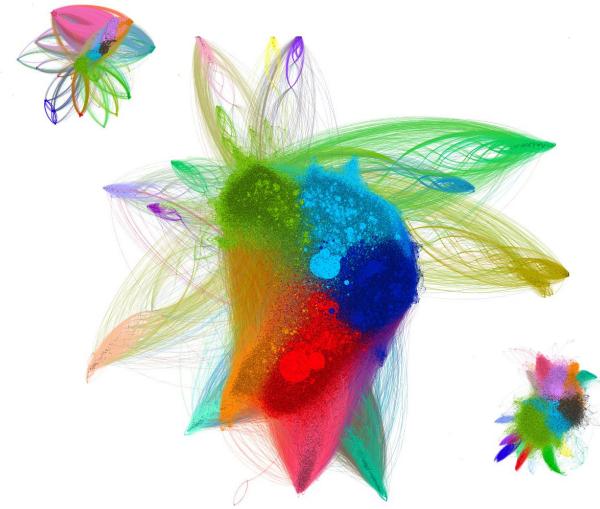
- User Impact:
  - Categorize nodes impact by sum aggregation of reactions.
  - According to  $\text{mean}(x) = 220$ ,  $\text{median}(x) = 15$ 
    - Top user:  $x > 330$
    - High:  $110 < x < 330$
    - Soft:  $15 < x < 110$
    - Low:  $x < 15$

# Vents Distribution



# Giant Component

- Staying with nodes with degree  $> 25$
- Nodes: 109,293 | Edges: 6,423,647
- Modularity: 0.444 | 22 Communities
- Triads: 25.5M | Clustering Coefficient: 0.125
- innermost k-shell: 180 (with 954 nodes)

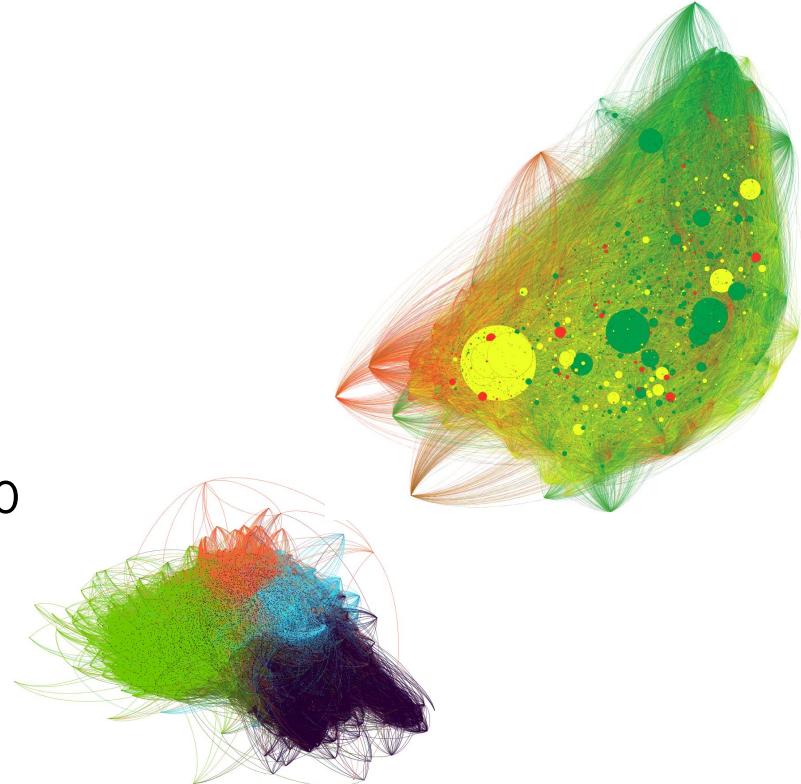


# Comparison with other Random Graphs

	Directed Graph	Undirected Graph	Erdos-Renyi	Preferential Attachment	Configuration Model	Node Rewiring
<b>Nodes</b>	109,293	109,293	109,293	109,293	109,293	109,293
<b>Edges</b>	6,423,647	4,548,800	6,423,647	4,480,152	4,392,319	4,548,194
<b>Zero Deg Nodes</b>	4	4	0	0	4	4
<b>Zero InDeg Nodes</b>	21	4	0	0	4	4
<b>Zero OutDeg Nodes</b>	1292	4	0	0	4	4
<b>NonZero In-Out Deg</b>	107,984	109,289	109,293	109,293	109,289	109,289
<b>Unique directed edges</b>	6,423,647	9,096,994	6,423,647	8,960,304	8,784,638	9,096,388
<b>Unique undirected edges</b>	4,548,800	4,548,800	6,421,873	4,480,152	4,392,319	4,548,194
<b>Self Edges</b>	606	606	0	0	0	0
<b>BiDir Edges</b>	3,750,300	9,096,994	3,548	8,960,304	8,784,638	9,096,388
<b>Closed triangles</b>	25,542,734	25,645,065	270,784	1,569,752	25,788,187	30,592,501
<b>Open triangles</b>	5,479,933,273	5,479,845,676	753,861,837	943,834,141	3,724,154,970	5,464,783,972
<b>Frac. of closed triads</b>	0.00464	0.004658	0.000359	0.00166	0.006877	0.005567
<b>Connected component size</b>	0.999963	0.999963	1	1	0.999963	0.999963
<b>Strong conn. comp. size</b>	0.987364	0.999963	1	1	0.999963	0.999963
<b>Approx. full diameter</b>	6	5	4	4	4	4
<b>90% effective diameter</b>	2.851364	2.848767	2.886788	2.884743	2.856691	2.819429

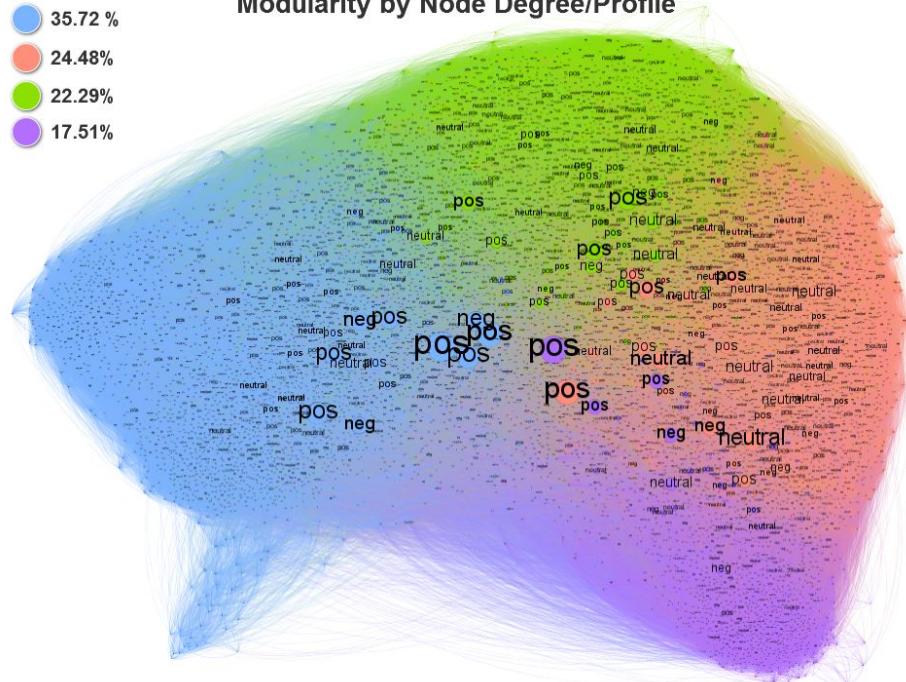
# Graph's Core

- Staying with nodes with degree > 200
- Nodes: 7,852 | Edges: 1,018,120
- Modularity: 0.326 | 4 Communities
- Triads: 10.01M | Clustering Coefficient: 0.170
- innermost k-shell: 180 (with 898 nodes)

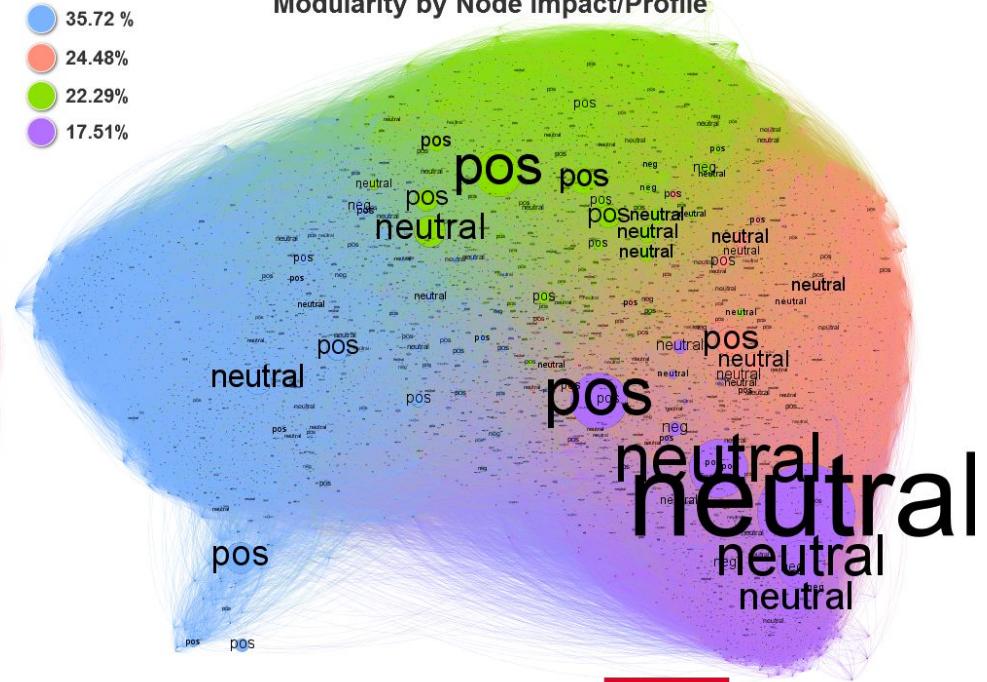


# Modularity

Modularity by Node Degree/Profile



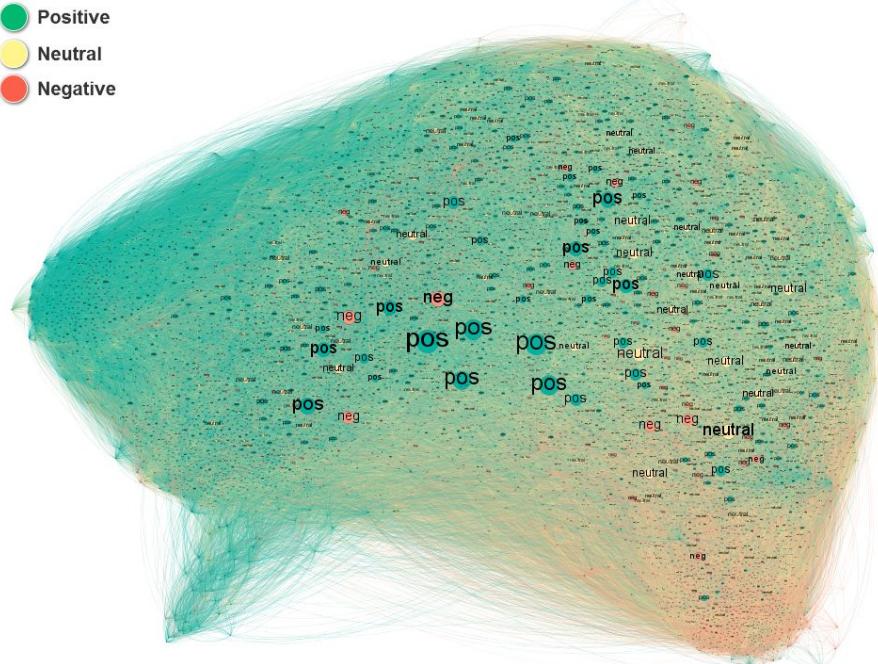
Modularity by Node Impact/Profile



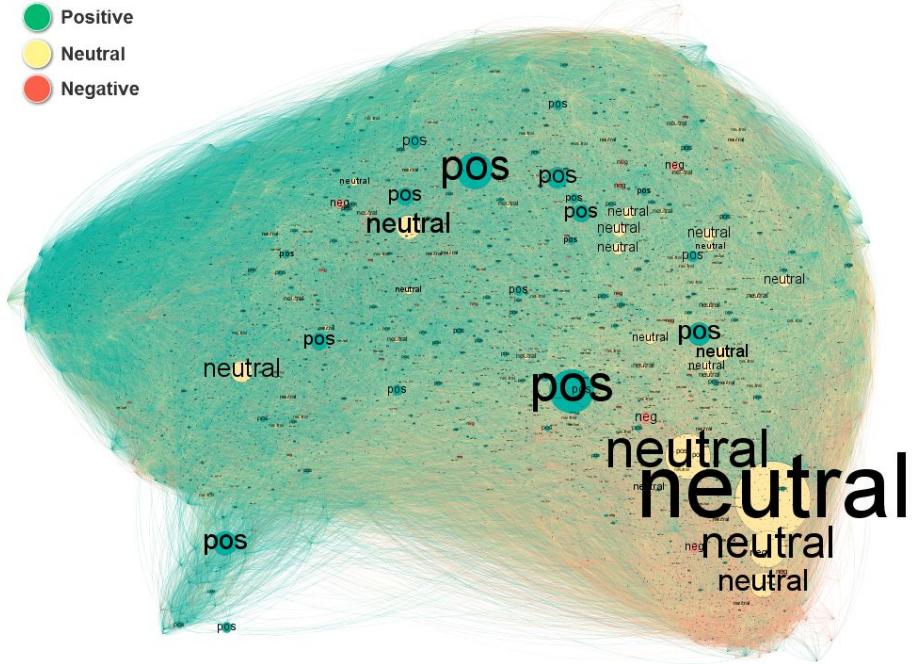
→ Modularity: 0.326

# Profile

Profile by Node Degree

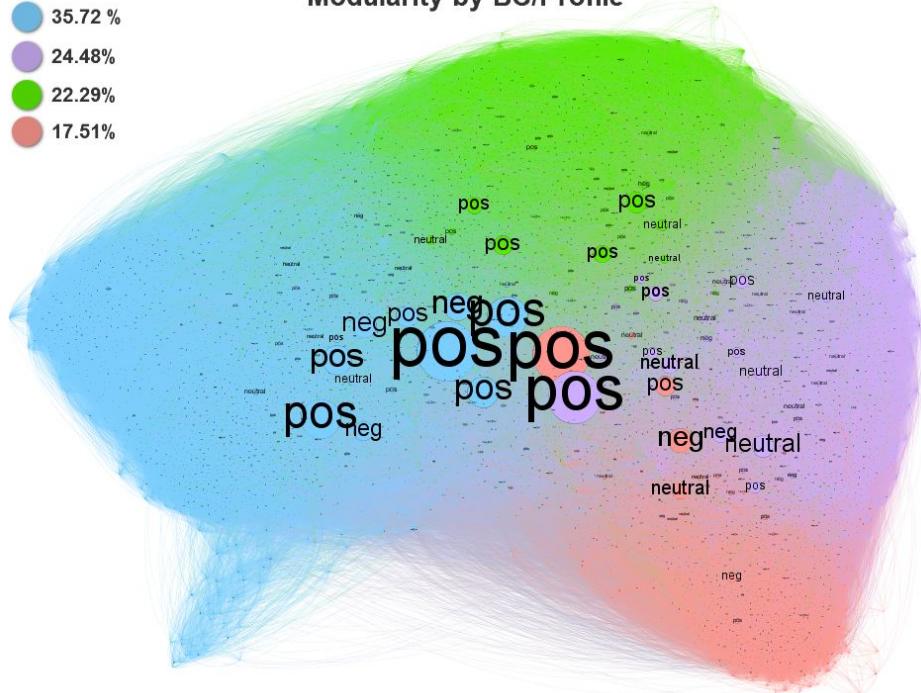


Profile by Node Impact

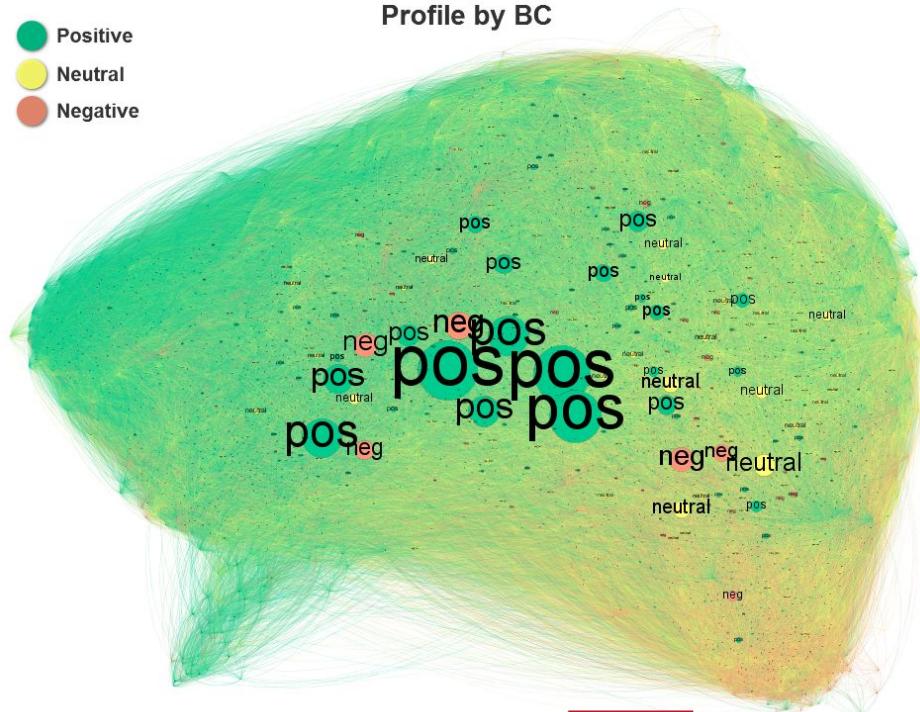


# Betweenness Centrality

Modularity by BC/Profile



Profile by BC



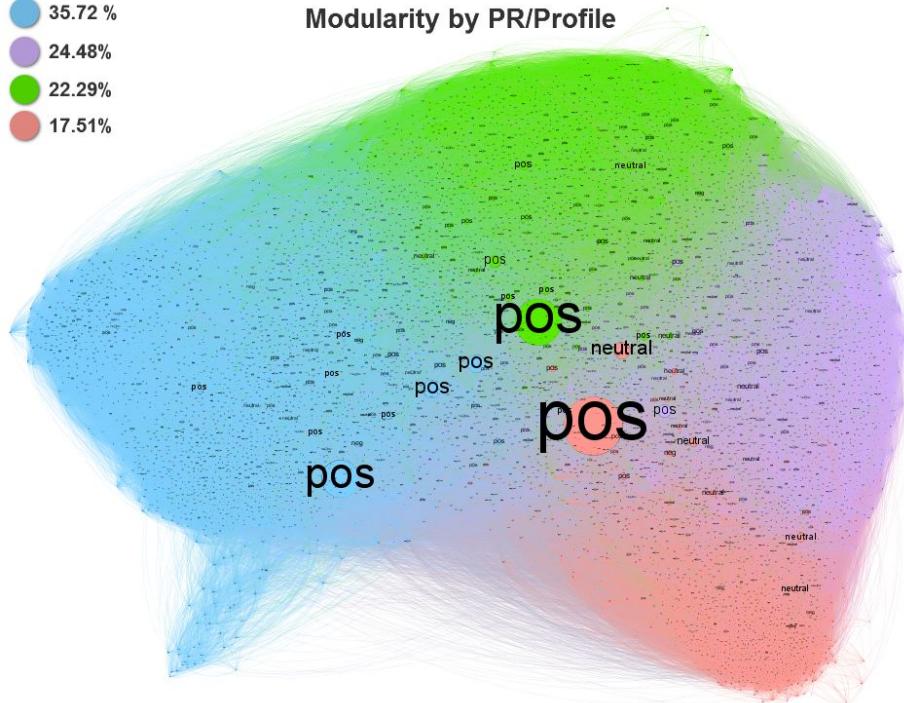
# Betweenness Centrality

	VENTS	reactions	profile	score	node_id
Halloweenie 🎃, ' Creativity', ' Surprise', ' Festive 2015', ' 🎃 Halloween 🎃', ' ❤️ Valentines '17 ❤️', ' Feelings', 'Positivity', ' 🎃 ' Happiness', ' Sadness', 'Anger', 'Affection', ' Positivity	73184	Positive	693440.1729	322502	0
Creativity', ' Surprise', ' Fear', ' 💀 Springy 💀', ' ❤️ Valentines '17 ❤️', ' 🎊 Festive 2016 🎊', ' Feelings', ' Happiness', ' Sadness', ' " " 🍀 St Patrick's 🍀', ' Happiness', ' 🎈 Black HM 🎈', ' Anger', ' Affection', ' ✪ Star wars ✪', ' Positivity	46547	Positive	669161.4564	206017	1
Trans Remembrance 🙏, ' ● Autism Acceptance ●', ' 💍 Marriage 💍', ' Surprise', ' 💀 Springy 💀', ' 🎃 Wintery 🎃', ' 🎄 Fairy Tale 🎄 ' 🎄', ' 🎊 Festive 2016 🎊', ' 🎄 Vampire 🎄', ' Happiness', ' Anger', ' Affection', ' Creativity', ' Fear', ' 🎃 Halloween 🎃', ' Anger', ' Feelings', ' Happy Birthday!', ' 🌻 Summery 🌻', ' 🎈 Black HM 🎈', ' 🐛 Insect 🐛', ' 🎄 Zombie 🎄', ' 🎄 New Year 🎄', ' ✦ Hanukkah ✦', ' 💋 Candy 💋', ' ✪ Mental Health ✪', ' 🎃 Halloweenie 🎃', ' ✨ Friendship Day ✨', ' Paralympics', ' 🌈 LGBT+ Pride 🌈', ' Sadness', ' "!" 💕 Valentines '18 💕', ' Positivity', "!" Women's HM	30933	Positive	552886.5147	99870	2
Creativity', ' Surprise', ' Fear', ' 💀 Springy 💀', ' 🎄 New Year 🎄', ' 🎃 Halloween 🎃', ' Creativity', ' Feelings', ' Happiness', ' " " Sadness', ' Anger', ' Affection', ' Positivity	6226	Positive	537870.7501	25840	3
Marriage 💍', ' Surprise', ' 💀 Springy 💀', ' Happiness', ' Anger', ' 🌙 Lunar NY 🌙', ' Affection', ' Creativity', ' Fear', ' Feelings', ' 💍 ' Surprise', ' 🌻 Summery 🌻', ' 🐱 Cat Day 🐱', ' 🌎 Earth Day '17 🌎', ' 🐸 Frog Day 🐸', ' ✪ Star wars ✪', " 🎅 Football '18 🎅", " 🎉 \u200d Pride '18 \u200d", " 🎉 Writers' Day 🎉", " 🎉 Friday 13th 🎉", ' ✨ Friendship Day ✨', ' Sadness', ' 🎄 Shark Day 🎄', ' 🎉 "!" Pirate Day 🎉', ' Positivity', "!" Women's HM	9717	Positive	395637.0814	875879	4

# Page Rank

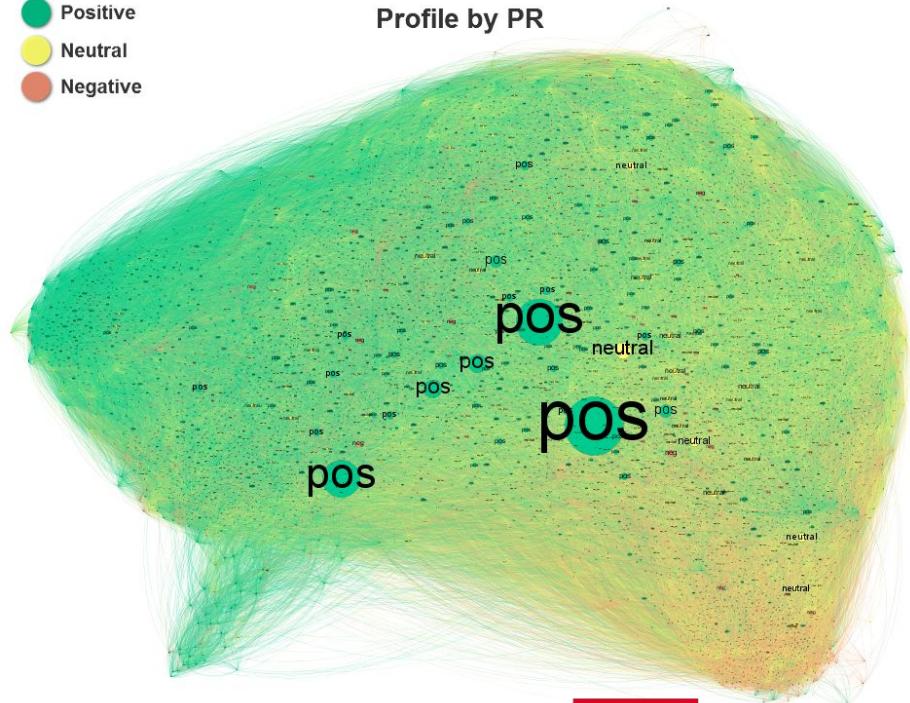
- 35.72 %
- 24.48%
- 22.29%
- 17.51%

Modularity by PR/Profile



- Positive
- Neutral
- Negative

Profile by PR

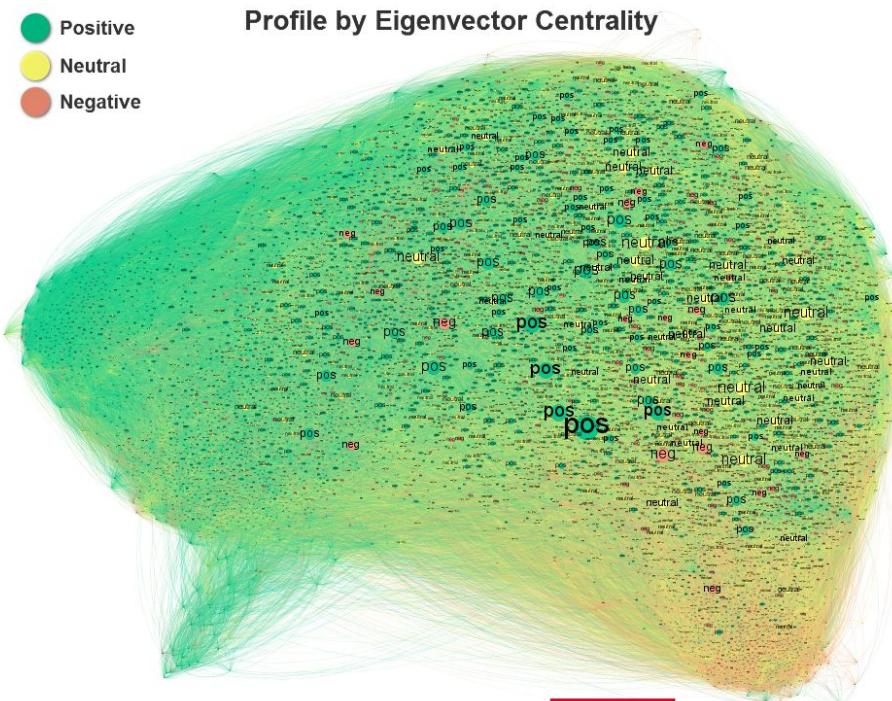
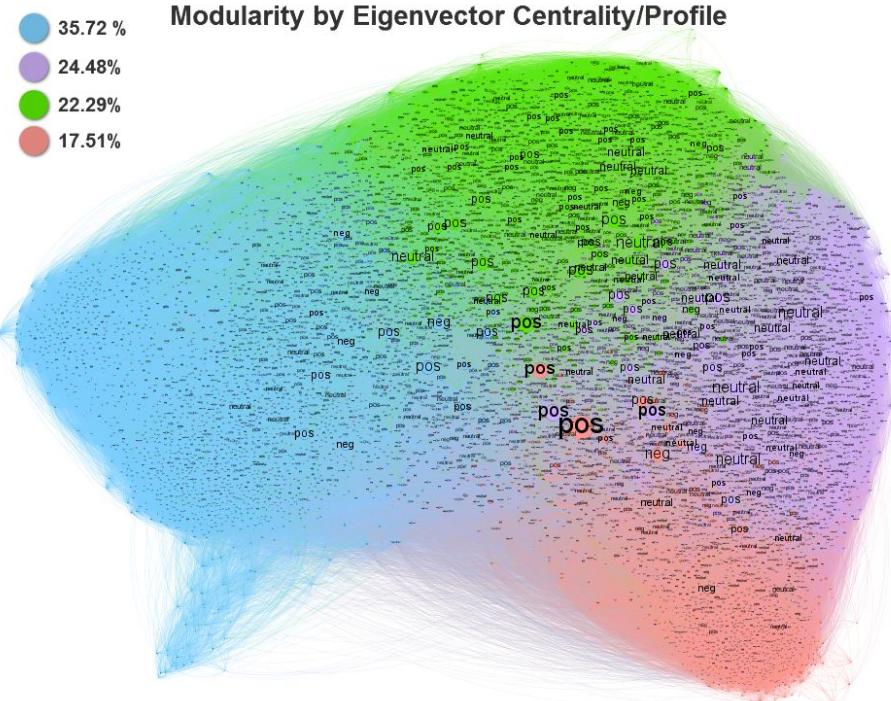


# Page Rank

	VENTS	reactions	profile	score	node_id
Trans Remembrance ⌚, '● Autism Acceptance ❶', '⌚ Marriage ⌚', 'Surprise!', '⌚ Wintery ⌚', '⌚ Springy ⌚', "⌚ Earth Day '18 ⌚", '⌚', '⌚ Fairy Tale ⌚', '⌚ Festive 2016 ⌚', '⌚ Advent ⌚', '⌚ Vampire ⌚', 'Happiness', 'Anger', '⌚ Lunar NY ⌚', 'Affection', '⌚ Coffee Day ⌚', '⌚ Advent ⌚', 'Creativity', '⌚ Angel Day ⌚', 'Fear', 'Festive 2015', '⌚ Halloween ⌚', '⌚ Kindness Day ⌚', 'Happy Birthday!', 'Feelings', '⌚ Summery ⌚', '⌚ Rabbit Day ⌚', '⌚ Black HM ⌚', '⌚ Dog Day ⌚', '⌚ Punk Day ⌚', '⌚ Cat Day ⌚', '⌚ Frog Day ⌚', '⌚ Insect ⌚', '⌚ Star wars ⌚', '⌚ Earth Day '17 ⌚', '⌚ Hurricane ⌚', '⌚ Zombie ⌚', '⌚ Football '18 ⌚', '⌚ New Year ⌚', '⌚ Writers' Day ⌚', '⌚ Candy ⌚', '\u2628u200d\ufe0f Pride '18 \u2628u200d\ufe0f', '⌚ Solar Eclipse ⌚', '⌚ Hanukkah ⌚', '⌚ Mental Health ⌚', '⌚ St Patrick's ⌚', '⌚ Ramadan ⌚', '⌚ Valentines '18 ⌚', '⌚ Autumn ⌚', '⌚ Halloweenie ⌚', '⌚ Friday 13th ⌚', '⌚ Gaming ⌚', '⌚ Friendship Day ⌚', '⌚ Valentines '17 ⌚', '⌚ Paralympics', '⌚ LGBT+ Pride ⌚', 'Sadness', '⌚ Shark Day ⌚', '⌚', '⌚ Pirate Day ⌚', 'Positivity', '⌚ Women's HM	787319	Positive	0.010409	768100	
Surprise!', '⌚ Springy ⌚', '⌚ Wintery ⌚', "⌚ Earth Day '18 ⌚", '⌚ Fairy Tale ⌚', '⌚ Festive 2016 ⌚', 'Happiness', 'Anger', '⌚', '⌚ Lunar NY ⌚', 'Affection', '⌚ Coffee Day ⌚', 'Creativity', '⌚ Angel Day ⌚', 'Fear', '⌚ Halloween ⌚', 'Feelings', '⌚ Summery ⌚', '⌚ Black HM ⌚', '⌚ Dog Day ⌚', '⌚ Cat Day ⌚', '⌚ Earth Day '17 ⌚', '⌚ Star wars ⌚', '⌚ Shark Day ⌚', '⌚ Solar Eclipse ⌚', '⌚ New Year ⌚', '⌚ Writers' Day ⌚', '⌚ Candy ⌚', '⌚ Hanukkah ⌚', '⌚ St Patrick's ⌚', '⌚ Autumn ⌚', '⌚ Halloweenie ⌚', '⌚ Friday 13th ⌚', '⌚ Valentines '17 ⌚', '⌚ Friendship Day ⌚', 'Creativity', '⌚ Paralympics', '⌚ LGBT+ Pride ⌚', 'Sadness', '⌚', '⌚ Valentines '18 ⌚', '⌚ Pirate Day ⌚', 'Positivity', '⌚ Women's HM	167355	Positive	0.009760	653154	
Creativity', 'Surprise!', 'Fear', '⌚ Solar Eclipse ⌚', '⌚ Halloween ⌚', '⌚', '⌚ Writers' Day ⌚', '⌚ Wintery ⌚', '⌚ Hanukkah ⌚', '⌚', '⌚ Coffee Day ⌚', '\u2628u200d\ufe0f Pride '18 \u2628u200d\ufe0f', '⌚ Summery ⌚', 'Happiness', 'Affection', '⌚ Halloween ⌚', 'Positivity	7070	Positive	0.006833	564363	
Surprise!', '⌚ Springy ⌚', '⌚ Wintery ⌚', "⌚ Earth Day '18 ⌚", '⌚ Fairy Tale ⌚', '⌚ Festive 2016 ⌚', '⌚ Advent ⌚', '⌚ Vampire ⌚', 'Happiness', 'Anger', '⌚', '⌚ Lunar NY ⌚', 'Affection', '⌚ Newbie ⌚', '⌚ Coffee Day ⌚', 'Creativity', '⌚ Angel Day ⌚', 'Fear', 'Festive 2015', '⌚ Halloween ⌚', '⌚ Kindness Day ⌚', 'Feelings', '⌚ Summery ⌚', '⌚ Rabbit Day ⌚', '⌚ Dog Day ⌚', '⌚ Cat Day ⌚', '⌚ Punk Day ⌚', '⌚ Earth Day '17 ⌚', '⌚ Frog Day ⌚', '⌚ Insect ⌚', '⌚ Star wars ⌚', '⌚ Hurricane ⌚', '⌚ Coffee Day ⌚', '⌚ Zombie ⌚', '⌚ Football '18 ⌚', '⌚ New Year ⌚', '⌚ Writers' Day ⌚', '⌚ Hanukkah ⌚', '⌚ Candy ⌚', '⌚ Solar Eclipse ⌚', '⌚ Mental Health ⌚', '⌚ St Patrick's ⌚', '⌚ Ramadan ⌚', '⌚ Autumn ⌚', '⌚ Halloweenie ⌚', '⌚ Friday 13th ⌚', '⌚ Gaming ⌚', '⌚ Valentines '17 ⌚', '⌚ Friendship Day ⌚', '⌚ LGBT+ Pride ⌚', 'Sadness', '⌚', '⌚ Valentines '18 ⌚', '⌚ Pirate Day ⌚', 'Positivity', '⌚', '⌚ Women's HM	108231	Positive	0.003375	25056	
'Positivity', 'Affection	7804	Positive	0.003354	120858	



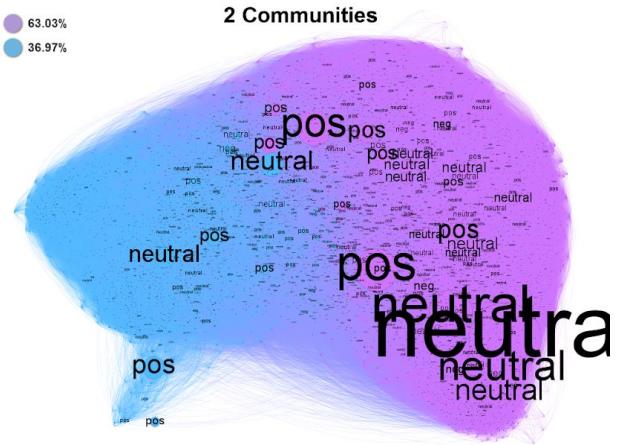
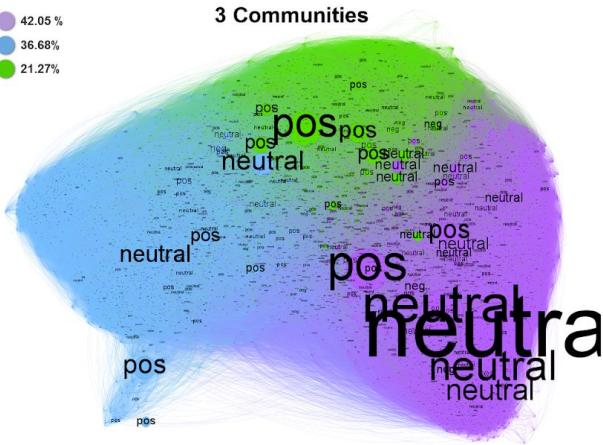
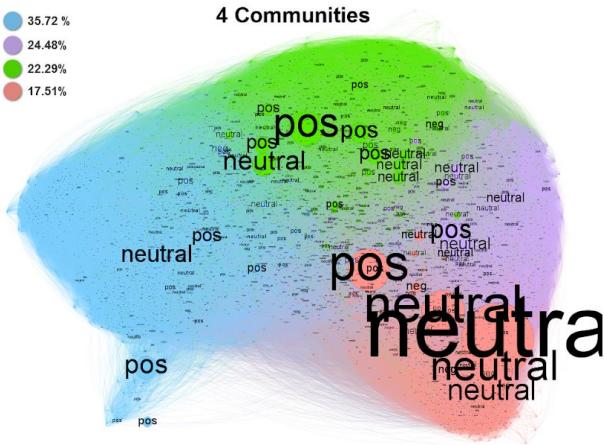
# Eigenvector Centrality



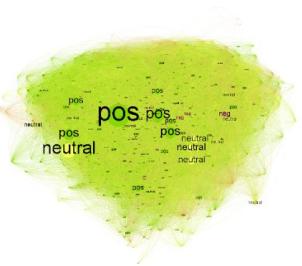
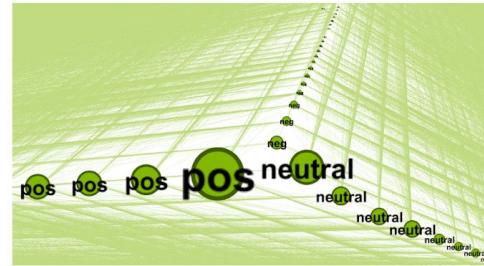
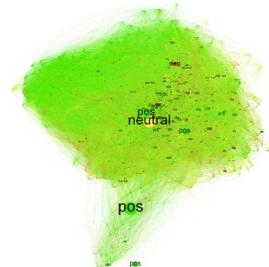
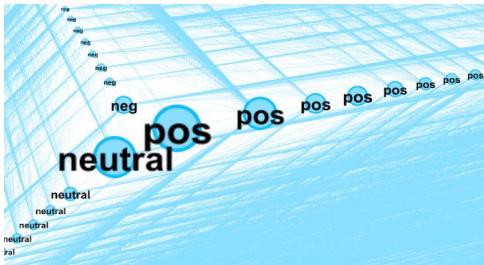
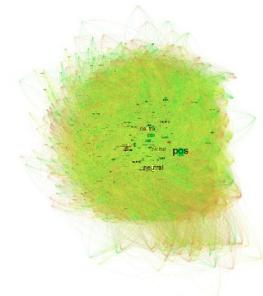
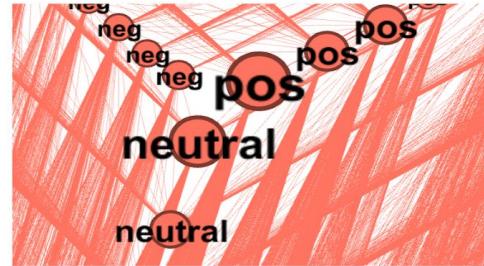
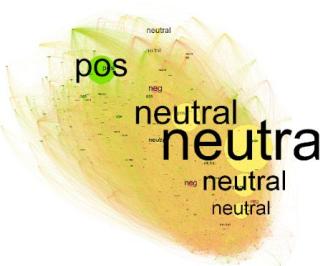
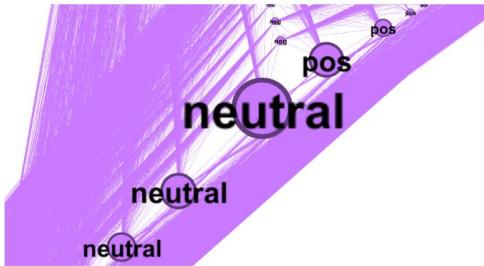
# Eigenvector Centrality

	VENTS	reactions	profile	score	node_id
Creativity', ' Surprise', ' Fear', ' 🌸 Springy 🌸', ' ❤️ Valentines '17 ❤️', ' 🎉 Festive 2016 🎉', ' Feelings', ' Happiness', ' Sadness', ' 🍀 St ' Patrick's 🍀', ' Happiness', ' 🎃 Black HM 🎃', ' Anger', ' Affection', ' ✨ Star wars ✨', ' Positivity	46547	Ppositive	0.102766	206017	
Creativity', ' Surprise', ' Fear', ' 🌸 Springy 🌸', ' 🎉 New Year 🎉', ' 🎃 Halloween 🎃', ' Creativity', ' Feelings', ' Happiness', ' Sadness', ' '' Anger', ' Affection', ' Positivity	6226	Ppositive	0.101722	25840	
Halloweenie 🎃', ' Creativity', ' Surprise', ' Festive 2015', ' 🎃 Halloween 🎃', ' ❤️ Valentines '17 ❤️', ' Feelings', ' Positivity', ' ✨ ' Happiness', ' Sadness', ' Anger', ' Affection', ' Positivity	73184	Ppositive	0.101318	322502	
Trans Remembrance 🏳️', ' ● Autism Acceptance ●', ' 💍 Marriage 💍', ' Surprise', ' 🌸 Springy 🌸', ' 🎉 Wintery 🎉', ' 🎉 Fairy Tale 🎉', ' 🎉 ' 🎉 Festive 2016 🎉', ' 🎉 Vampire 🎉', ' Happiness', ' Anger', ' Affection', ' Creativity', ' Fear', ' 🎃 Halloween 🎃', ' Anger', ' Feelings', ' Happy Birthday!', ' 🎉 Summery 🎉', ' 🎃 Black HM 🎃', ' 🐛 Insect 🐛', ' 🎉 Zombie 🎉', ' 🎉 New Year 🎉', ' ✯ Hanukkah ✯', ' 🎉 Candy 🎉', ' ✯ Mental Health ✯', ' 🎃 Halloweenie 🎃', ' ✨ Friendship Day ✨', ' Paralympics', ' 🏳️ LGBT+ Pride 🏳️', ' Sadness', ' ❤️ Valentines '18 '❤️', ' Positivity', ' "❤️' Women's HM	30933	Ppositive	0.098089	99870	
Marriage 💍', ' Surprise', ' 🌸 Springy 🌸', ' 🎉 Fairy Tale 🎉', ' 🎉 Festive 2016 🎉', ' Happiness', ' Anger', ' 🎉 Lunar NY 🎉', ' 💍 ' 💍 Affection', ' ✨ Advent ✨', ' Creativity', ' 🎉 Angel Day 🎉', ' Fear', ' Festive 2015', ' 🎃 Halloween 🎃', ' 🎉 Kindness Day 🎉', ' Feelings', ' 🎉 Summery 🎉', ' 🐄 Rabbit Day 🐄', ' 🎃 Black HM 🎃', ' 🎉 Frog Day 🎉', ' 🎉 Football '18 🎉', ' 🎉 New Year 🎉', ' 🎉\u200d Pride '18 🎉\u200d', ' ✯ Mental Health ✯', ' 🌙 Ramadan 🌙', ' 🎃 Halloweenie 🎃', ' 🎉 Gaming 🎉', ' ❤️ Valentines '17 ❤️', ' Sadness', ' ❤️ '❤️ Valentines '18 ❤️', ' Positivity', ' "❤️' Women's HM	142611	Ppositive	0.091298	874574	

# Communities Hierarchy



# Thought



# Conclusion

- It's all a question of perspective - this project analyzed only the core of the VENT application
- Deeper analysis including time intervals would allow me to infer the relationship between externalities and this data
- Different emotions have strong effects on relationships between communities and different user characteristics.

