

**“Haters gonna (make
you) hate”**

The political discussion as a network and
the hate as nodes' attributes.

RESEARCH QUESTIONS

- Which is the best variable to detect hateful contents? (manual coding vs. sentiment vs. LIWC)
- Where is the hate speech more relevant? (left vs. right parties, positive vs. negative campaign, posts vs. comments)
- How can we qualitatively describe the topics discussed in the different data frames and their relation? (cluster analysis, topic comparison)

Hate Speech

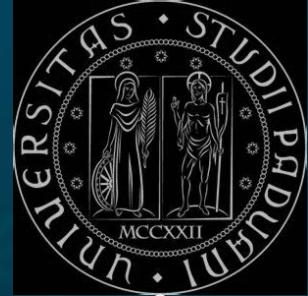


is defined as fomenting, promoting or encouraging, in any form of denigration, hatred or **defamation of a person or group, based on "race," color, ancestry, national or ethnic origin, age, disability, language, religion or belief, sex, gender, gender identity, sexual orientation, and other characteristics or personal status."**

The database



Type of campaign



Positive = not mentioning opponents

Comparative = mention the opponent and their own position.

Negative = with references to just to opponents

Literature

Conover et AL. 2011

Political polarization on
twitter

Casara et Al. 2020

immigrazione, stili e temi: uno studio sui tweet dei politici italiani. immigrazione, stili e temi: uno studio sui tweet dei politici italiani

Eddington et Al. 2018

The communicative constitution of hate organizations online: A semantic network analysis of “make america greatagain



Suitner et Al.2020

The rise of climateaction in the timeof the fridaysforfuture movement: a semantic network analysis

Grimmer et Al. 2013

ext as data: The promise and pitfalls of automatic content analysis methods for political texts

Stewart et Al. 2015

Lexical shifts, substantive changes, and continuity in state of the union discourse, 1790–2014

Content group

Participants

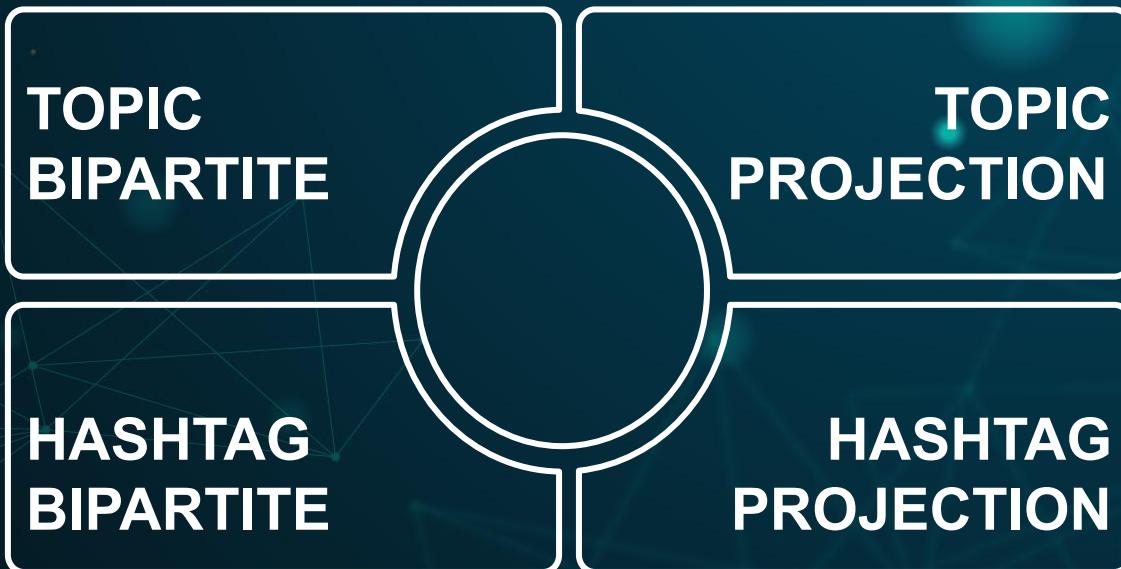
Gabriella Buosi, Luca Dalla Gassa, Edoardo Monaco,
Matteo Piva, Laura Soccoll, Arthur Tassan-Mazzocco,
Francesco Guarnaccia.

Network Creation

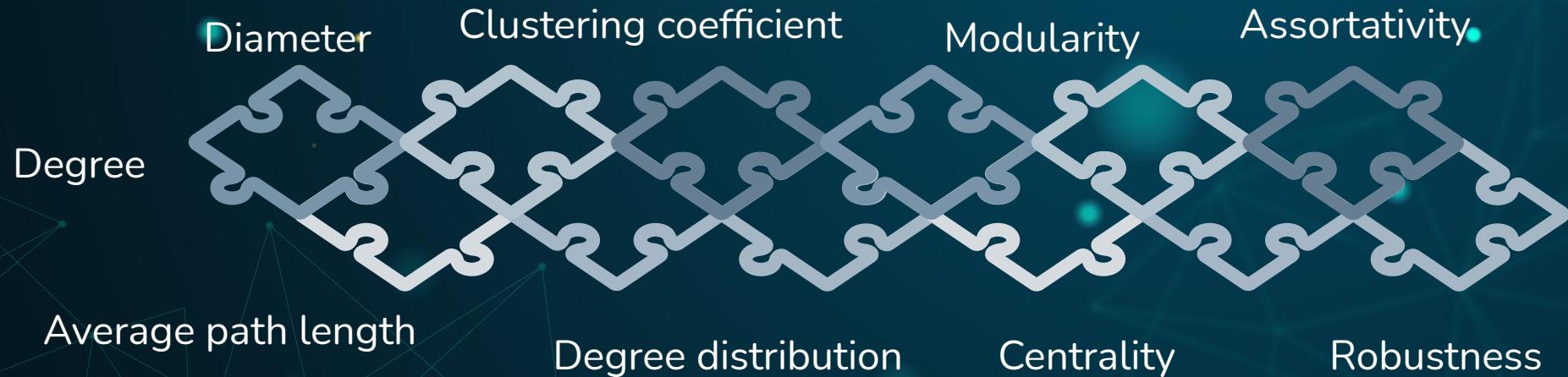
- Positive vs negative campaigns
- Right vs left parties
- Comments vs posts



Network Creation.



Performed statistics



Analysis are performed mainly on the projection hashtag network.

Clustering coefficient and robustness are performed also on the bipartite network.

Graphical representation

Degree
(node's size)

Multigravity
ForceAtlas2

Modularity
(label's color)

Circular
Layout

(by modularity and degree)

Qualitative
analysis

Negative and Positive Campaigns



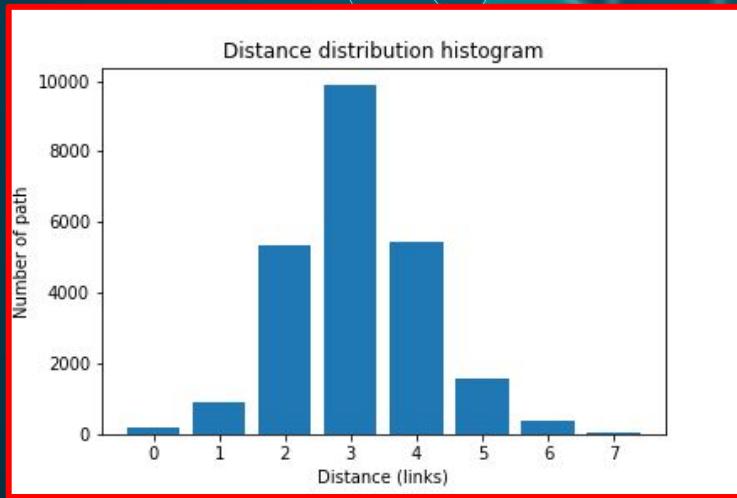
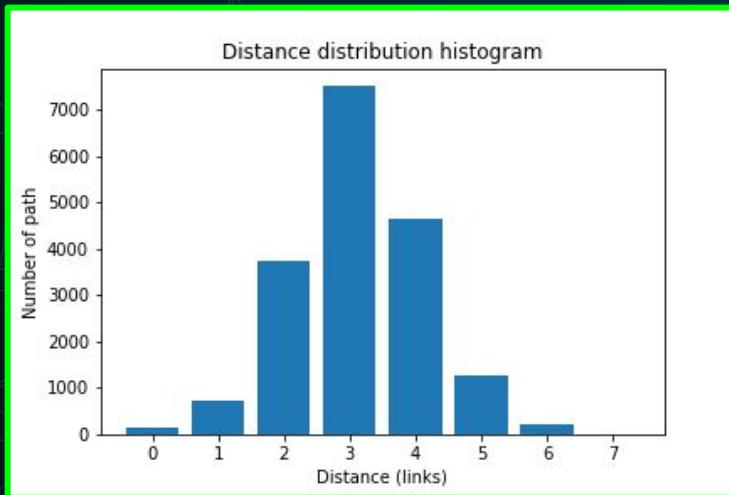
Participants:
Gabriella Buosi
Laura Soccoll

General parameters

| | Positive database | Negative database |
|-----------------------------|-------------------|-------------------|
| Number of nodes N | 183 | 160 |
| Number of edges L | 452 | 360 |
| Average degree k | 4.9399 | 4.5000 |
| Second order average degree | 57.9344 | 48.6875 |
| Third order average degree | 1205.8251 | 818.4375 |
| Variance | 33.5319 | 28.4375 |
| Min degree | 0 | 0 |
| Max degree | 42 | 30 |
| Power law coefficient | 3.4254 | 2.4294 |

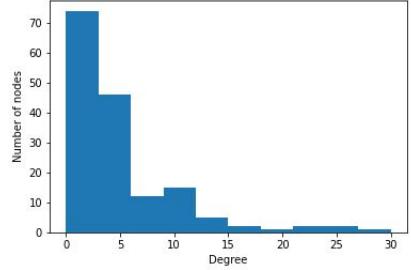
Diameter and average path length

| | Positive | Negative |
|--------------|----------|----------|
| Diameter | 7 | 7 |
| Average path | 3.1186 | 3.1466 |

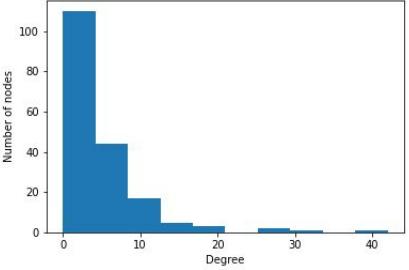


Degree Distribution

Degree distribution histogram



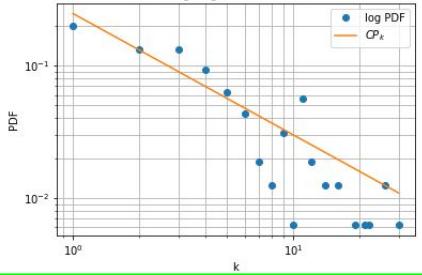
Degree distribution histogram



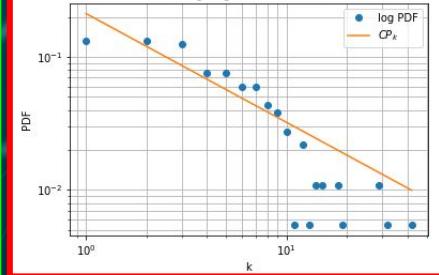
Histograms

PDFs

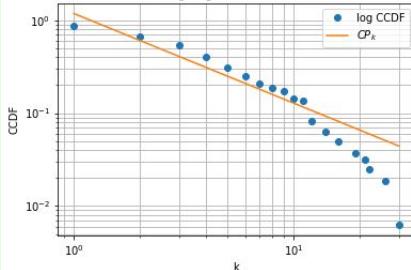
Log-Log PDF function



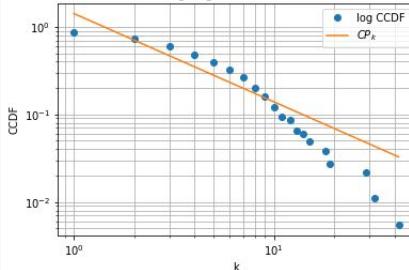
Log-Log PDF function



Log-Log CCDF function



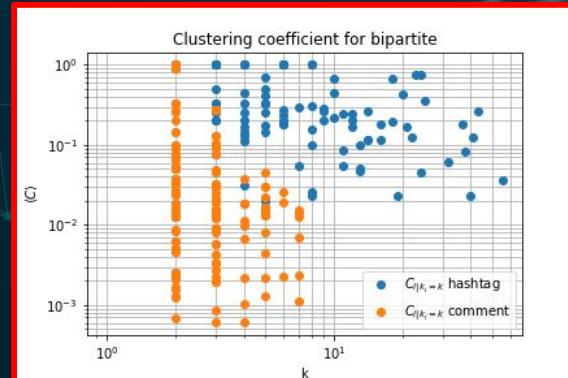
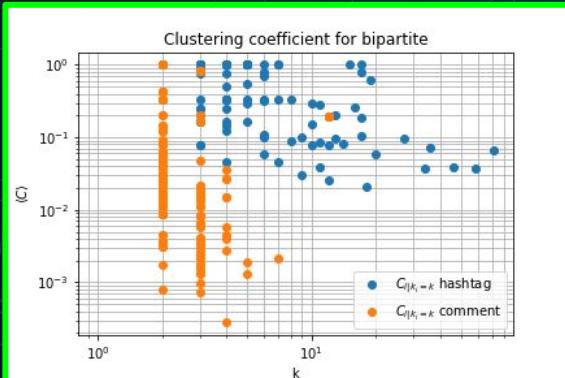
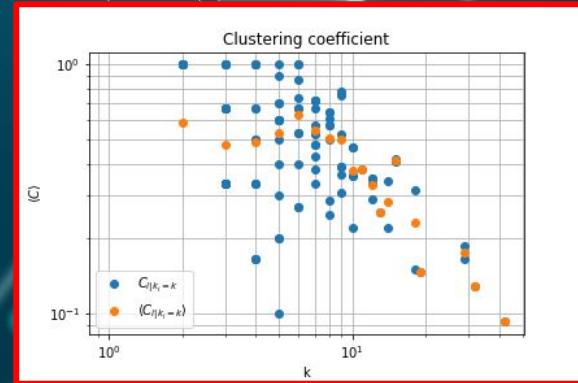
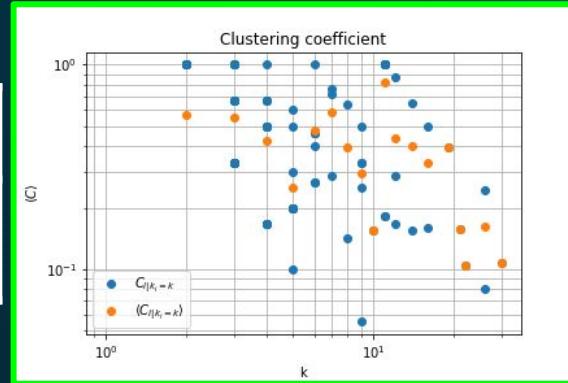
Log-Log CCDF function



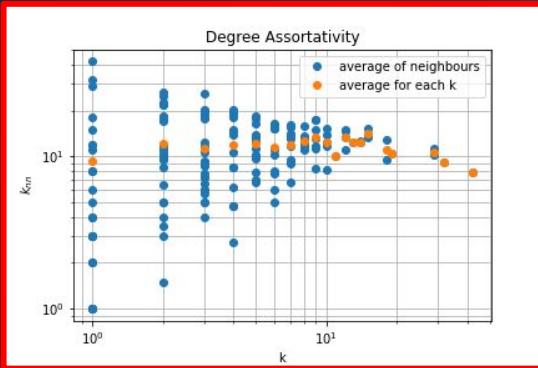
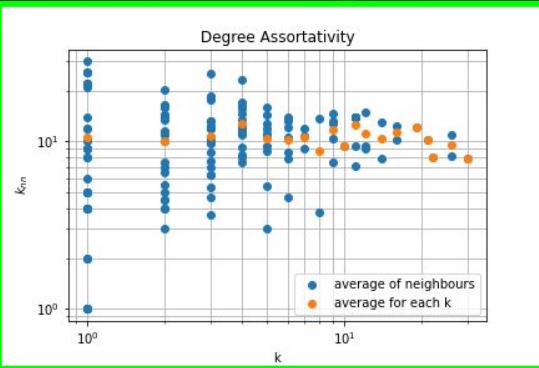
CCDFs

Clustering coefficients

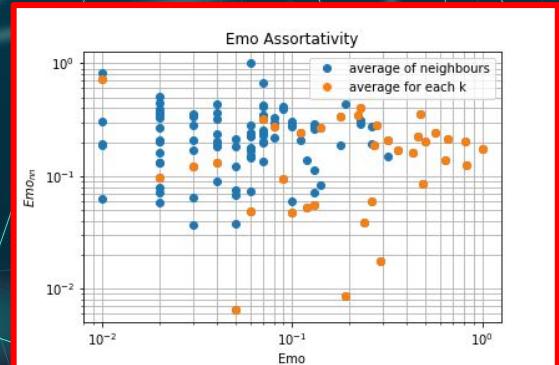
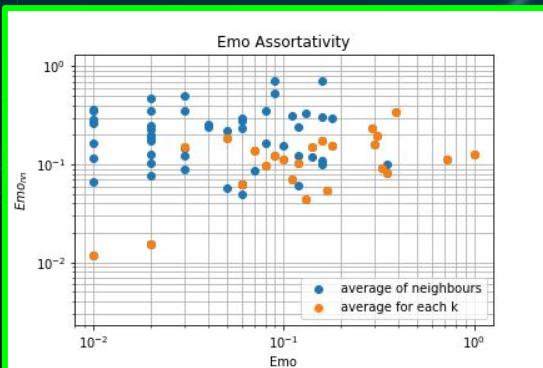
| | Positive | Negative |
|------------|----------|----------|
| Avg. value | 0.4294 | 0.3796 |



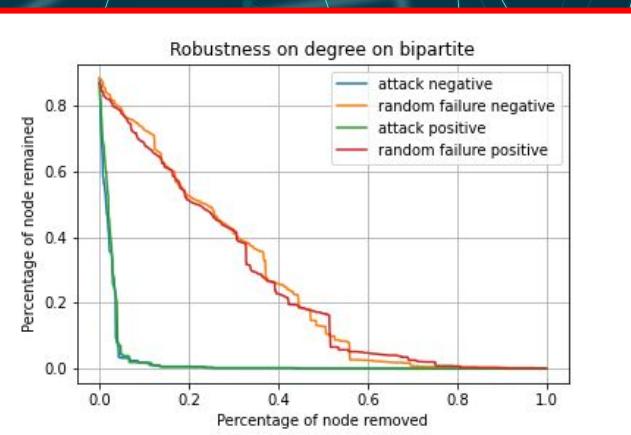
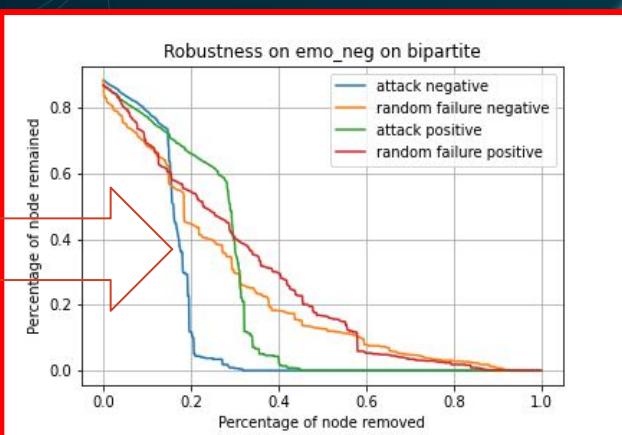
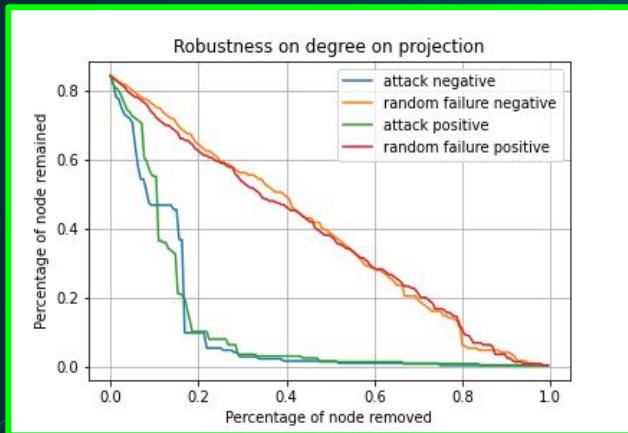
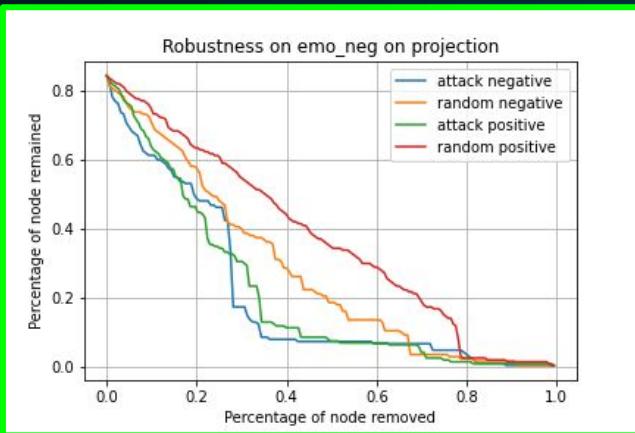
Assortativity



| | Positive | Negative |
|--------|----------|----------|
| Degree | -0.0808 | -0.0699 |
| Emo | -0.0013 | 0.0892 |

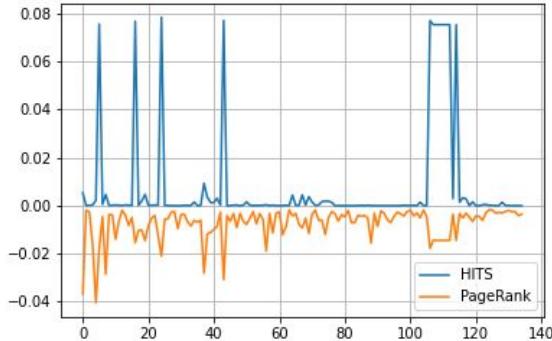


Robustness

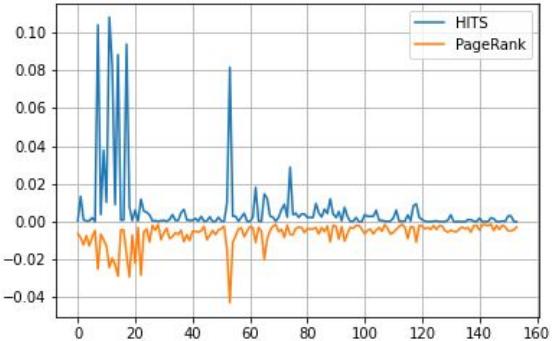


Pagerank and HITS

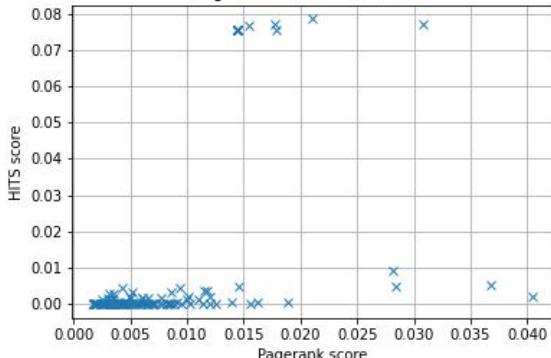
Pagerank vs HITS



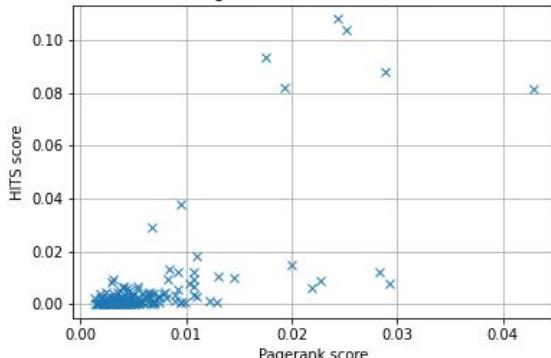
Pagerank vs HITS



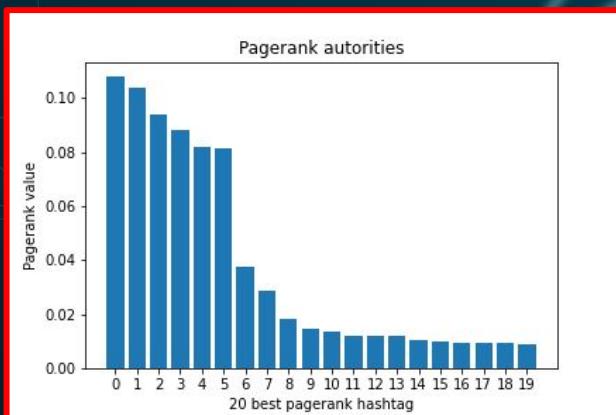
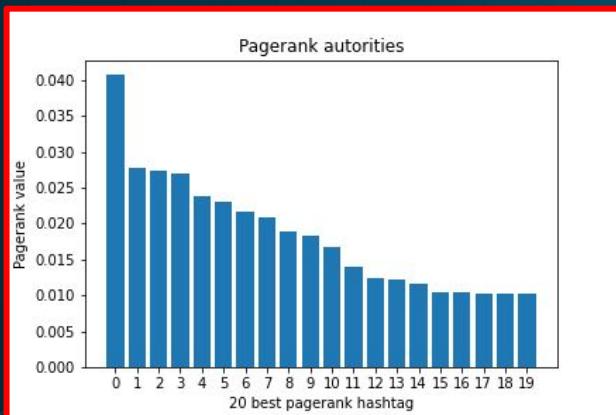
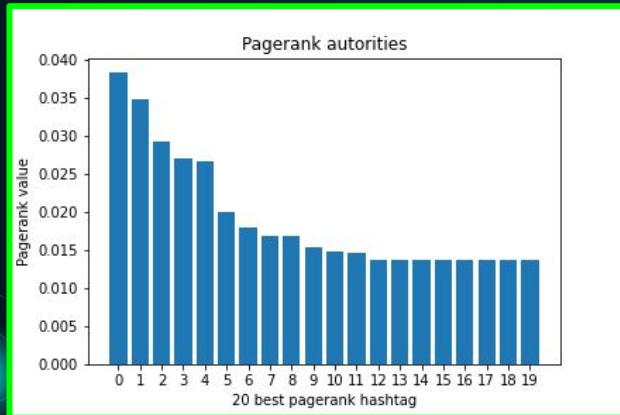
Pagerank vs hits coefficient



Pagerank vs hits coefficient



Top 20 ranked hashtag



| Negative | Positive |
|---------------------|------------------|
| #facciamorete | #facciamorete |
| #salvini | #iostoconsalvini |
| #m5s | #propagandalive |
| #lega | #milano |
| #pd | #maiconsalvini |
| #renzi | #votafdi |
| #salvinidimettiti | #instagram |
| #calenda | #dantetop |
| #ue | #italia |
| #portichiusi | #governo |
| #fascismo | #lariachetirala7 |
| #grillo | #selfini |
| #europa | #tolleranzazero |
| #parma | #piueuropa |
| #pilotta | #italexit |
| #pizzarotti | #europee2019 |
| #formigli | #stopinvasione |
| #carofiglio | #pizzarotti |
| #federicopizzarotti | #25aprile |
| #pizzatotto | #formigli |

Hashtag Projection Networks

#renzi #lasinistra
#alitalia #forzaitalia #careggio
#raggi #grillo #m5s #europee #umbria
#monti #pd #fornigli #votalega #gretathunberg
#federicopizzarotti #pizzarotti #scrivisardone #digos #svegliatequiviriale
#ue #pizzatotto #scrivimussolini #tendina #fakenews
#lezioniueuropee2019 #fdi #casalbruciato #berlusconi #ramelli #licenzia_luca_morisi_#12evotopd
#eu #calenda #santanche #parma #bergoglio #gretathunberg
#fi #senzadime #casalbruciato #destra #stross #legaladrona #noncredible
#silvioberlusconi #feminismo #falexit #neuro #mandriandepando #sound #ariachetrala7 #saviano #siri
#fascismo #apoli #meloni #siscia #fasciss #forzafatu #fascism #mandriandepando
#neuropapercambiaretutto #governo #meloni #siscia #casalbruciato #italiananza #26maggio #26maggiovotolega
#costituzione #civediamocamilano #sud #meloni #siscia #casalbruciato #italiananza #26maggio
#ribaltiamoquestaeuropa #dimai #rom #face #portichi #governodelfallimento
#salvinini #baggio #fratellitalia #migranti #rotatalano #salvinidimettiti #siamoeuropei
#italia #europa #immolucano #selfini #maiconsalvin #condonate_tasseano
#primagliitaliani #scrividanti #agorarai #mezzogiorno #facebook #fascista #belacqua #estinzioneipd #25aprile
#piueuropa #censura #pdotti #instagram #bufagni #quot100 #sewatch #facciamovotare
#regionelazio #venezuela #resistenza #lega #salvinifattiprocessare #maquandolavori
#49milioni #europee2019 #49milioni

#facciamorete

#fi #siri #unitisvince
#tav #vota #vincisalvin #governodelcambiamento
#climatechange #m5s #continuarexcambiare
#tuttidante #notredame #santanche #sionconmarabibotto
#taranto #srilankaitaly #poverapatria
#impatri #scuola #lega #tasse
#nezzoraincipi #portaiporta #berlusconi
#flattax #m5s #tangenti #santanche
#dantecattaneo #04/2019 #scriviberlusconi #pd #meloni #europaverde #salvinipremier
#sindraco #sindaco #greta #ministrodellamalavita
#isudonsilega #buonaspassa #daimo #redditodicitidianza
#espulsione #bimbominkia #galadrona #correnteclimatica
#propagandavive #galadrona #madediav #idi #iva
#votodonna #sovranisti #disegnoperdella #enzi #zingaretti #mafia #niklauza
#toscani #governo #piopiatore #italia #italia #portaperiti
#inasinistra #calenda #musolin #silvaroman #sionconmariotti
#ionondimette #mimmoluccano #cazzaro #votodonna
#vergogna #veneto #italia #sintira #marche #vototingigli
#europa #neuropapercambiaretutto #europee #cambiamenti #corrente #votaitaliano #opariosueuropa #feminismo
#siamoeuropei #scrivisantanche #26maggio #governodelfallimento
#26maggio #italia #roma #votalega #europee #ambienmento #corrente #fakenews #facebook #facciamovotare
#scrivimussolini #25aprile #piazzalempieueuropa #plazza #massimobordini #scrivitovaglieri
#maipup #earthday #giornatamondialedellterra #sillvalberri #scrivitobanelli #grazie #12evotopd
#casapound #europee2019 #africa #democrazia #cucchi #centrodestra #dellaclao #sicurezza #olleranzero
#salvinidimettiti #condomini #salvinidimettiti #salvinimommolars #sionconsalvin
#sigraganero #capitano #dimanardi #26maggio
#liberazione #camerano #stestenz #eu #vantutu #dimitri
#ilsonmodelleralagione #generasalvin #casapound #portichi #casalbruciato
#maquandolavori #dalleparoleaiatti #falexit
#casapound #portichi #casalbruciato
#dalleparoleaiatti #primagliitaliani
#stopinvasione



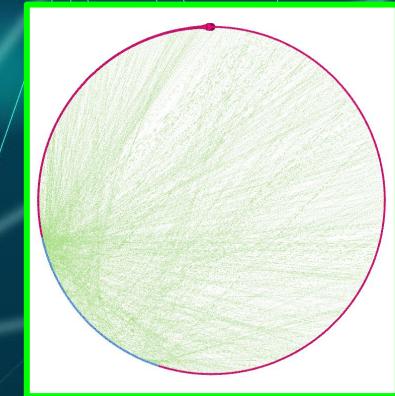
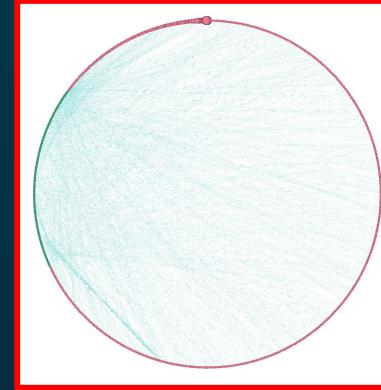
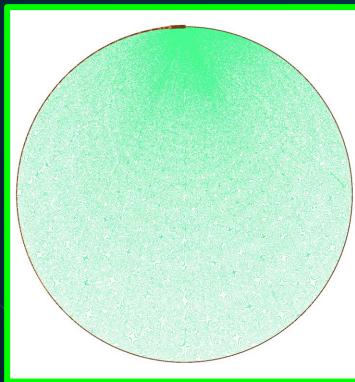
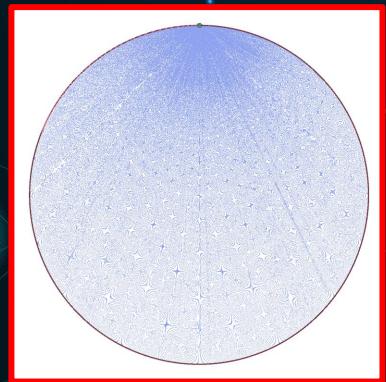
donne
solidarietà
povertà
europà
religioni
amnesty
politico
rifugiati
disabili
clima
altroPolitico

Topic Projection Networks



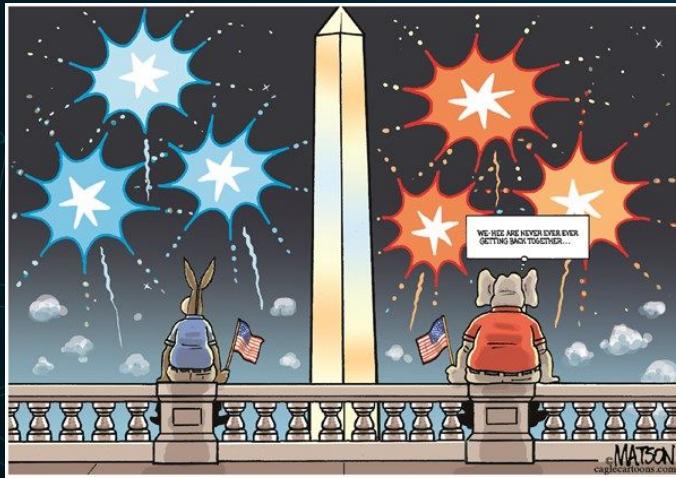
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europà
religioni

Topic Bipartite Networks



Hashtag Bipartite Networks

Left and Right Parties

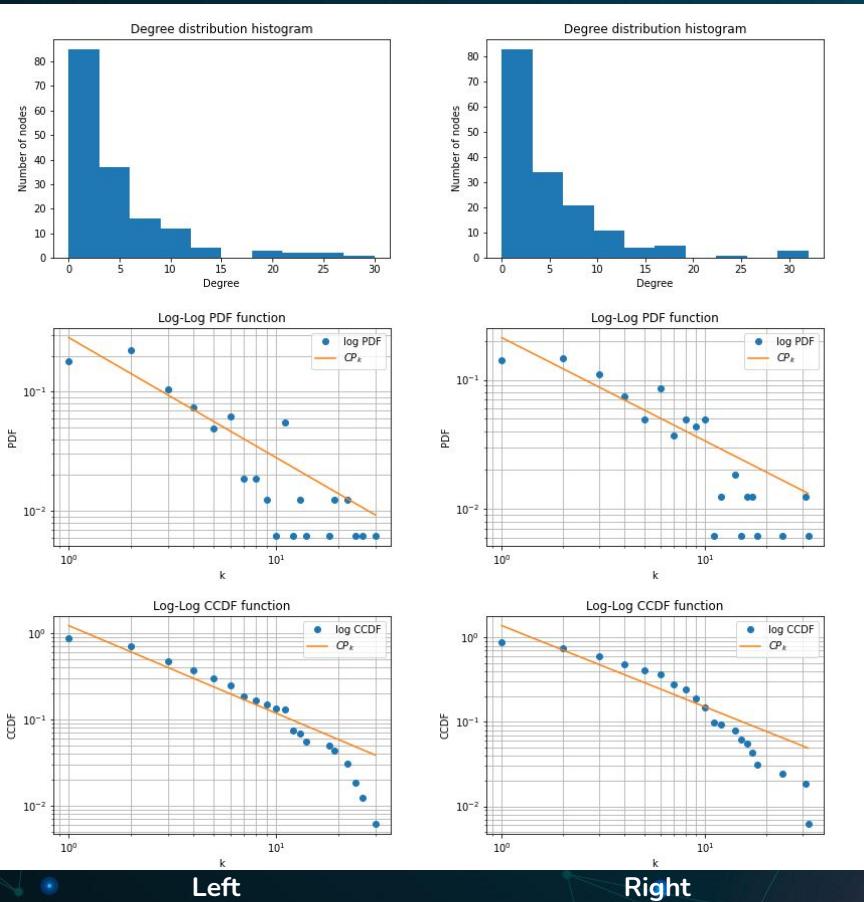


Participants:
Matteo Piva, Luca
Dalla Gassa.

General statistics

| | Left database | Right database |
|-----------------------------|---------------|----------------|
| Number of nodes | 162 | 162 |
| Number of edges | 352 | 420 |
| Average degree | 4.3457 | 5.1852 |
| Second order average degree | 46.9876 | 50.6913 |
| Third order average degree | 801.3457 | 1056.5926 |
| Variance | 28.1027 | 31.8052 |
| Min degree | 0 | 0 |
| Max degree | 30 | 32 |
| Power law coefficient | 2.2821 | 3.6095 |
| Density | 0.0270 | 0.0322 |

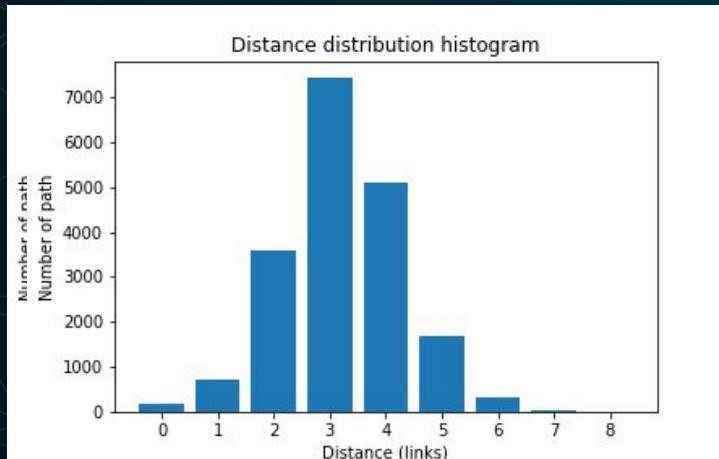
Degree and CCDF distribution



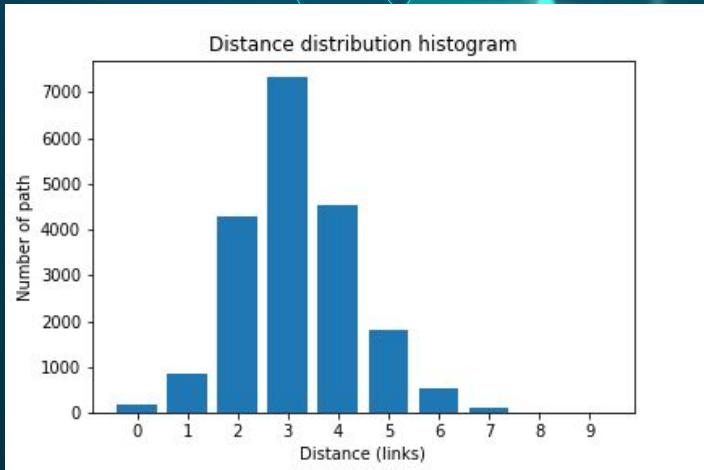
Similar degree distribution between Left and Right: lots of nodes with small degree and few nodes with higher degree (hubs).

Diameter and average path length

| | Left | Right |
|---------------------|--------|--------|
| Diameter | 8 | 9 |
| Average path length | 3.2462 | 3.2188 |



Left distance distribution histogram

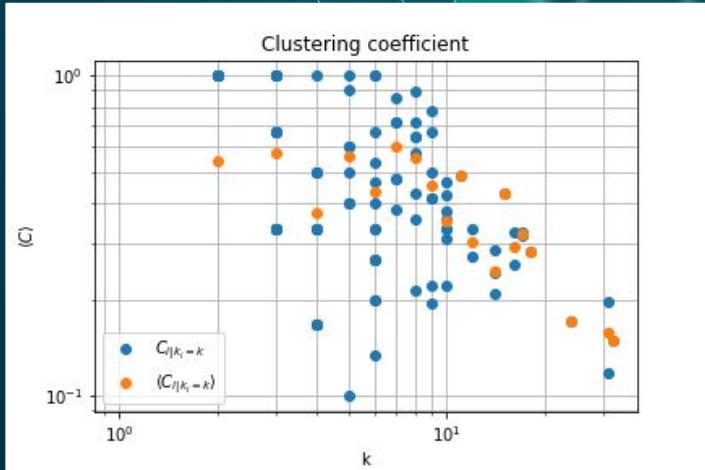
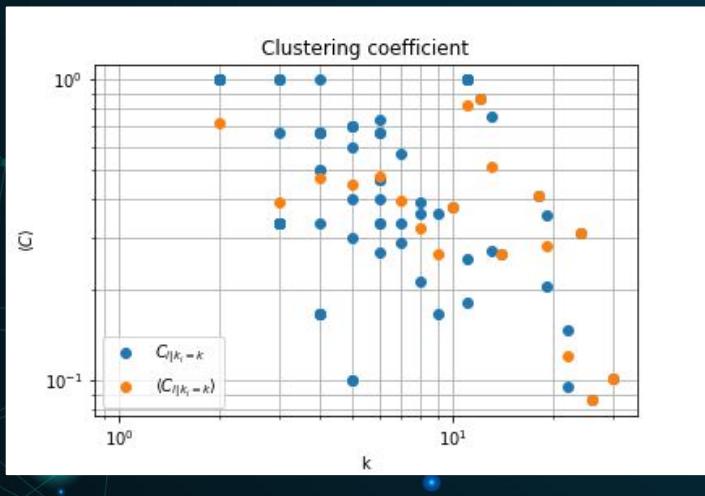


Right distance distribution histogram

Similar behavior between the 2 networks according to the values in table and the distance distributions

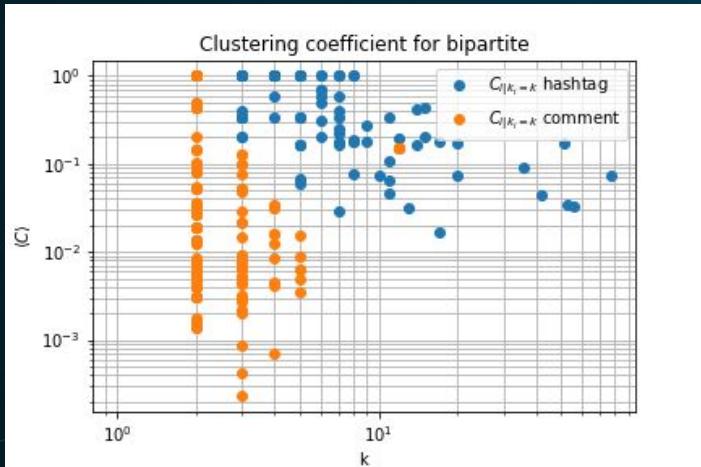
Clustering coefficient - projection

| | Left | Right |
|--------------------------------|--------|--------|
| Average clustering coefficient | 0.4427 | 0.4064 |

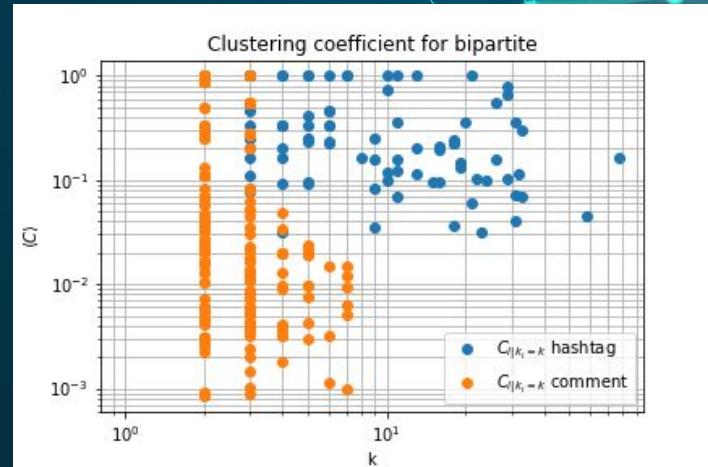


Clustering coefficient inversely proportional to hashtags degree and **similar in both the networks**. It means that for a hashtag with a high degree, its neighbors are not connected within each other.

Clustering coefficient - bipartite



Left

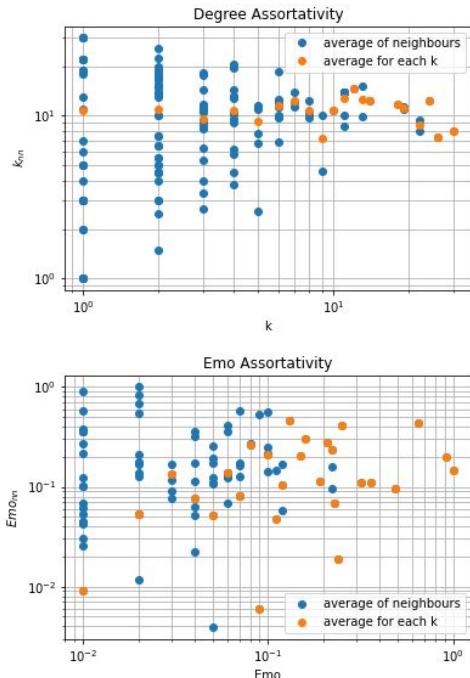


Right

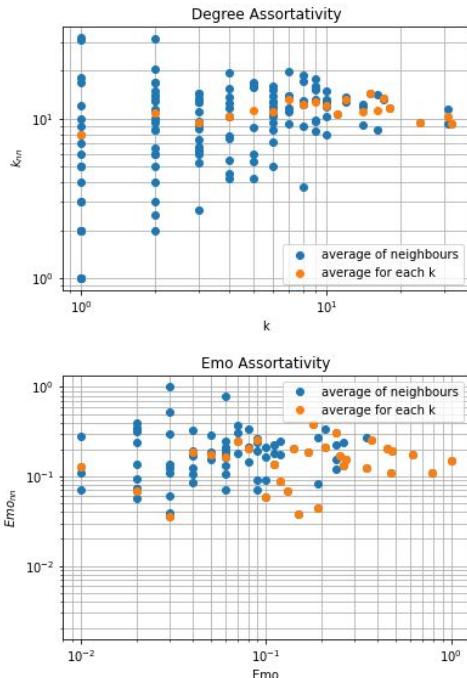
Comments hold a similar behavior between Left and Right: if the degree increases, the clustering coefficient decreases.

Hashtags follow the inversely proportional behavior in the Left network, while the hashtags clustering coefficients are more uniform in the right network.

Assortativity



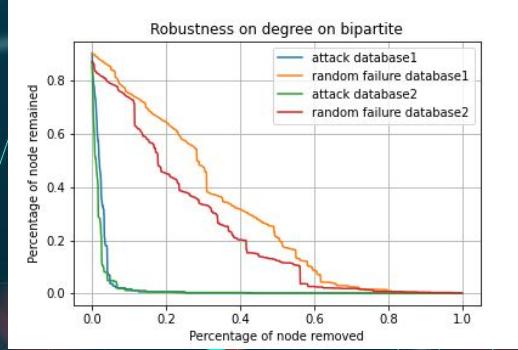
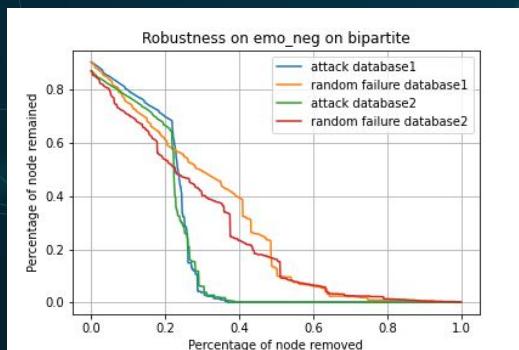
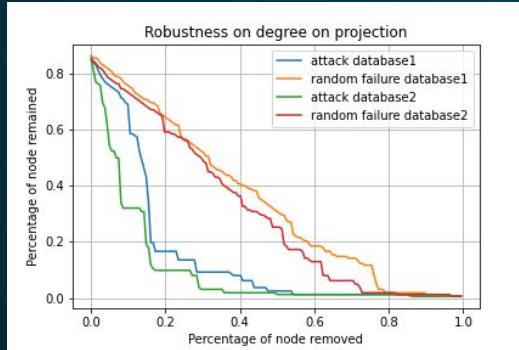
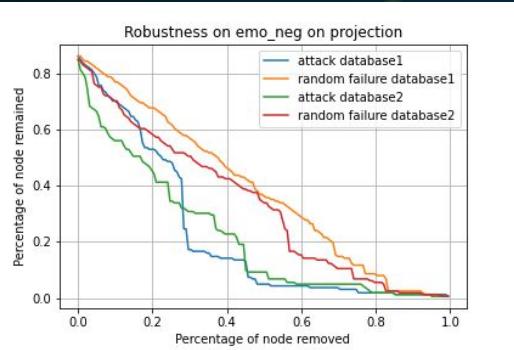
Left



Right

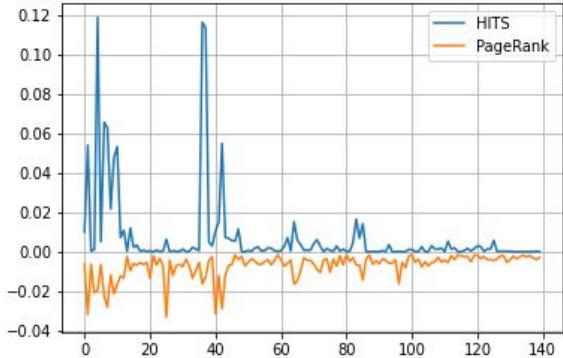
| | Left | Right |
|-----------------------|---------|---------|
| Degree assortativity | -0.0512 | -0.0157 |
| Emotion assortativity | 0.0589 | 0.0211 |

Robustness

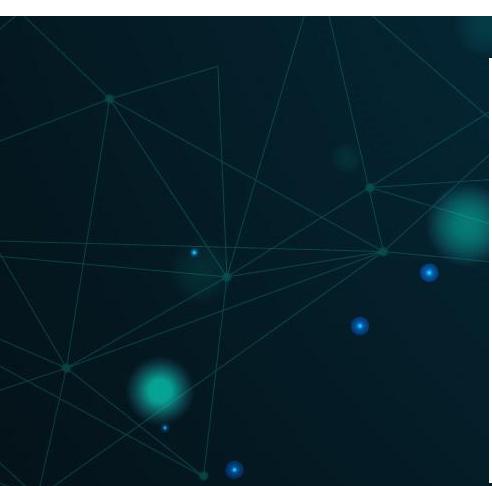
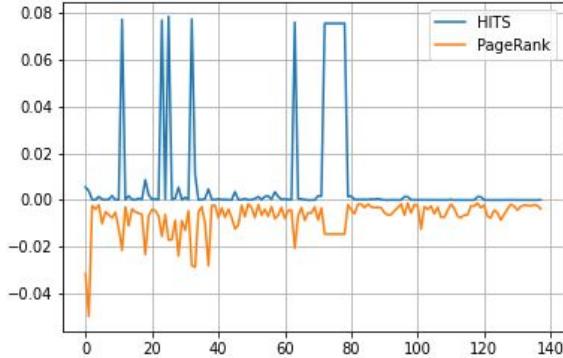


Pagerank

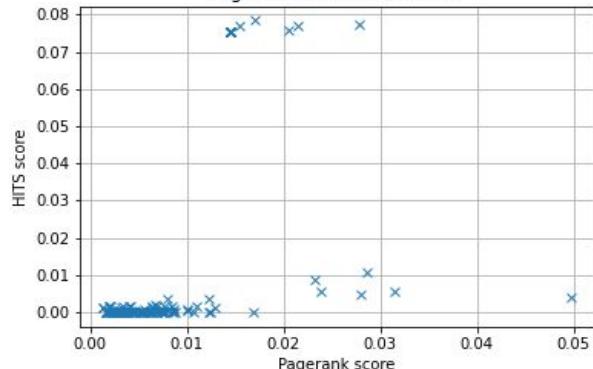
Pagerank vs HITS



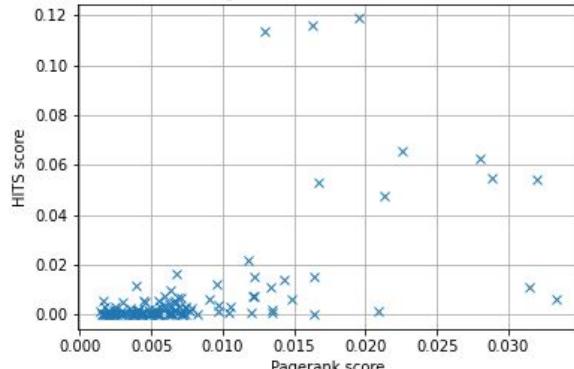
Pagerank vs HITS



Pagerank vs hits coefficient

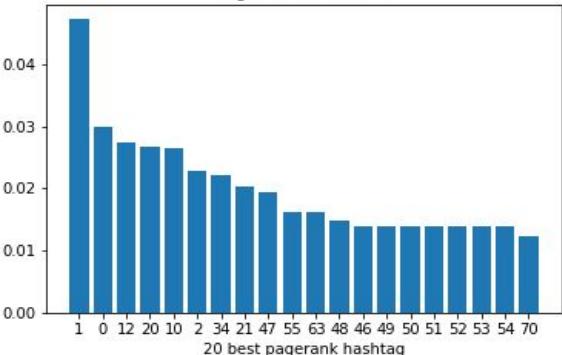


Pagerank vs hits coefficient



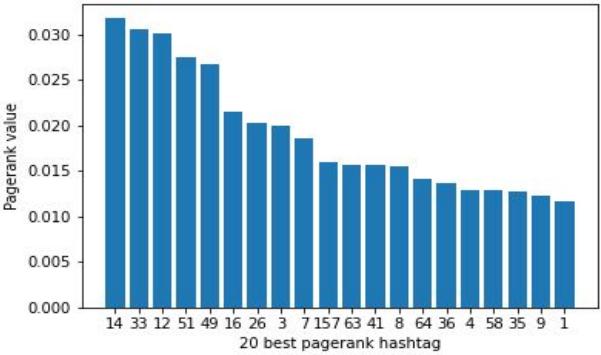
Pagerank authorities

Pagerank value



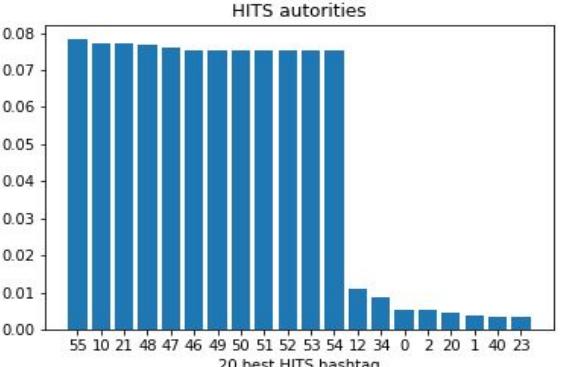
Pagerank authorities

Pagerank value



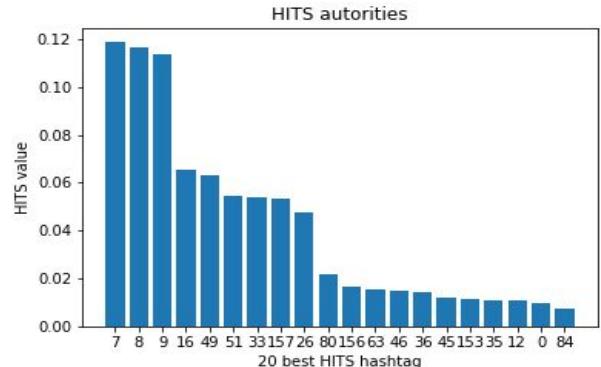
HITS authorities

HITS value



HITS authorities

HITS value

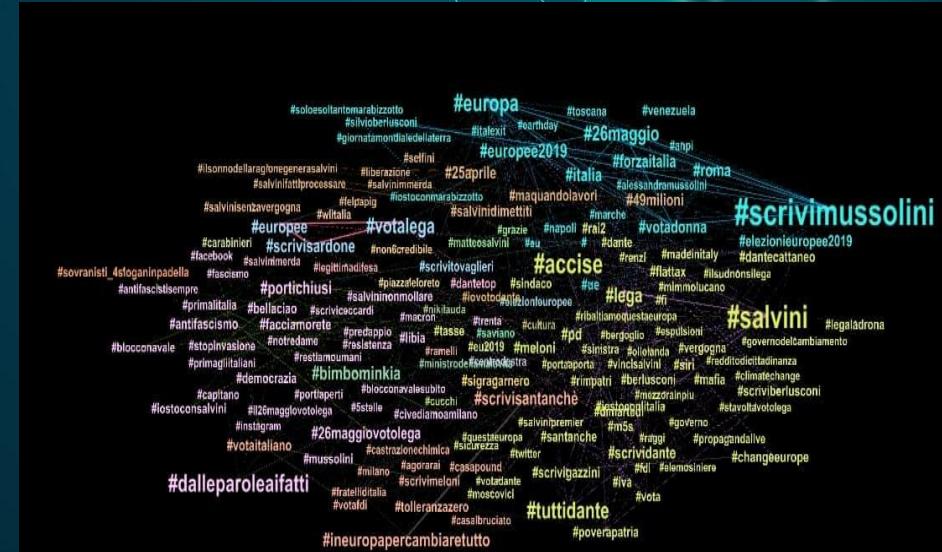


Left

Right

| Left hashtag | Right hashtag |
|--------------------|--------------------------|
| facciamo rete | salvini |
| salvini | europa |
| pd | lega |
| siamoeuropei | europee2019 |
| m5s | scrivimussolini |
| europee2019 | 26maggio |
| lega | italia |
| calenda | portichiusi |
| ue | europee |
| renzi | eu2019" |
| 25aprile | forzaitalia |
| grillo | salvinidimettiti |
| pizzatotto | votalega |
| pizzarotti | pd |
| parma | libia |
| pilotta | salvininonmollare |
| formigli | facciamorete |
| carofiglio | ineuropapercambiaretutto |
| federicopizzarotti | mussolini |
| facciamovotare | votaitaliano |

Hashtag networks



Topic networks

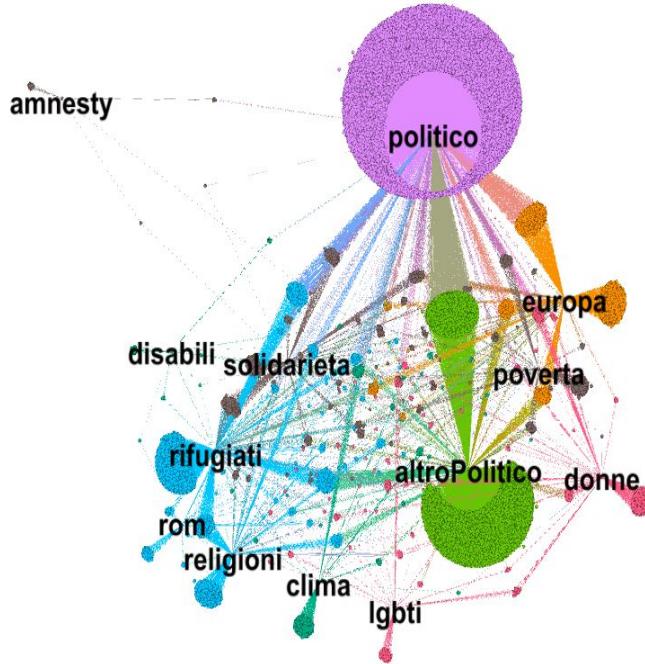
A topic network visualization on a black background. The network consists of several words in different colors (pink, purple, blue, green) connected by thin white lines. The words include: povertà, donne, europa, solidarietà, rifugiati, politico, lgbti, rom, altroPolitico, religioni, amnesty, clima, disabili. The word 'solidarietà' is in pink, 'rifugiati' is in blue, 'politico' is in green, 'lgbti' is in purple, 'rom' is in pink, 'amnesty' is in small blue text near 'clima', and 'disabili' is in small blue text near 'europa'. The word 'clima' is in green.

A topic network visualization on a black background. The network consists of several words in different colors (green, blue, red, orange, yellow, pink) connected by thin white lines. The words include: povertà, clima, europa, disabili, politico, altroPolitico, lgbti, donne, solidarietà, rifugiati, religioni, amnesty, rom. The word 'povertà' is in green, 'clima' is in blue, 'europa' is in red, 'disabili' is in orange, 'politico' is in yellow, 'altroPolitico' is in pink, 'lgbti' is in green, 'donne' is in blue, 'solidarietà' is in pink, 'rifugiati' is in green, 'religioni' is in pink, 'amnesty' is in small blue text near 'rom', and 'rom' is in pink.

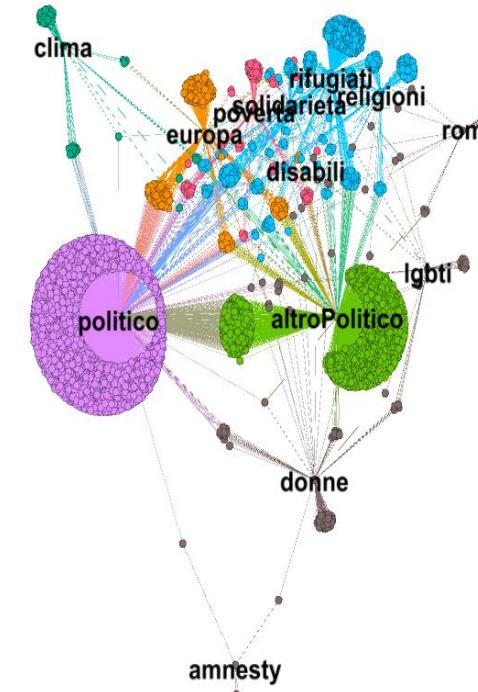
Posts vs. Comments

Participants: Arthur Tassan-Mazzocco, Edoardo Monaco and Francesco Guarnaccia.

Topic Bipartite Networks



comments

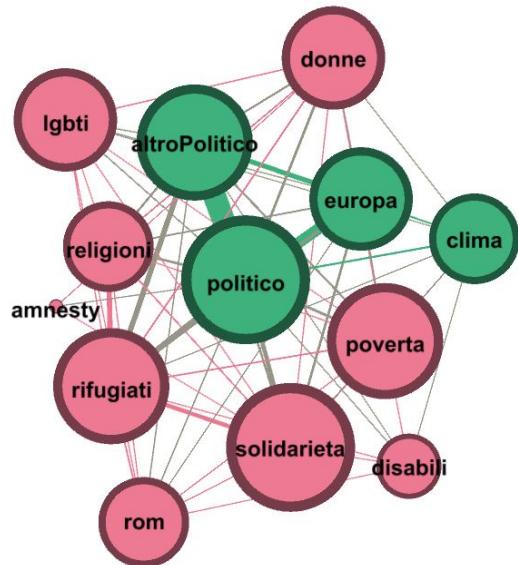


posts

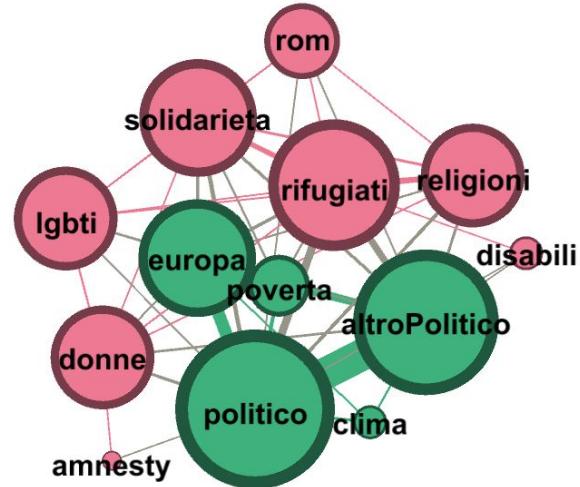
Topic Bipartite Networks general measures comparison

| Measures | Comment database | Post database |
|-----------------------|------------------|---------------|
| Number of nodes | 40657 | 5512 |
| Number of edges | 47473 | 6396 |
| Average degree | 2.3353 | 2.3208 |
| Variance | 19714.5477 | 2732.3194 |
| Min degree | 1 | 1 |
| Max degree | 25536 | 3435 |
| Average path length | 1.2051 | 1.3974 |
| Power-law coefficient | 9.2447 | 9.0647 |
| Diameter | 2 | 2 |
| Density | 5.7440 | 0.0004 |

Topic Projection Networks

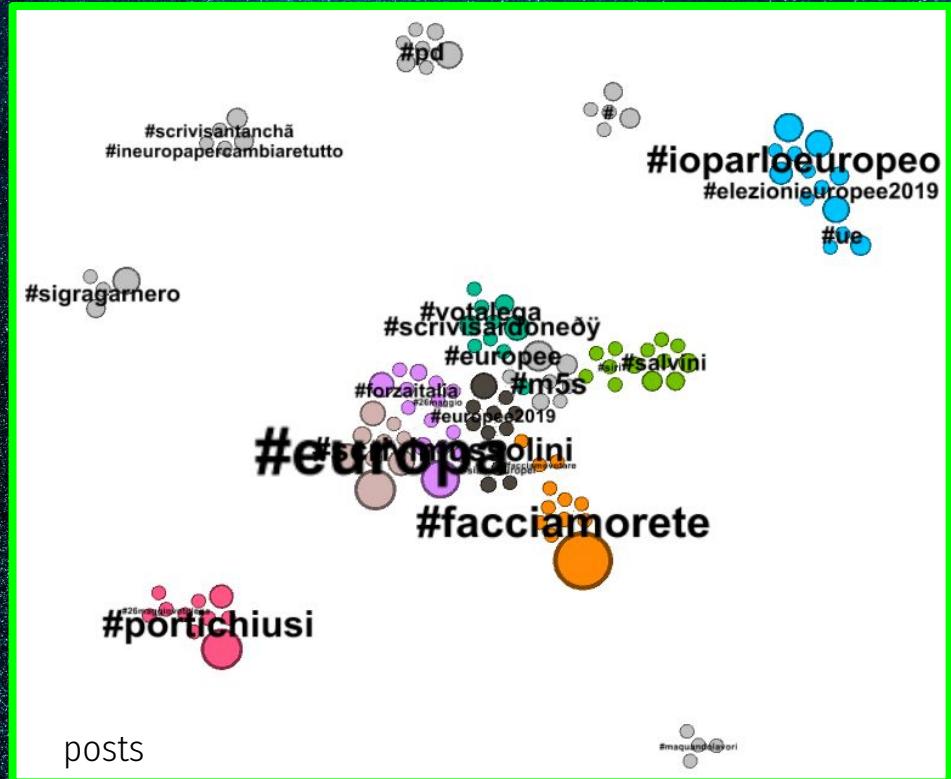
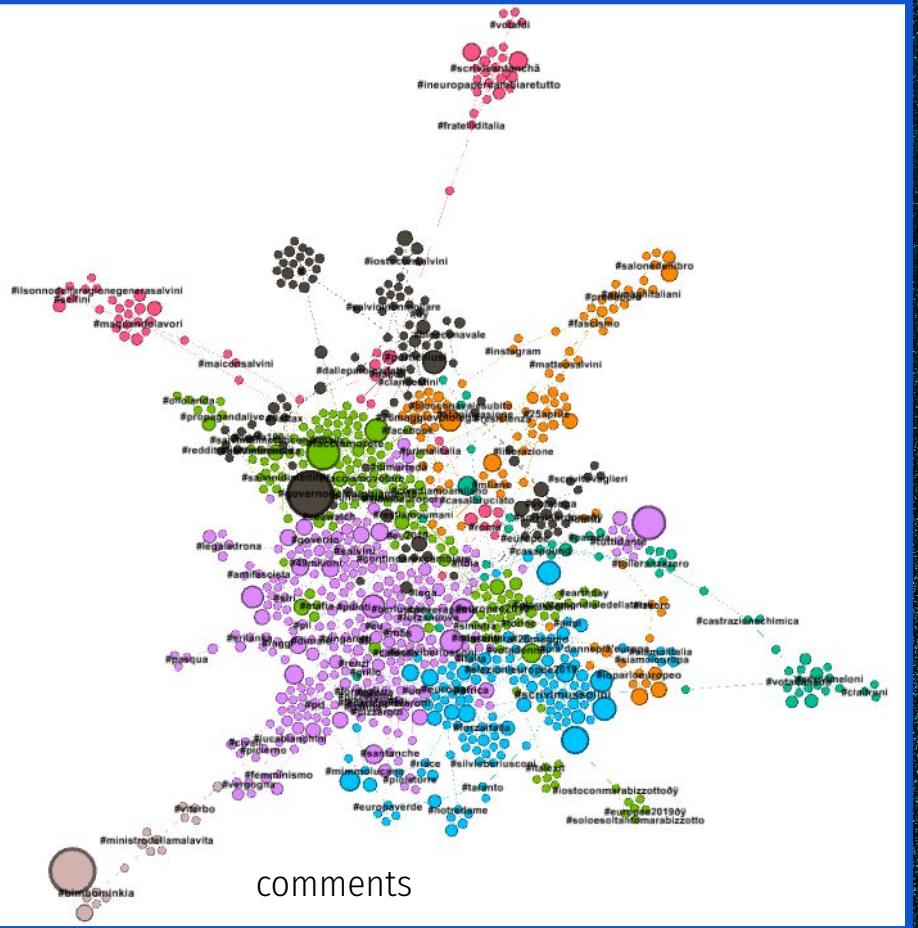


comments

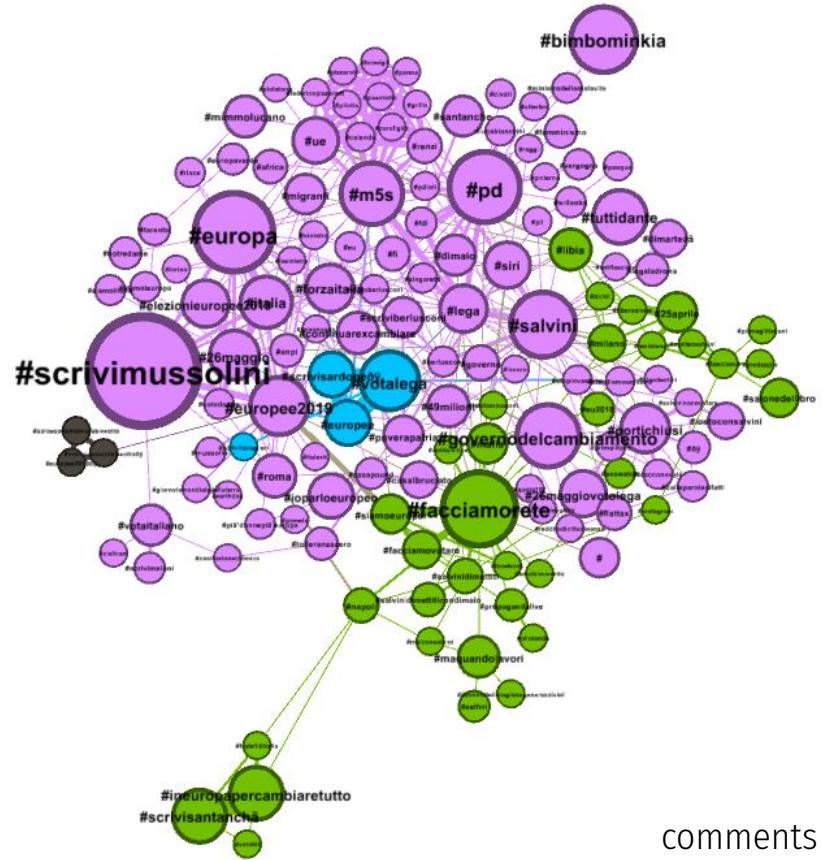


posts

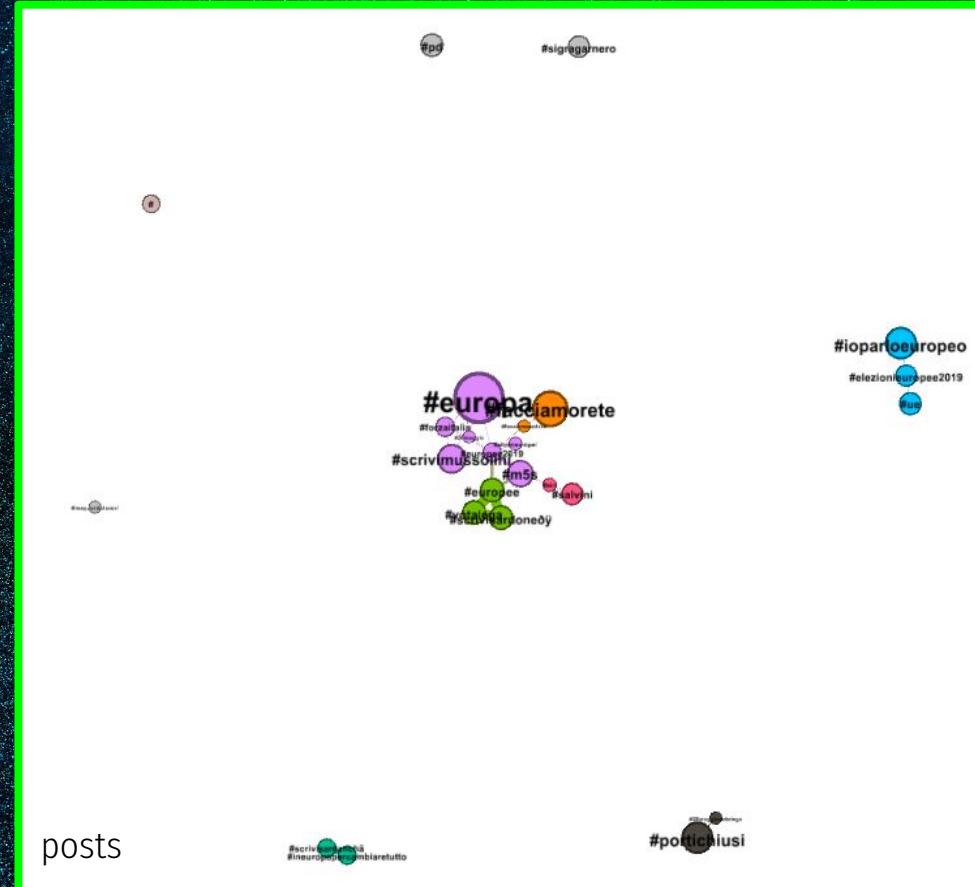
Hashtag Bipartite Networks :



Hashtag Projection Networks :



comments

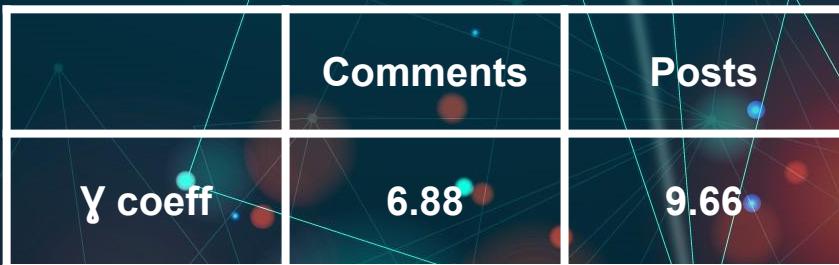
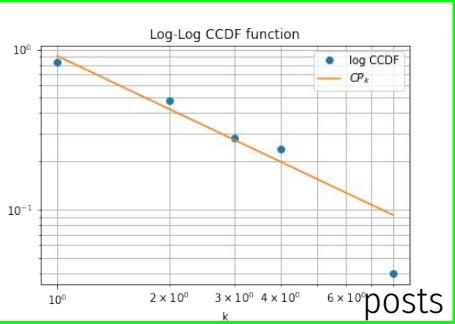
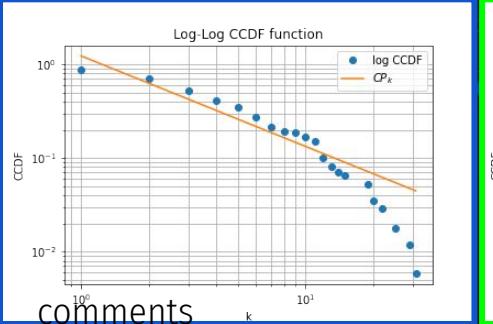
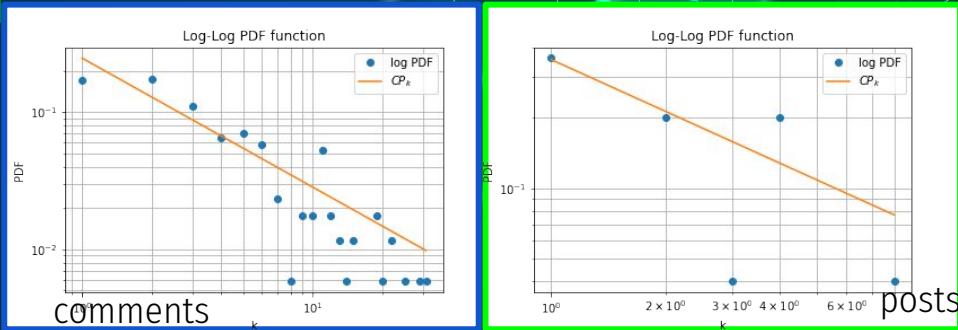
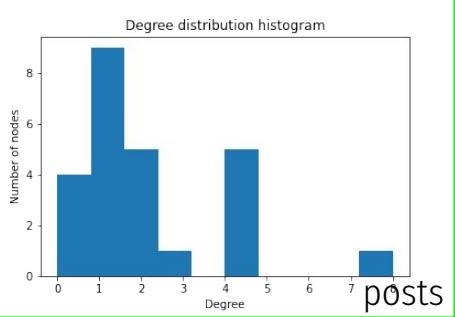
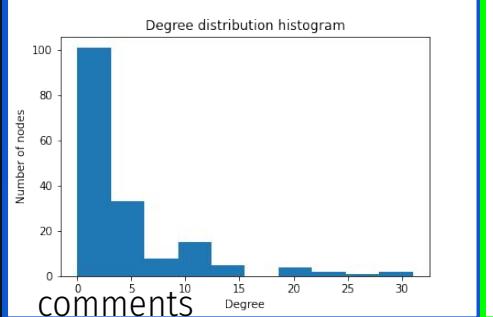


posts

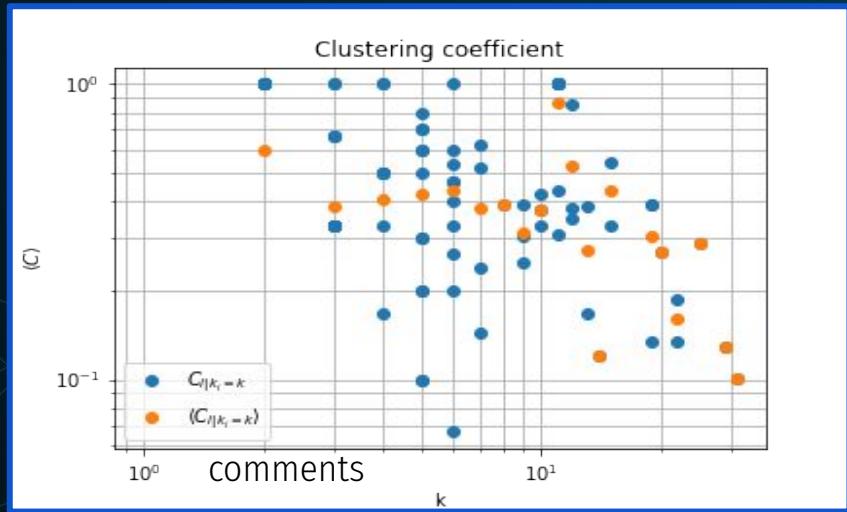
Hashtag projection Networks general measures comparison

| | Comment database | Post database |
|-----------------------------|------------------|---------------|
| Number of nodes | 171 | 25 |
| Number of edges | 407 | 25 |
| Average degree | 4.76 | 2 |
| Second order average degree | 54.63 | 7.28 |
| Variance | 31.97 | 3.28 |
| Min degree | 0 | 0 |
| Max degree | 31 | 8 |
| Power law coefficient | 6.88 | 9.66 |
| Density | 0.0288 | 0.083 |

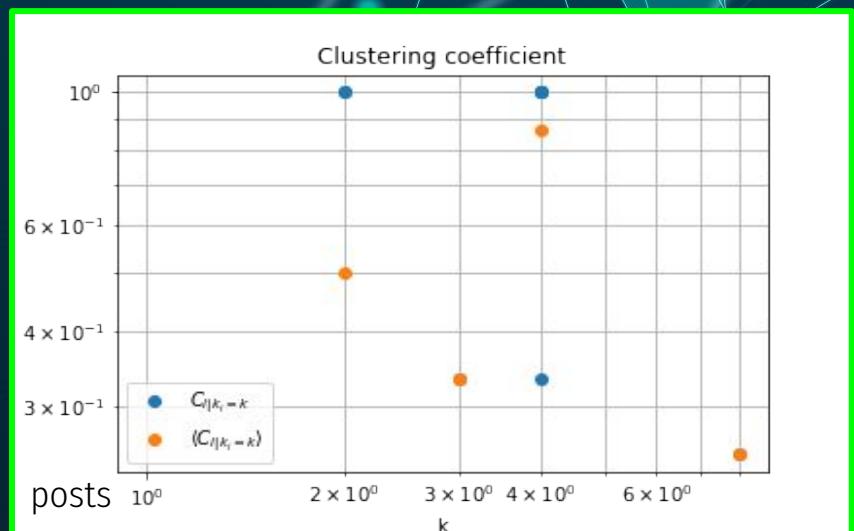
Degree and density distribution



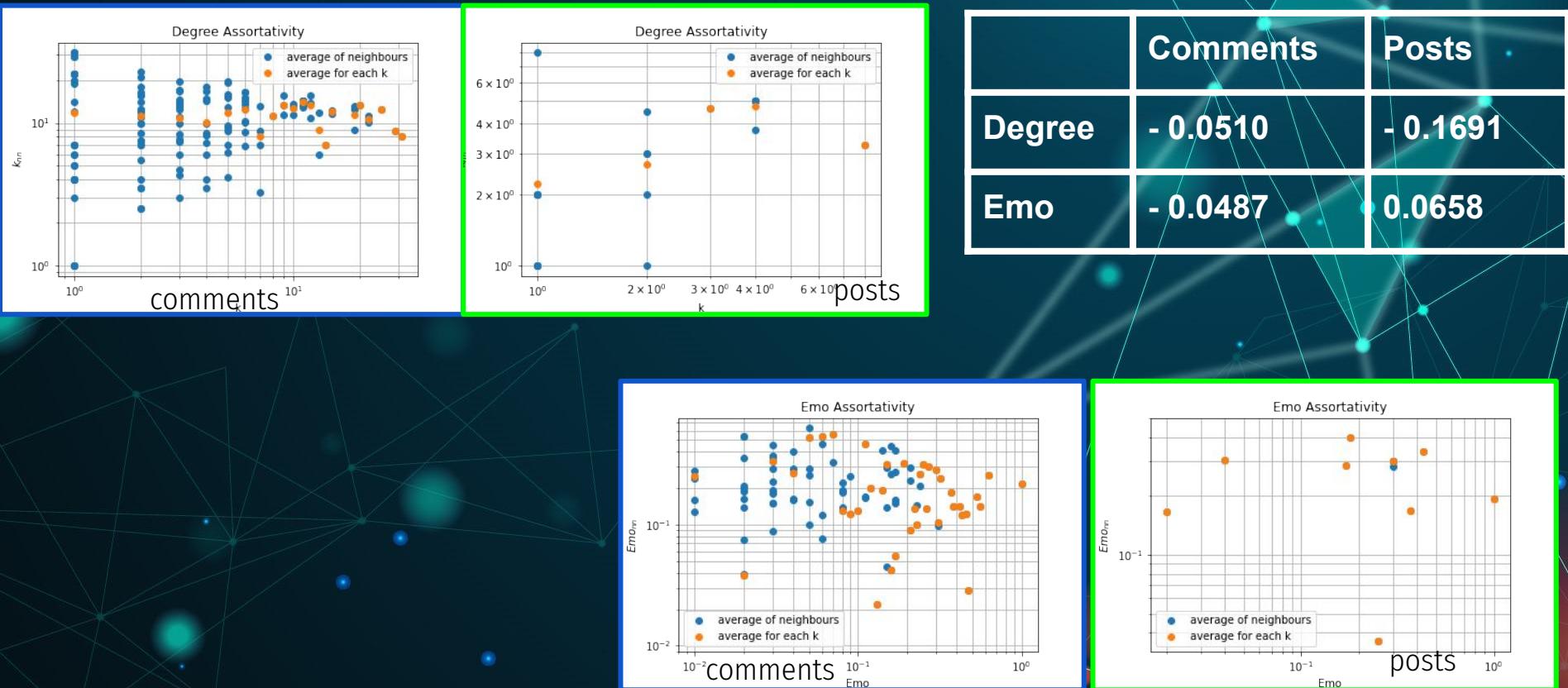
Clustering coefficients



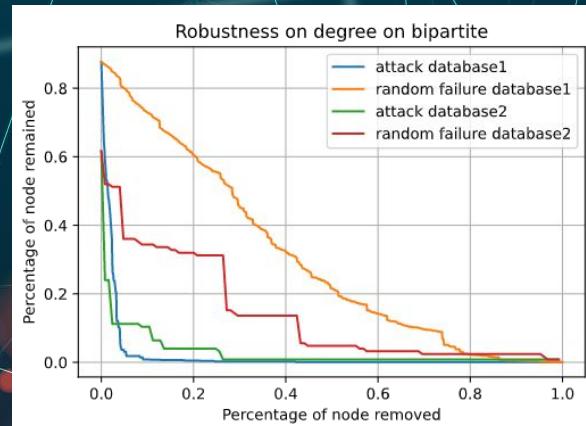
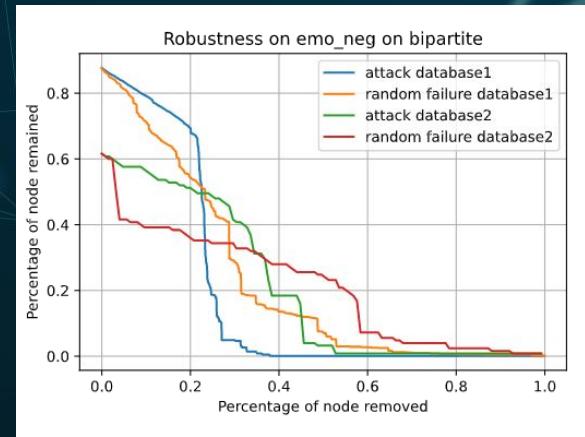
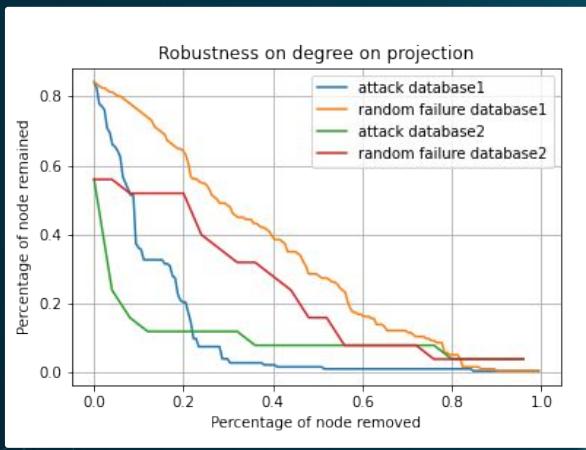
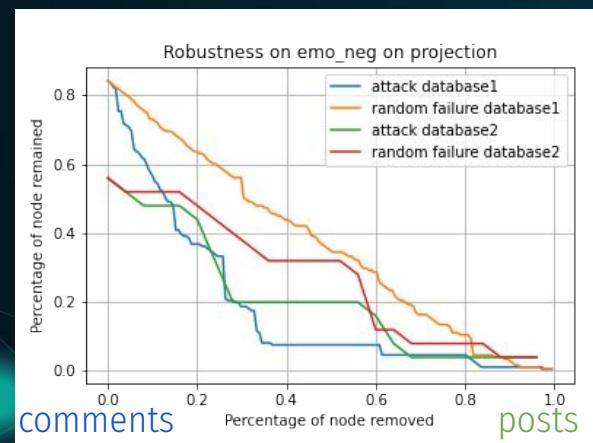
| | Comments | Posts |
|------------|----------|--------|
| Avg. value | 0.3284 | 0.2766 |



Assortativity

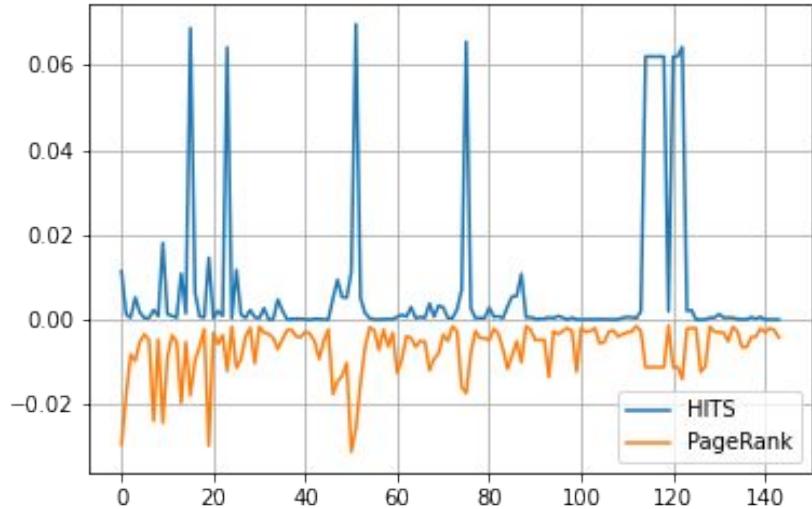


Robustness

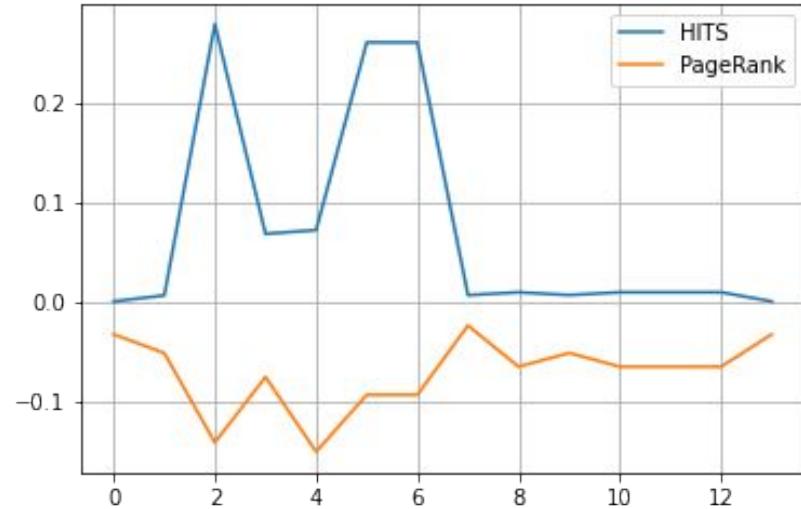


Pagerank and HITS

Pagerank vs HITS



Pagerank vs HITS



Top 10 ranked hashtag

| Pagerank | |
|------------------|---------------------------|
| Comments | Posts |
| #europee2019 | #europee2019 |
| #rpd | #europee |
| #salvini | #elezionieuropee2019 |
| #m5s | #voltalega |
| #lega | scrivisardone |
| #facciamorete | #m5s |
| #europa | #26maggiovotolega |
| #renzi | #portichiuse |
| #portichiuse | #ineuropapercambiaretutto |
| #scrivimussolini | #scrivisantanche |

Conclusions

1. Negative campaign seems to generate more negative emotions in the comments answering to it.
2. Left and right commenters use the same amount of negative emotions.
3. Hashtags are similarly used in posts and comments, their level of negative emotions is comparable.



Further research:

- Investigate other variables (like hate index) and compare them with the results of negative emotion score.
- Find relations between negativity (and other emotion) in the negative campaign posts for a comparison with comments' results.
- Work on the subnetwork of problematic contents: what are the most used hashtags and the prevalent sentiment?

Semantic group

SEMANTICS ARE IMPORTANT
FOR REPRESENTING
KNOWLEDGE IN COMPUTER
SCIENCE.

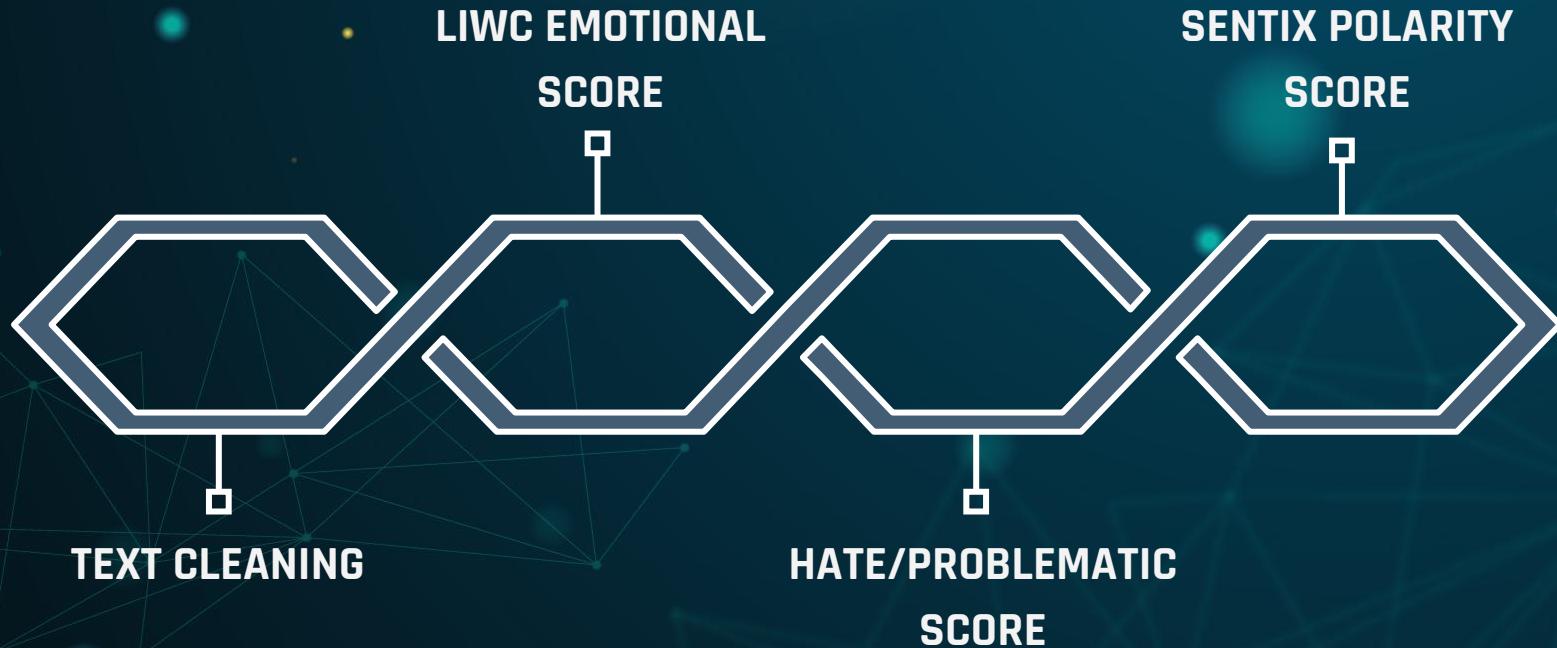


Participants: Caria Natasia, Yasmine
El Khaloufi, Lynda, Andrea, Diego

Network Creation

- Positive vs negative campaign
 - Right vs left parties
 - Singular vs Group target
- 
- 

Variable Creation



Degree

Problematic/Hate
index

Node Removal Analysis

Sentix
Sentiment

LIWC
Sentiments
Attributes

Graphical representation

Page rank
(node's size)

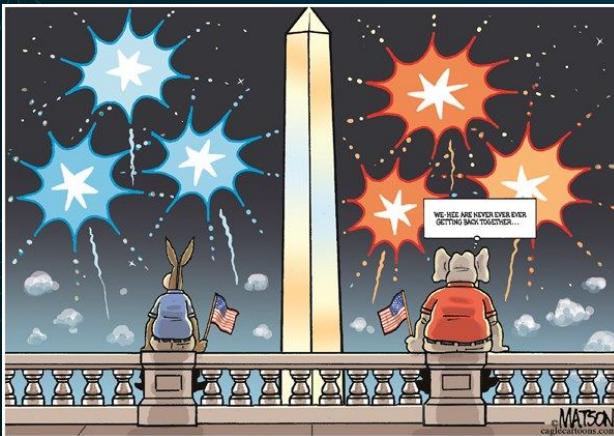
Multigravity
ForceAtlas2

Modularity
(label's color)

Circular
Layout
(by modularity and
page rank)

Qualitative
analysis

Left and Right Parties



Posts analysis:

- Yasmine El-Khaloufi

Comments analysis:

- Andrea Nicolai

Left and Right Posts

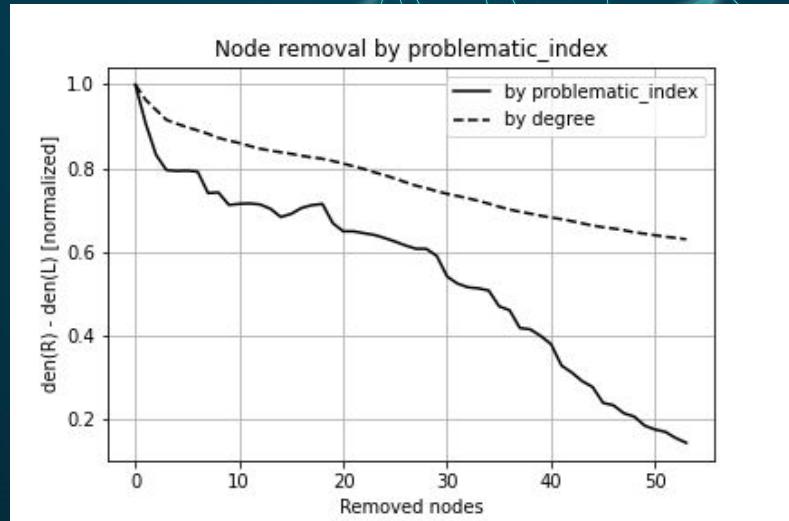
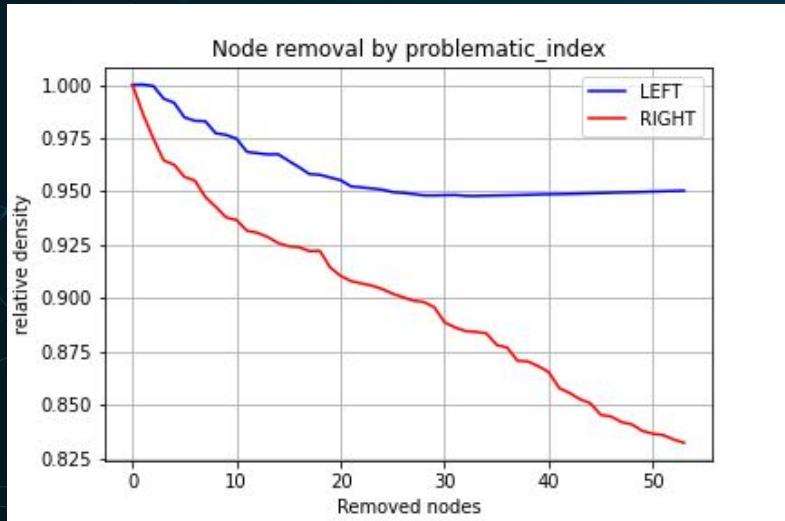
- General Description and statistics

| | Nodes | Edges | Avg.Degree | Density | Estim. γ |
|---------------|-------|-------|------------|----------|----------|
| Left Parties | 13513 | 79062 | 11.70 | 0.000866 | 2.68 |
| Right Parties | 9784 | 45846 | 9.92 | 0.00101 | 2.61 |

- Number of words in left is higher than the right although there are more posts in the latter.
- Left parties politicians use more words to express their ideas in the social network.
- Both networks are **scale-free**.
- 99% of the network is connected.

Node Removal Analysis

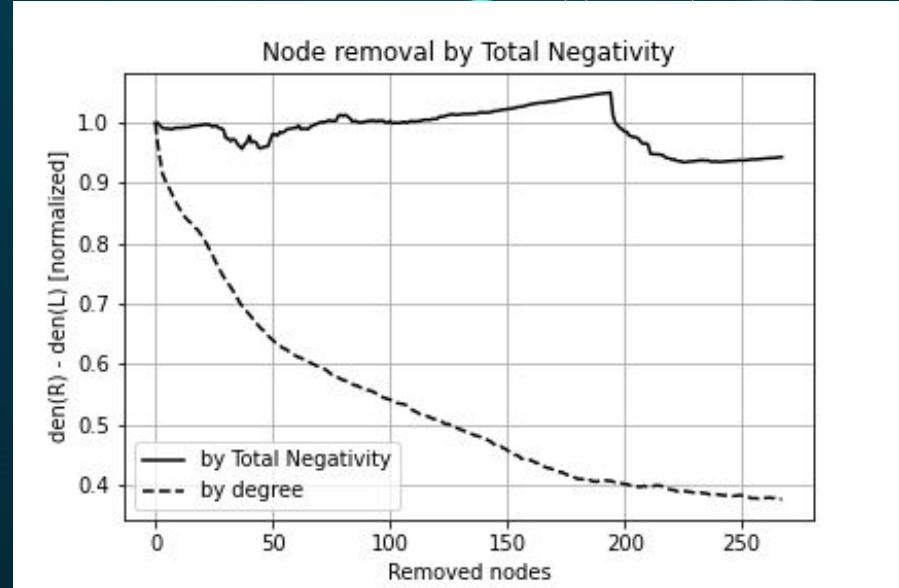
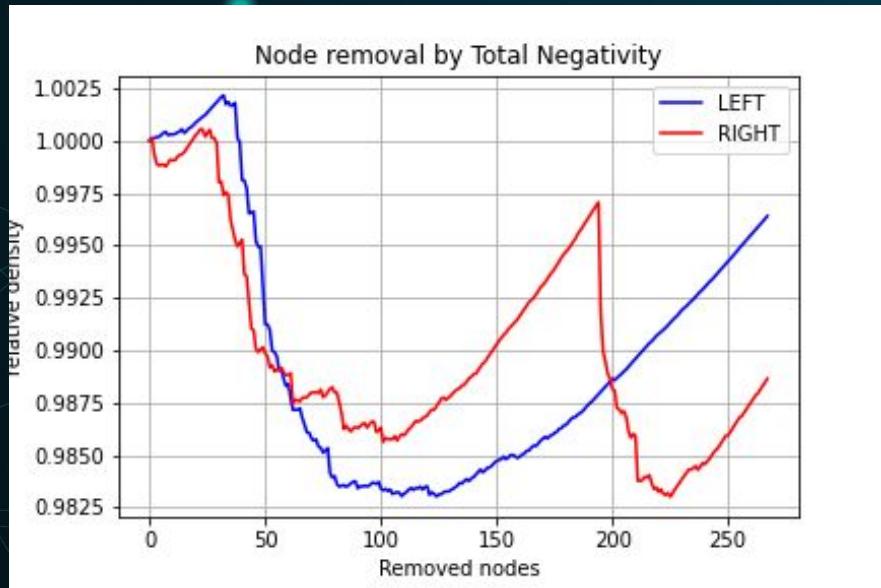
Removal by Problematic Index



Difference between left and right is significant, problematic words are **more central in the right parties' posts network**

Node Removal Analysis

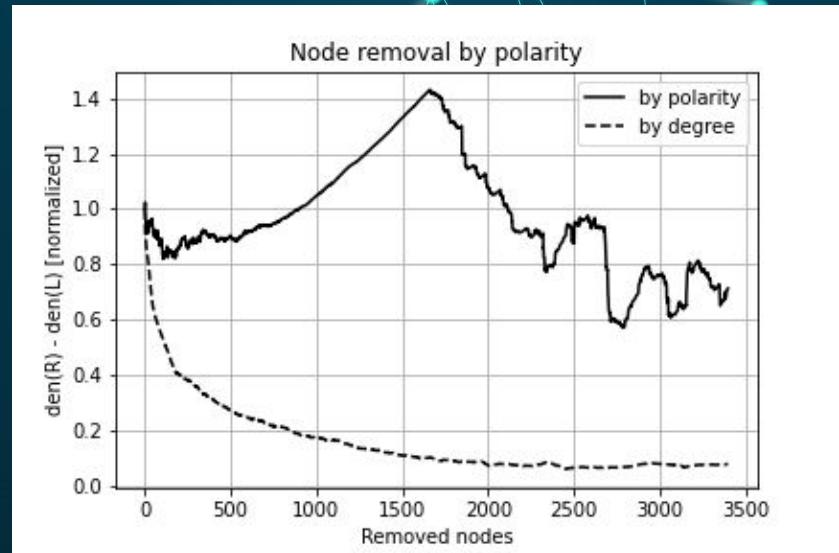
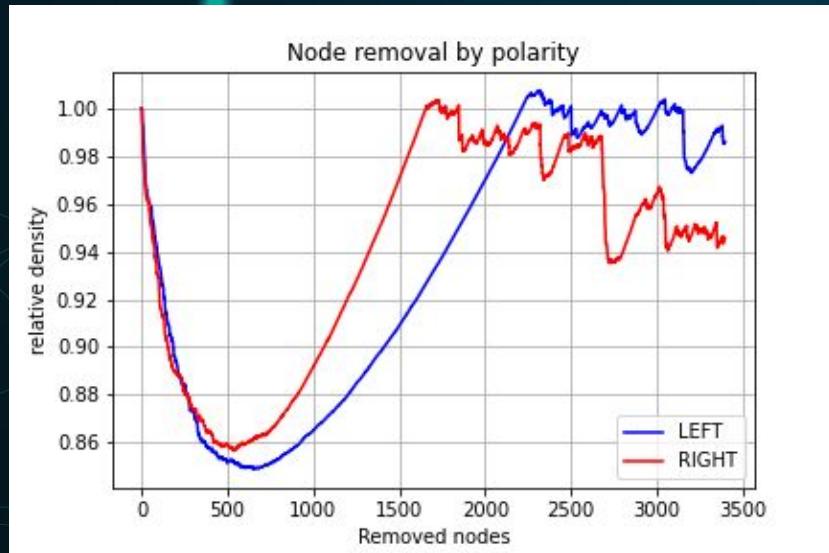
Removal by LIWC Total Negativity



Difference between left and right is not significant

Node Removal Analysis

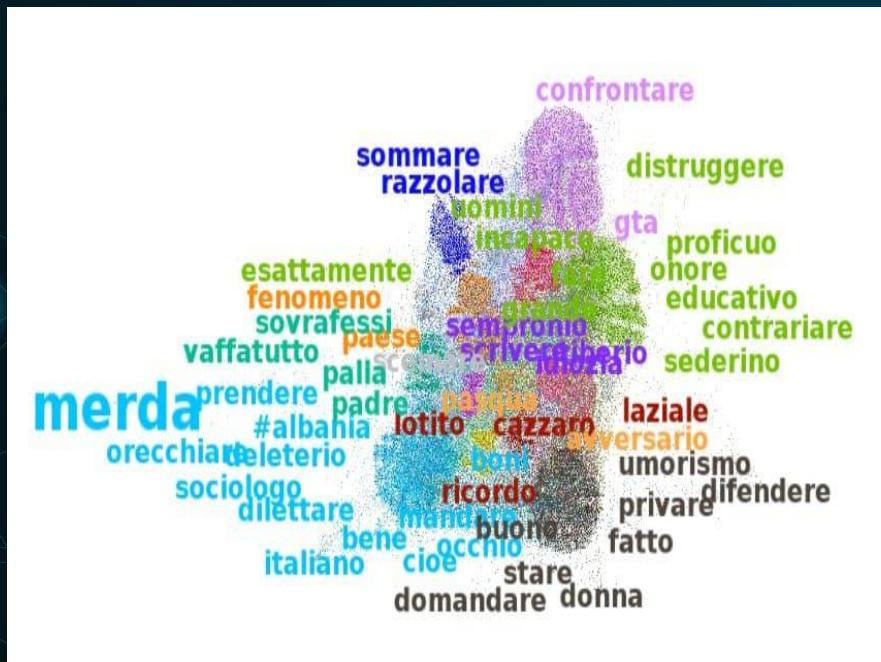
Removal by Polarity



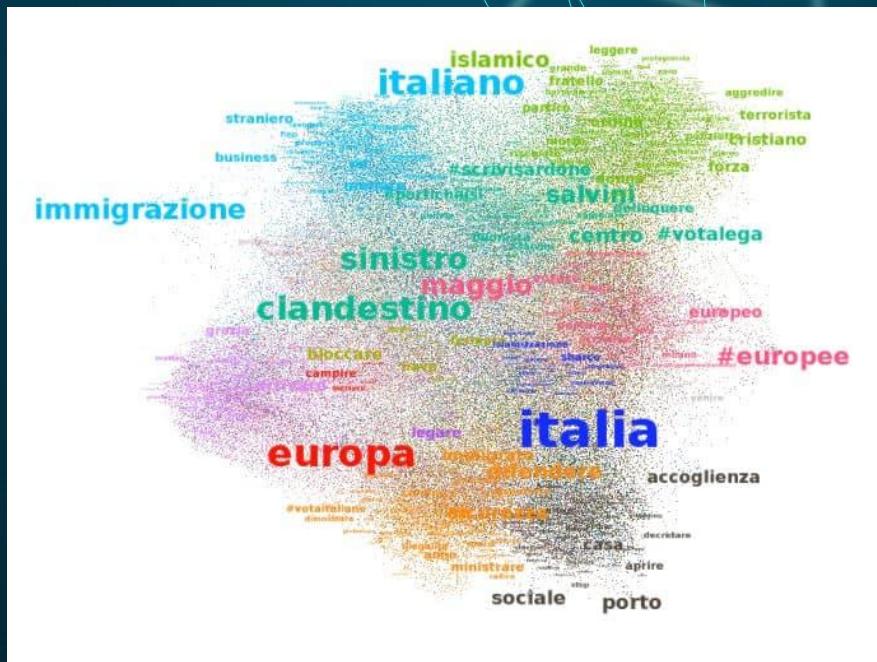
Difference between left and right is not significant

Modularity for Communities Detection - Gephi

Communities in Left Posts Network

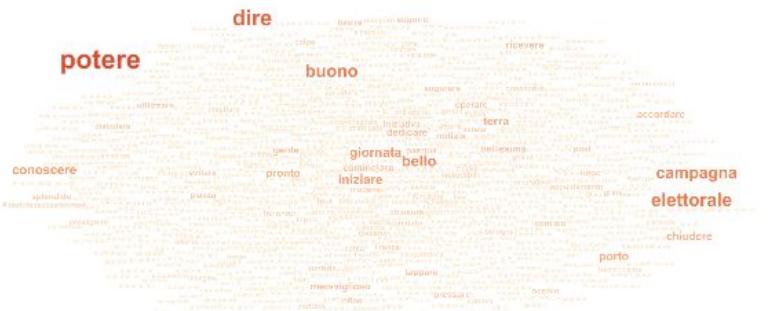


Communities in Right Posts Network



Close Look Into the Clusters...

'Clandestino' [Illegal Immigrant] Cluster in Left Posts



'Clandestino' [Illegal Immigrant] Cluster in Right Posts



'Clandestino' is more problematic in the right posts.

'Clandestino' Cluster - Right Posts

TOP 10 Nodes by Problematic Count

| Word | Problematic Count |
|--------------|-------------------|
| Clandestino | 50.0 |
| Immigrazione | 42.0 |
| Islamico | 33.0 |
| Centro | 31.0 |
| Sociale | 29.0 |
| Accoglienza | 26.0 |
| Bloccare | 24.0 |
| Immigrato | 24.0 |
| Delinquere | 20.0 |
| Terrorista | 20.0 |

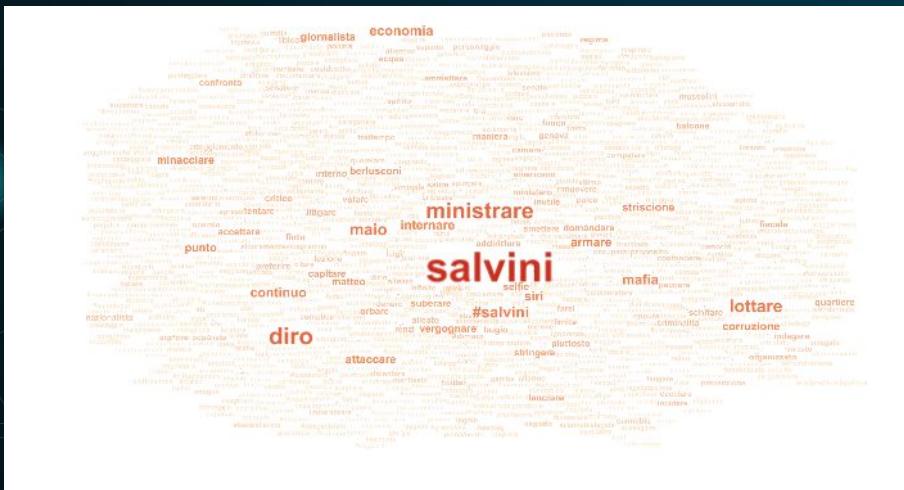
TOP 10 Nodes by Page Rank

| Word | Page Rank |
|--------------|-----------|
| Immigrazione | 0.034 |
| Clandestino | 0.022 |
| Centro | 0.020 |
| Sociale | 0.019 |
| Accoliengza | 0.014 |
| Islamico | 0.014 |
| Lottera | 0.012 |
| Delinquere | 0.012 |
| Business | 0.011 |

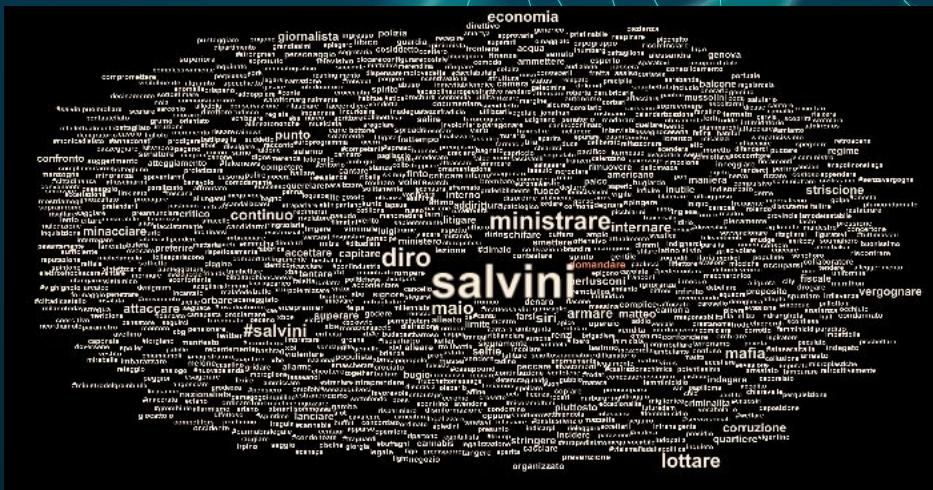
Close Look Into the Clusters...

'Salvini' Topic Cluster in Left Posts

Color of Node = Page Rank



Color of Node = Problematic count



Discussion about Salvini's Political ideas
and Decisions -> Not problematic

Left and Right Comments

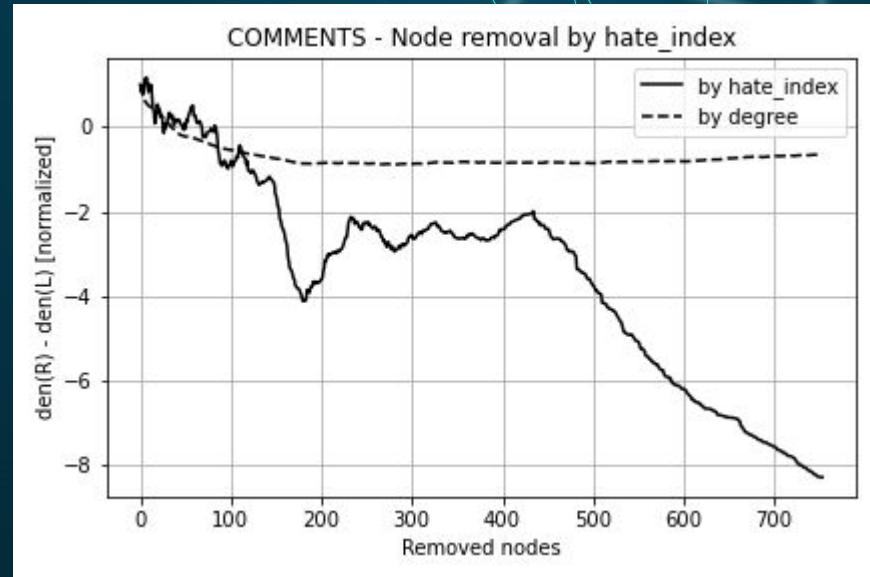
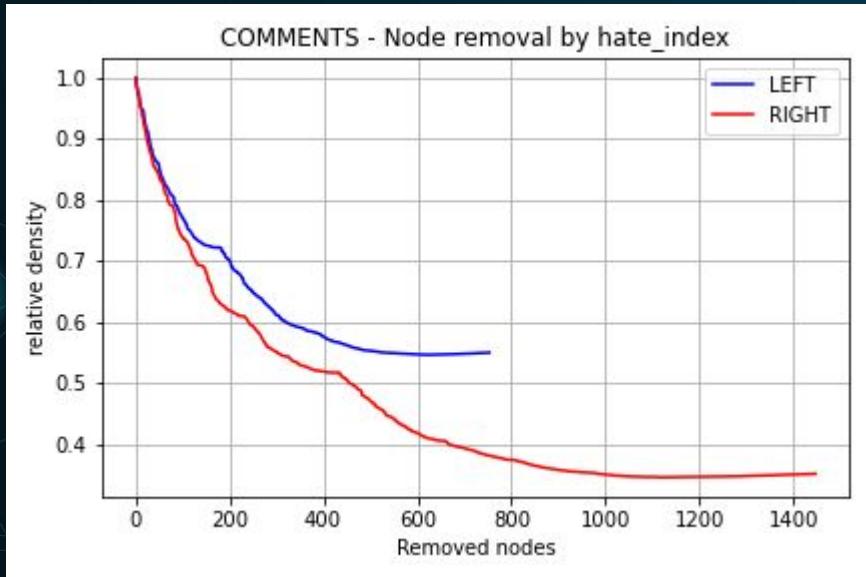
- Q1: Is hate speech more relevant in Right or Left comments network?
- Q2: do Left or Right networks differ somehow?
 - General Description and statistics

| | Nodes | Edges | Avg.Degree | Density | Estim. γ |
|---------------|-------|--------|------------|---------|-----------------|
| Left Parties | 29509 | 210178 | 14.24 | 0.00048 | 2.96 |
| Right Parties | 23861 | 140087 | 11.74 | 0.00049 | 2.92 |

- Number of unique words in comments replying to left-wing politicians is **higher** than the right-wing
- Both networks are sparse and have similar general statistics
- Both networks are **scale-free**.
- The largest component is **99%** of the network is connected.

Node Removal Analysis

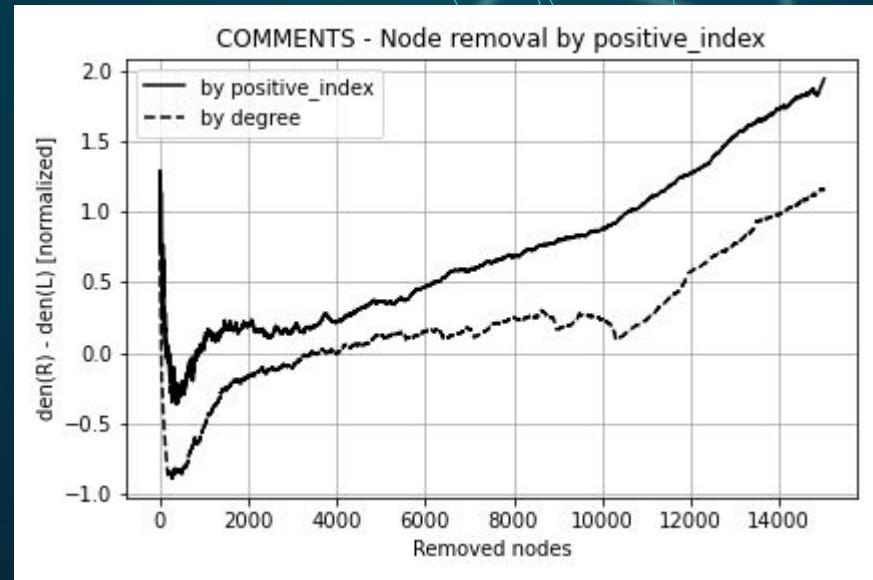
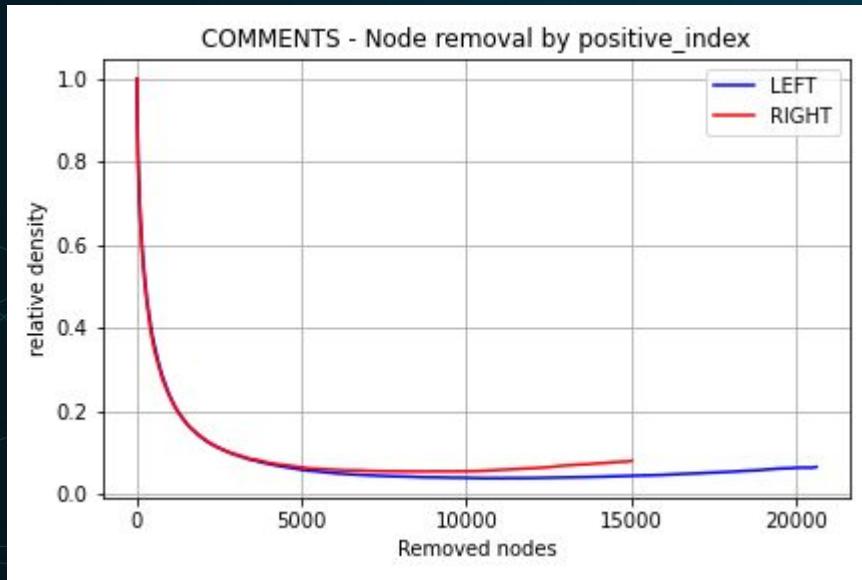
Removal by Hate index



Right parties have more **hate speech!**
hate speech is more central in Right subset! (network somehow breaks...)

Node Removal Analysis

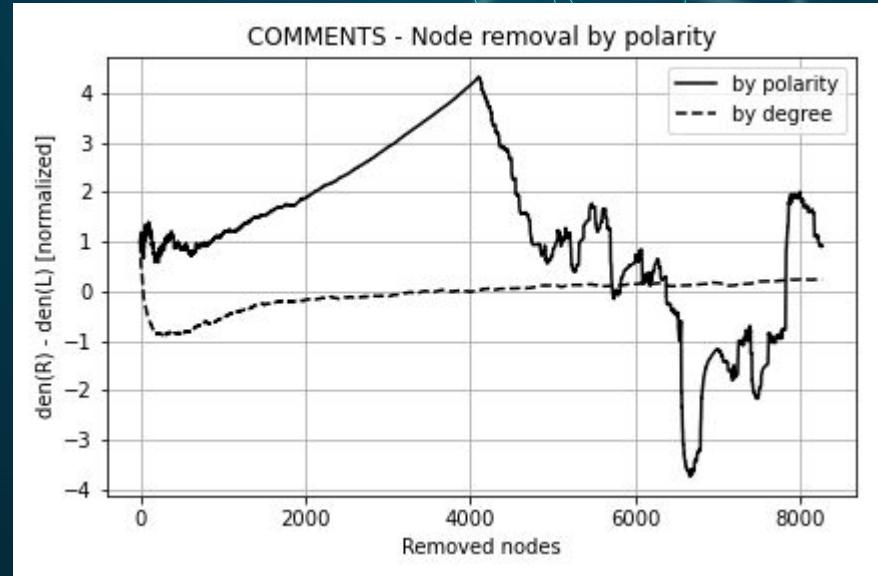
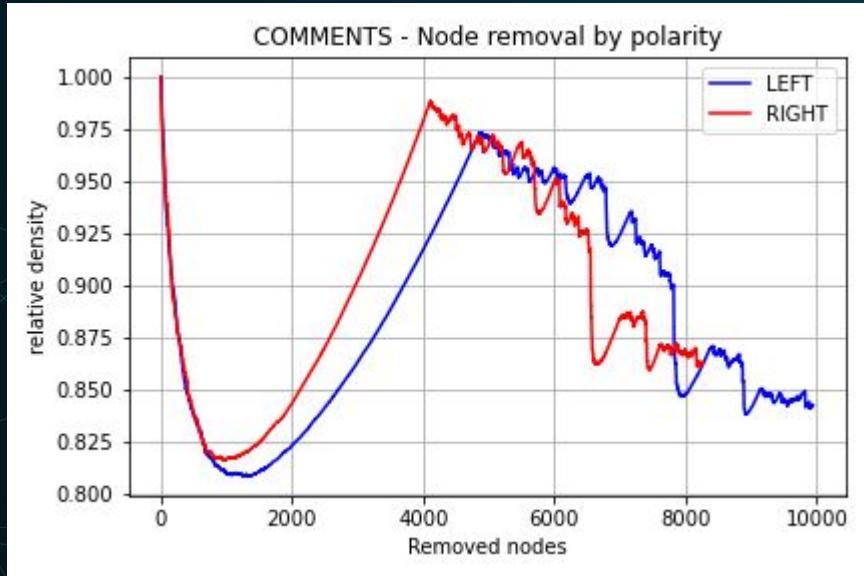
Removal by Positive index



- Very similar to node removal by degree...

Node Removal Analysis

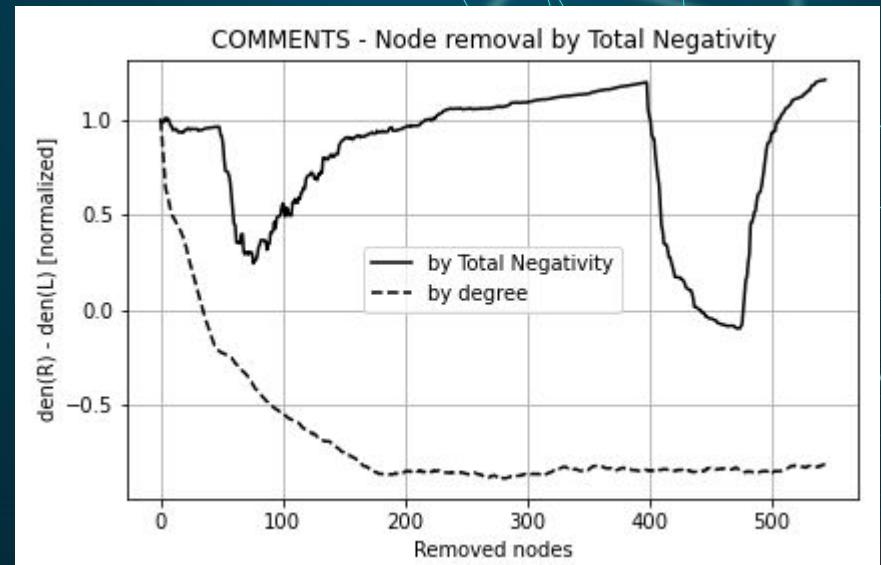
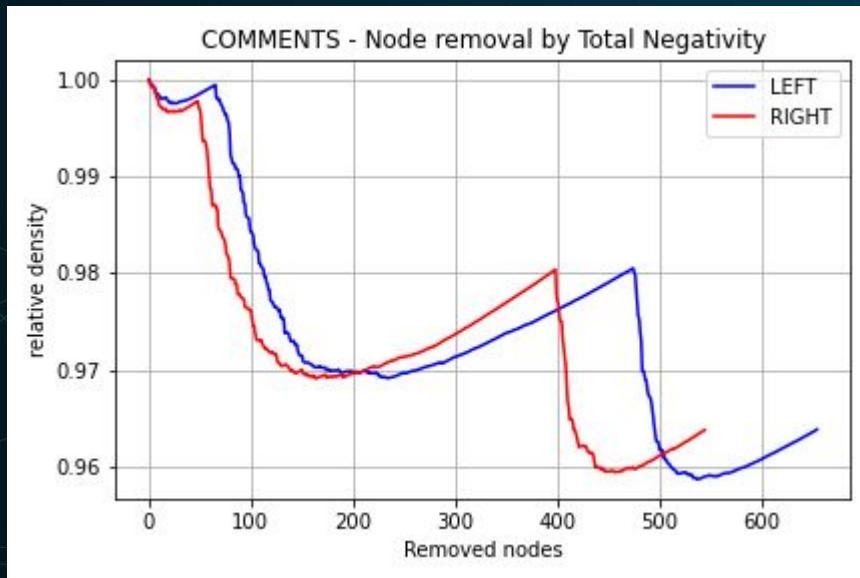
Removal by Polarity (Sentix)



NOT so significant, average overall density lost is ~15%
Similar behavior for both networks

Node Removal Analysis

Removal by Total Negativity (LIWC)



NOT so significant, we even do not lose density (~3%!)
Similar behavior for both networks

Node Removal Analysis - Results

| | <i>Left</i> | <i>Right</i> |
|--|-------------|--------------|
| $\rho_{\Delta_{density}, hate_index}$ | -0.62 | -0.60 |
| $\rho_{\Delta_{density}, polarity}$ | -0.05 | 0.02 |
| $\rho_{\Delta_{density}, tot_neg}$ | 0.24 | 0.08 |

Table V: Pearson correlation coefficients for the difference in density when a node is removed according to its attribute, for different attribute and different subset.

The larger the **hate index**, the larger the drop in density when a node is removed!

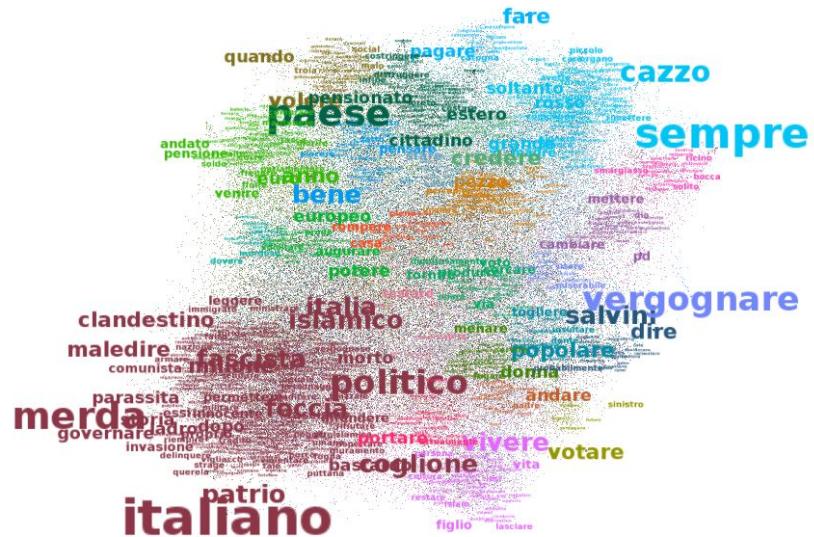
Hate index is the best variable to detect hate speech when applied lemmatization!

Cluster Analysis - LEFT parties

Left Comments - "clandestino" cluster

| Pagerank Score | Word | Hate index | Word |
|----------------|-------------------|------------|-----------------|
| 0.016026 | <i>partire</i> | 12.0 | <i>italiano</i> |
| 0.014124 | <i>politico</i> | 9.0 | <i>merda</i> |
| 0.012381 | <i>italia</i> | 8.0 | <i>politico</i> |
| 0.012167 | <i>italiano</i> | 6.0 | <i>feccia</i> |
| 0.011550 | <i>governare</i> | 6.0 | <i>italia</i> |
| 0.007750 | <i>fascista</i> | 6.0 | <i>fascista</i> |
| 0.007182 | <i>leggere</i> | 6.0 | <i>patrio</i> |
| 0.005588 | <i>legare</i> | 6.0 | <i>coglione</i> |
| 0.005449 | <i>dopo</i> | 6.0 | <i>islamico</i> |
| 0.004581 | <i>ministrare</i> | 5.0 | <i>milione</i> |

Table VII: Top 10 words for cluster Page Rank score and hate index in the cluster that contains the word "clandestino" ["illegal immigrant"] in Left comments network.



Cluster attribute statistics:

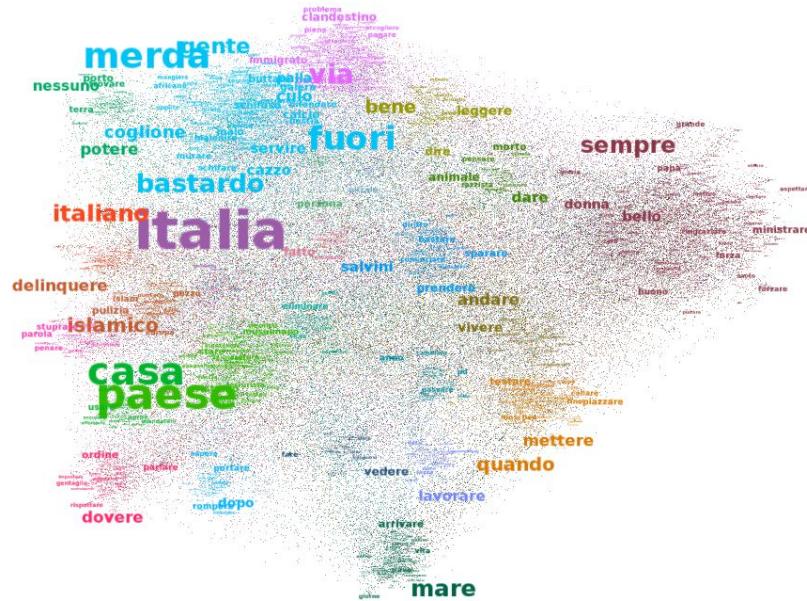
- **average hate index** ~ 0.08 (**1st cluster for average hate index!**)
- **total hate index** 349 (**1st cluster for total hate index!**)

Cluster Analysis - RIGHT parties

Right Comments - "clandestino" cluster

| Pagerank Score | Word | Hate index | Word |
|----------------|-------------|------------|-------------|
| 0.014797 | problema | 19.0 | via |
| 0.014664 | via | 8.0 | clandestino |
| 0.013994 | pagare | 7.0 | buonista |
| 0.012877 | euro | 7.0 | immigrato |
| 0.010131 | clandestino | 5.0 | problema |
| 0.009761 | certo | 5.0 | pagare |
| 0.008792 | migrare | 5.0 | pieno |
| 0.008780 | diventare | 4.0 | accogliere |
| 0.008006 | risolvere | 4.0 | straniero |
| 0.007590 | figlio | 3.0 | portato |

Table VI: Top 10 words for cluster Page Rank score and hate index in the cluster that contains the word "clandestino" ["illegal immigrant"] in Right comments network.



Cluster attribute statistics:

- **average hate index ~ 0.15 (4-th cluster for average hate index!)**
- **total hate index 214 (2-nd by total hate index!)**

Negative and Positive Campaigns



Posts : Lynda
Comments: Diego

Posts - Negative comparative vs Positive Type of Campaign

Research Questions

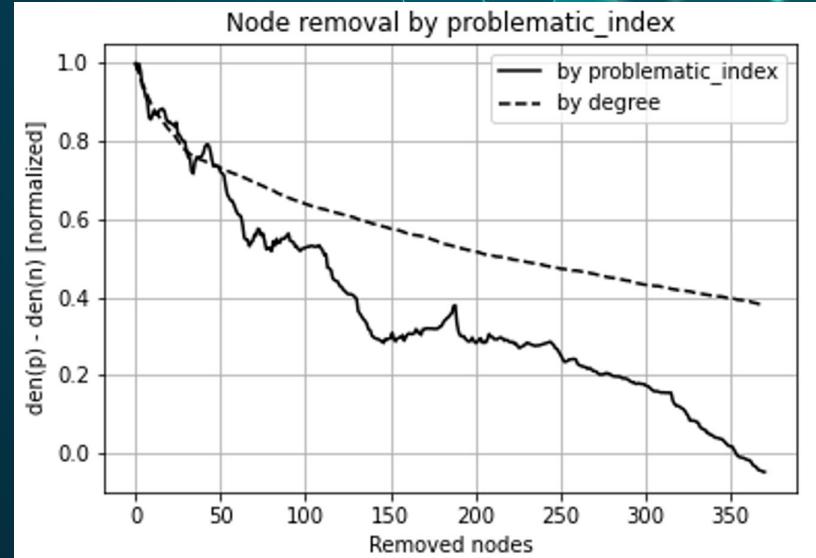
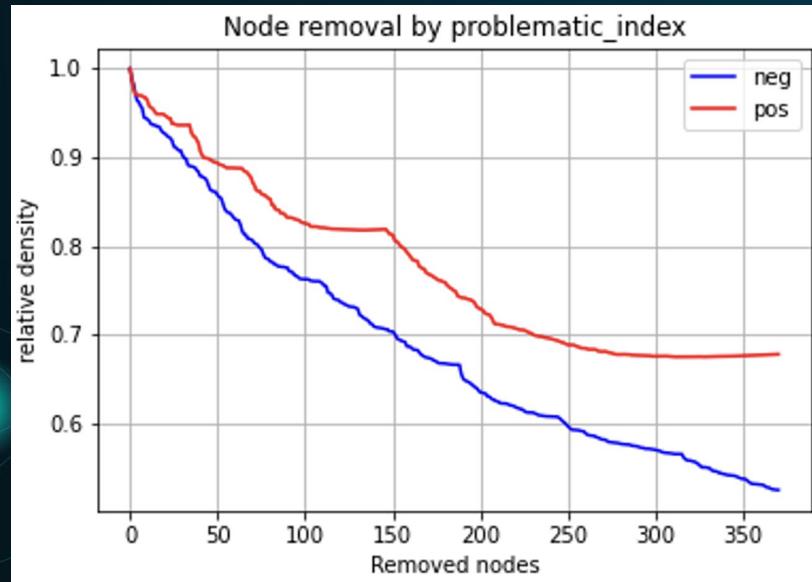
- Is there a difference in the level of hate in the negative and positive type of campaign?
- How Does node removal affect the two types of networks?
- Which type of campaign creates more hate?
- Is type of campaign an important variable in determining the level of hate?

Posts

| | Nodes | Edges | Average Degree | No. of clusters | Gamma Exp | Density |
|-----------------------------|--------|-------|----------------|-----------------|-----------|-----------|
| Negative-Comparative | 10,986 | 61856 | 11.261 | 27 | 2.758 | 0.0181568 |
| Positive | 12947 | 67833 | 10.479 | 58 | 2.717 | 0.0121676 |

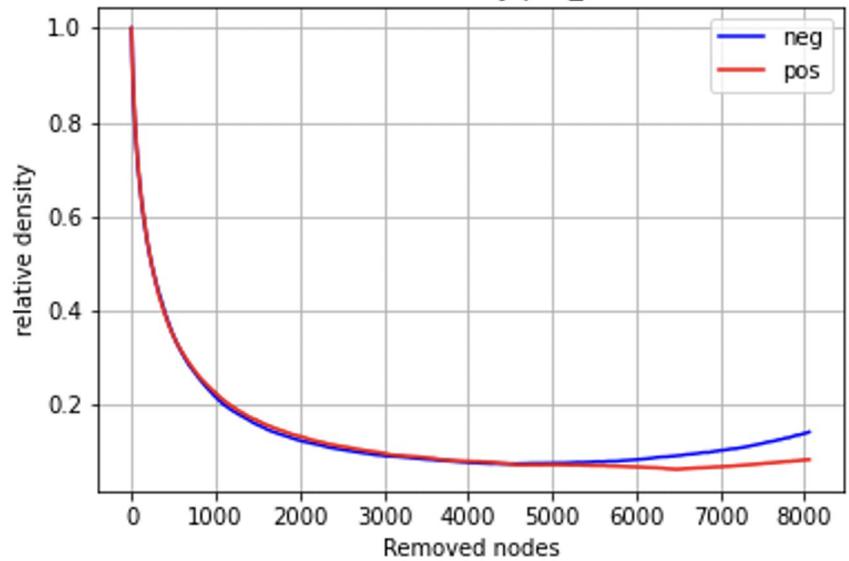
- Positive campaign data-base is slightly bigger than the negative type of campaign.
- Both networks are scale free.
- The network is 99% connected.
- Consider problematic index to indicate hate level

Network Analysis

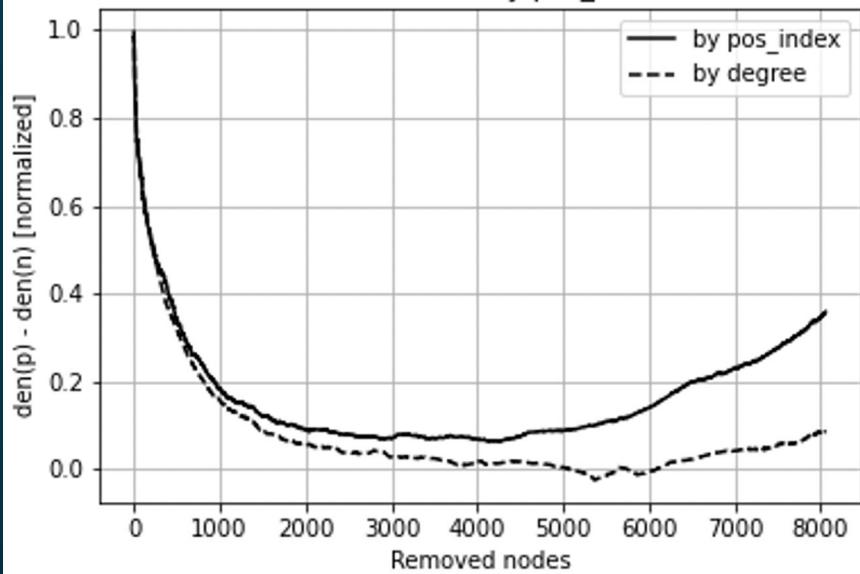


- Problematic Nodes are more central in the negative type of campaign
- Positive network is denser than negative network
- Problematic index is a more significant attribute in determining hate level

Node removal by pos_index

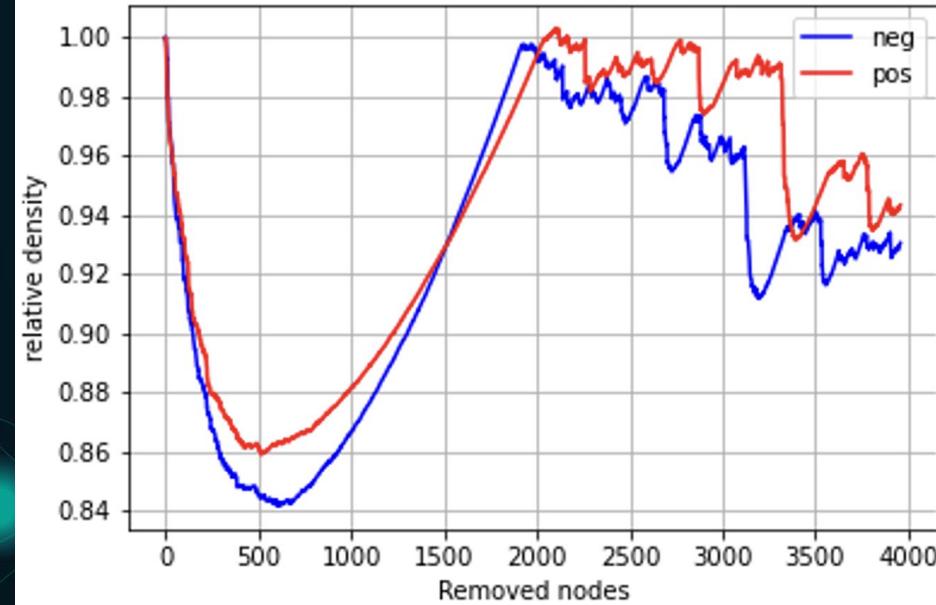


Node removal by pos_index

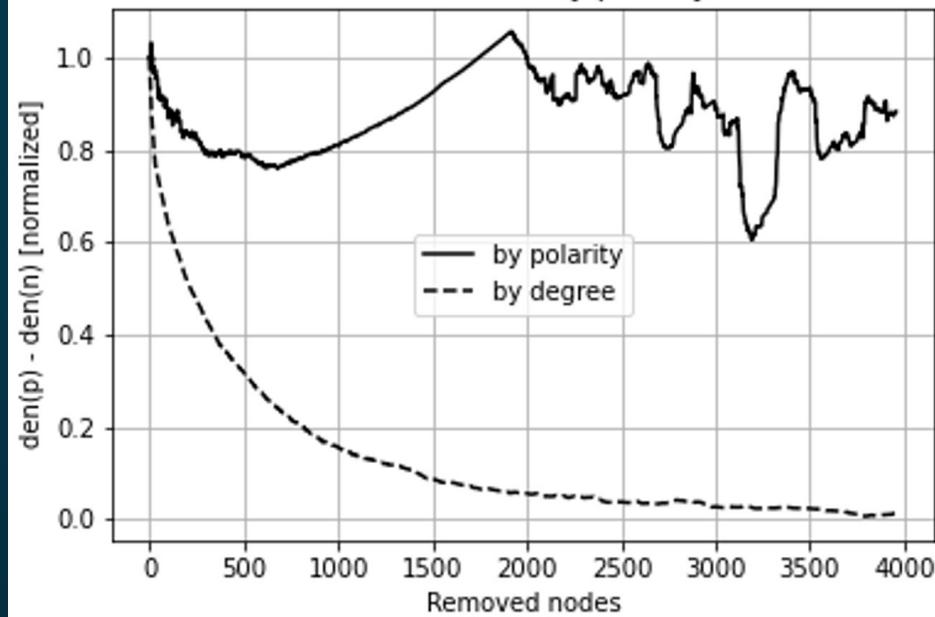


- Positive nodes are more central in positive type of network
- Plot starts increasing as we remove nodes of a low degree

Node removal by polarity



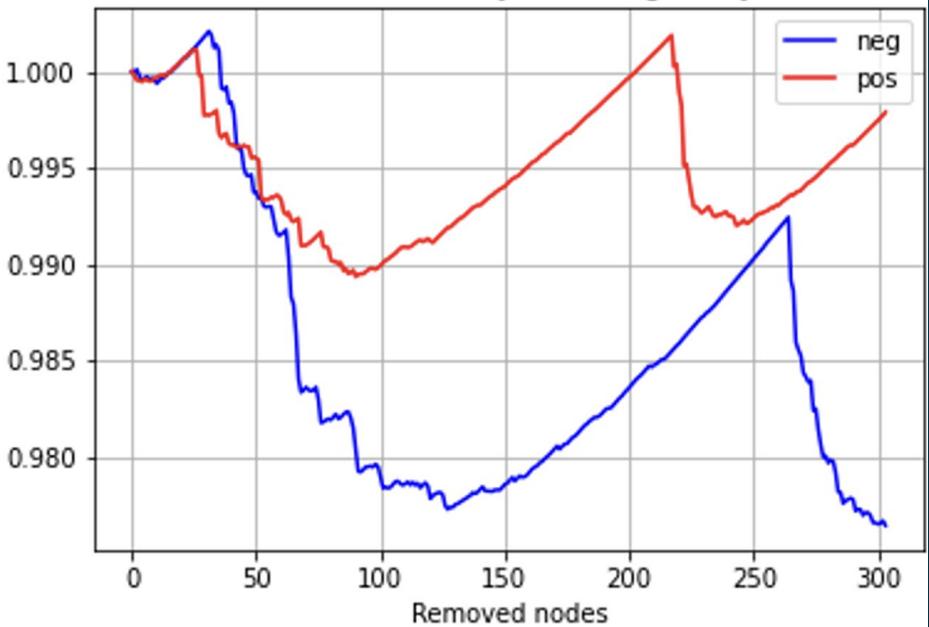
Node removal by polarity



- Decreases as we start removing nodes with high degree but same polarity
- Increases as we remove nodes with low degree
- Node removal by polarity is not a significant attribute in determining level of hate

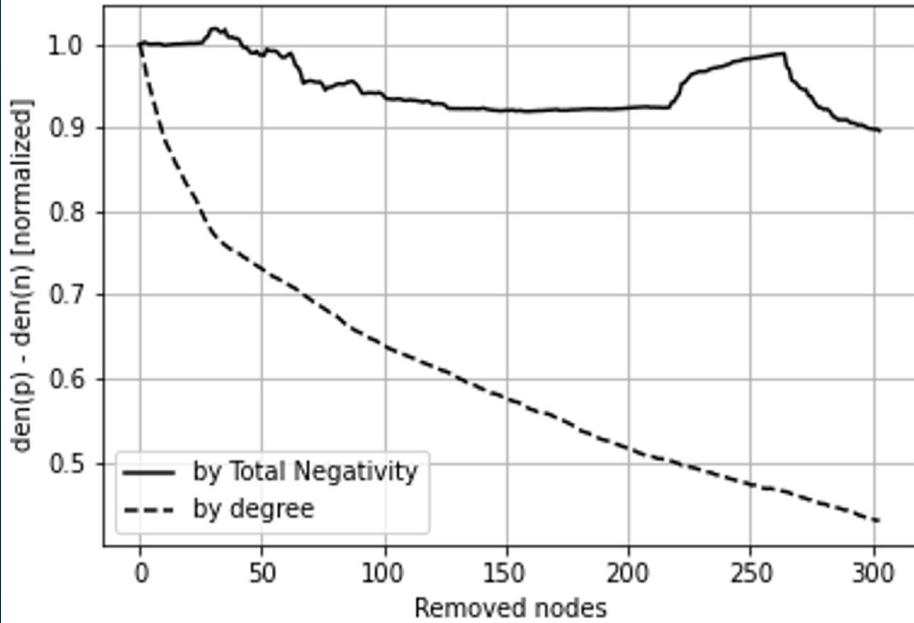
Node removal by Total Negativity

relative density



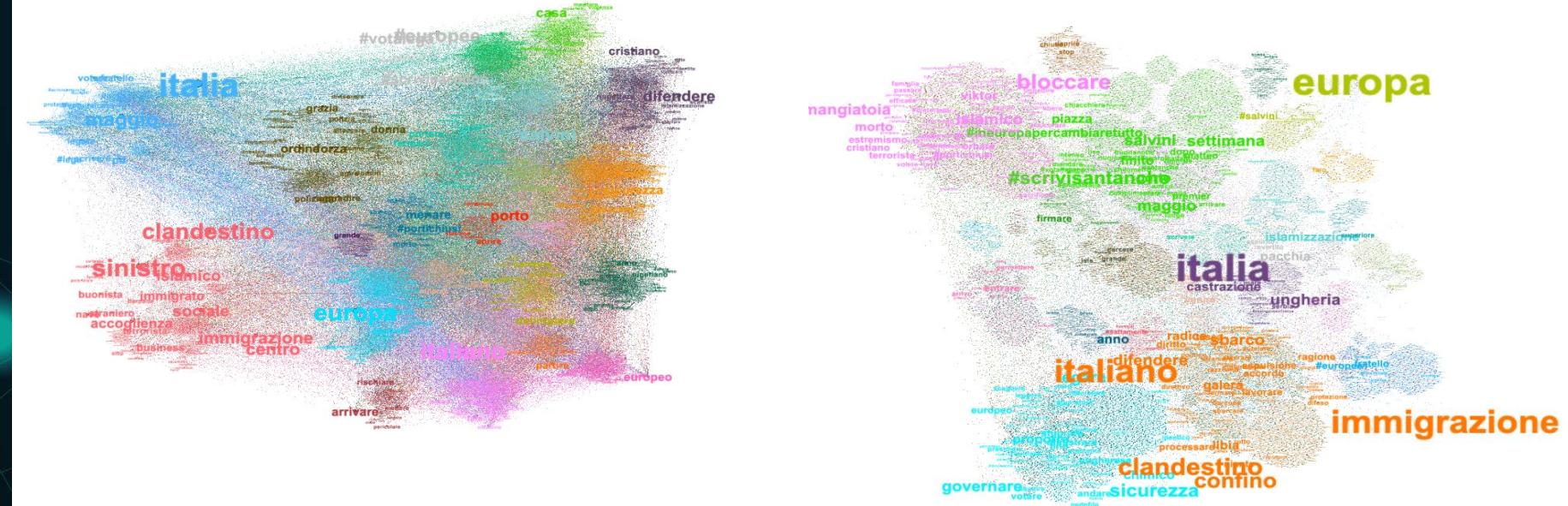
Node removal by Total Negativity

$\text{den}(p) - \text{den}(n)$ [normalized]

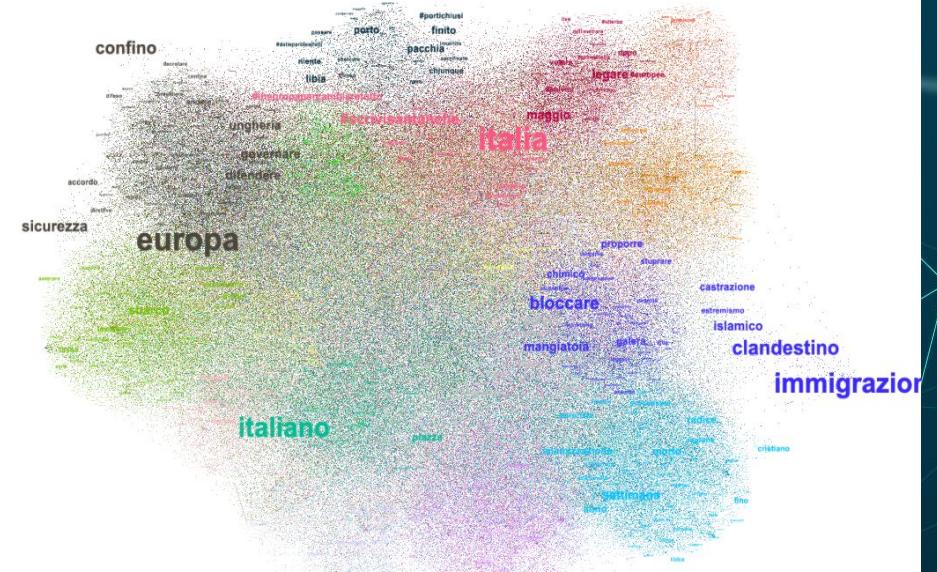
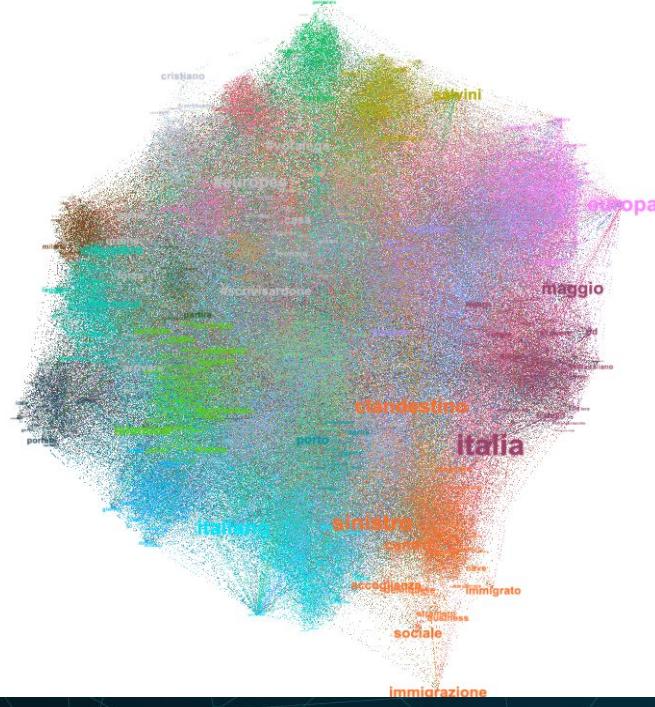


- Node removal by LIWC total negativity
- Not significant since we lose density < 3%

Network Cluster Analysis



- Negative vs positive type of campaign clusters
- Label size according to Problematic_count
- Label color according to modularity



- Negative vs positive type of campaign clusters
- Label size according to page rank
- Label color according to Modularity class

Network Cluster Analysis

Negative-Comparative Campaign - most hateful cluster

| Pagerank Score | Word | Problematic index | Word |
|----------------|---------------------|-------------------|---------------------|
| 0.0316 | <i>sinistro</i> | 46.0 | <i>sinistro</i> |
| 0.01818 | <i>centro</i> | 42.0 | <i>clandestino</i> |
| 0.01809 | <i>sociale</i> | 31.0 | <i>immigrazione</i> |
| 0.01627 | <i>immigrazione</i> | 31.0 | <i>centro</i> |
| 0.0147 | <i>clandestino</i> | 29.0 | <i>sociale</i> |
| 0.0128 | <i>destro</i> | 25.0 | <i>accoglienza</i> |
| 0.01057 | <i>accoglienza</i> | 23.0 | <i>immigrato</i> |
| 0.01015 | <i>delinquere</i> | 20.0 | <i>delinquere</i> |
| 0.009269 | <i>sentire</i> | 19.0 | <i>business</i> |
| 0.0077 | <i>centrare</i> | 18.0 | <i>straniero</i> |

Positive Campaign - most hateful cluster

| Pagerank Score | Word | Problematic index | Word |
|----------------|------------------|-------------------|---------------------|
| 0.01792 | <i>lavorare</i> | 11.0 | <i>italiano</i> |
| 0.0122 | <i>italiano</i> | 11.0 | <i>immigrazione</i> |
| 0.01124 | <i>persona</i> | 8.0 | <i>clandestino</i> |
| 0.00868 | <i>paese</i> | 7.0 | <i>confino</i> |
| 0.00752 | <i>diritto</i> | 6.0 | <i>sicurezza</i> |
| 0.00706 | <i>vita</i> | 5.0 | <i>islamico</i> |
| 0.0070 | <i>piccolo</i> | 5.0 | <i>sbarco</i> |
| 0.00665 | <i>cittadino</i> | 5.0 | <i>ungheria</i> |
| 0.006205 | <i>tutelare</i> | 4.0 | <i>morto</i> |
| 0.005918 | <i>leggere</i> | 4.0 | <i>galera</i> |

- Clandestino cluster analysis Negative vs Positive Campaign
- It is the cluster that generates more hate
- Negative campaign generates more hate

| Total Hate | Avg Hate | Nodes |
|------------|----------|-------|
| 704.0 | 0.8669 | 812 |

| Total Hate | Avg Hate | Nodes |
|------------|----------|-------|
| 259.0 | 0.126 | 2055 |

Negative-Comparitive and Positive Campaign Comments

Q1: Do posts belonging to different types of campaign generate more hate speech in political discussion on social media?

Q2: Which are the patterns and topics of hate speech for different types of campaign?

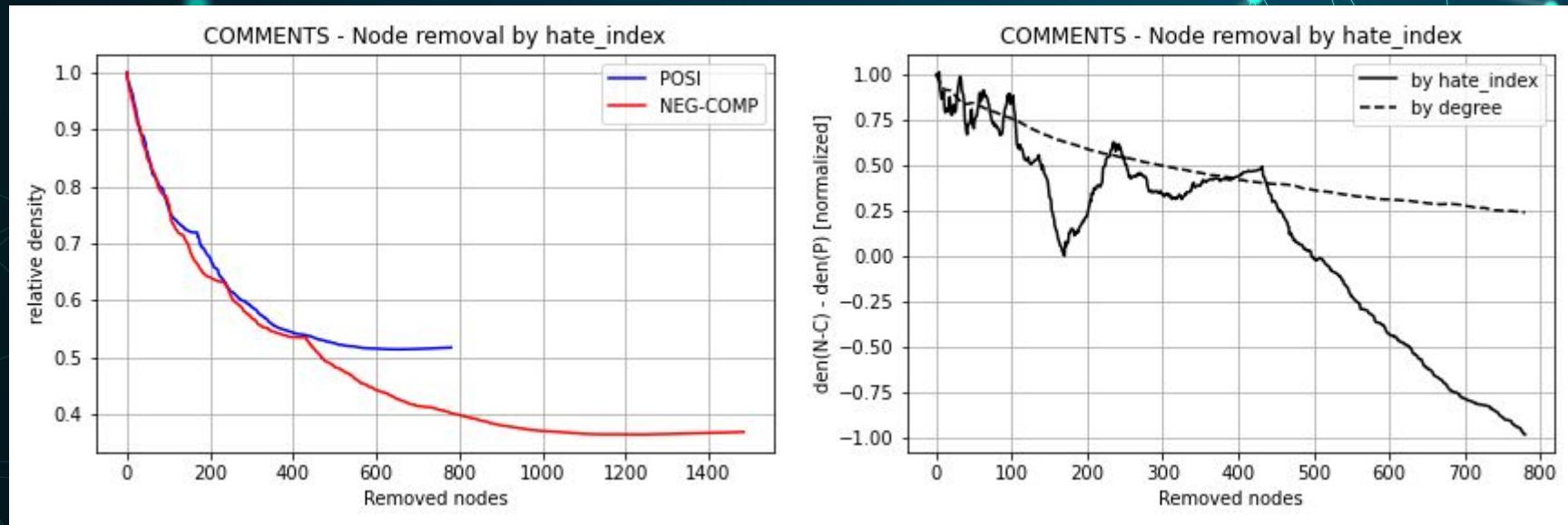
The Two Networks

| | Nodes | Edges | Avg Degree | Density | Estim. γ |
|-----------------|-------|--------|------------|----------|-----------------|
| Neg-Comp | 27530 | 187926 | 13.65 | 0.000496 | 2.95 |
| Positive | 26664 | 162783 | 12.21 | 0.000458 | 2.94 |

- After cleaning the number of comments for the Positive Campaign was 39235 and 36421 for the Negative-Comparative one.
- The two networks are comparable in size
- They are scale-free networks

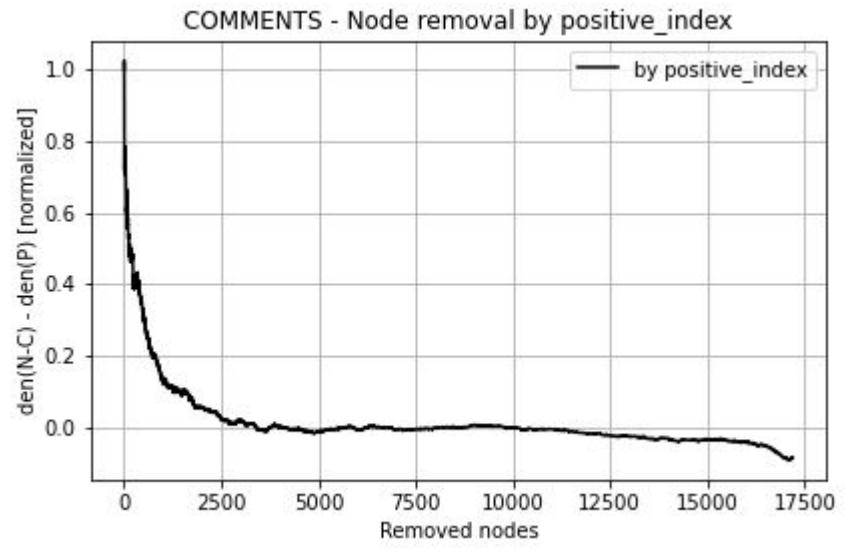
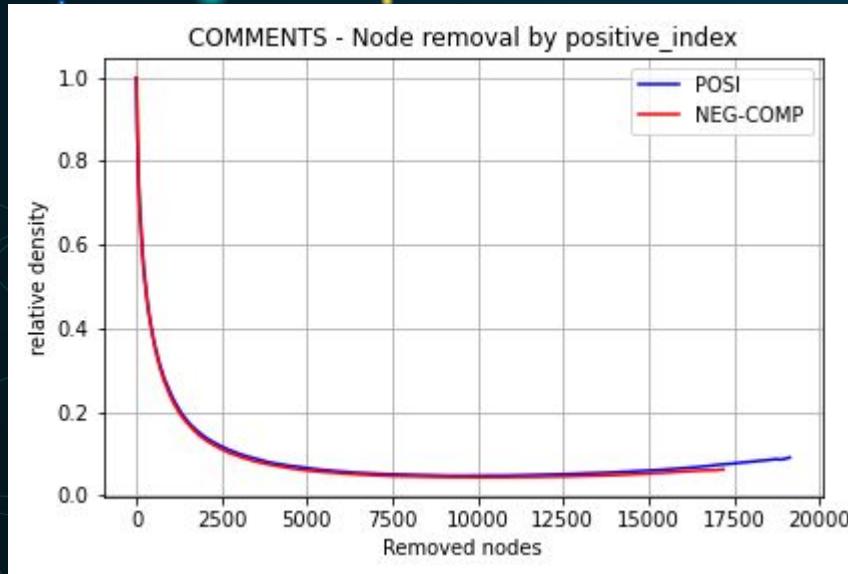
Negative-Comparative and Positive Campaign Comments

Node Removal by hate counts:



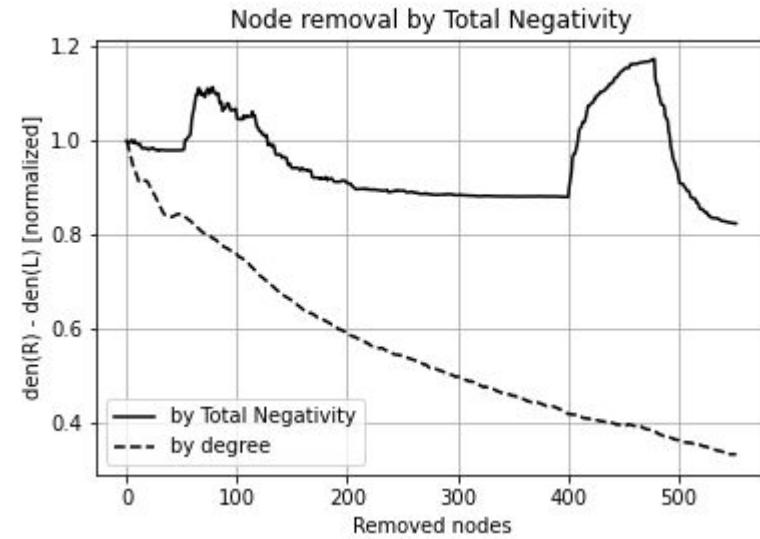
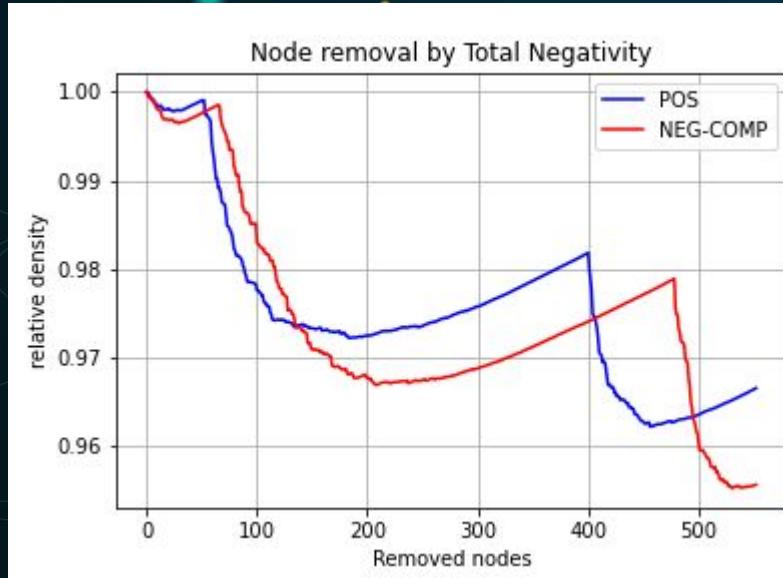
Negative-Comparative and Positive Campaign Comments

Node Removal by positive counts:



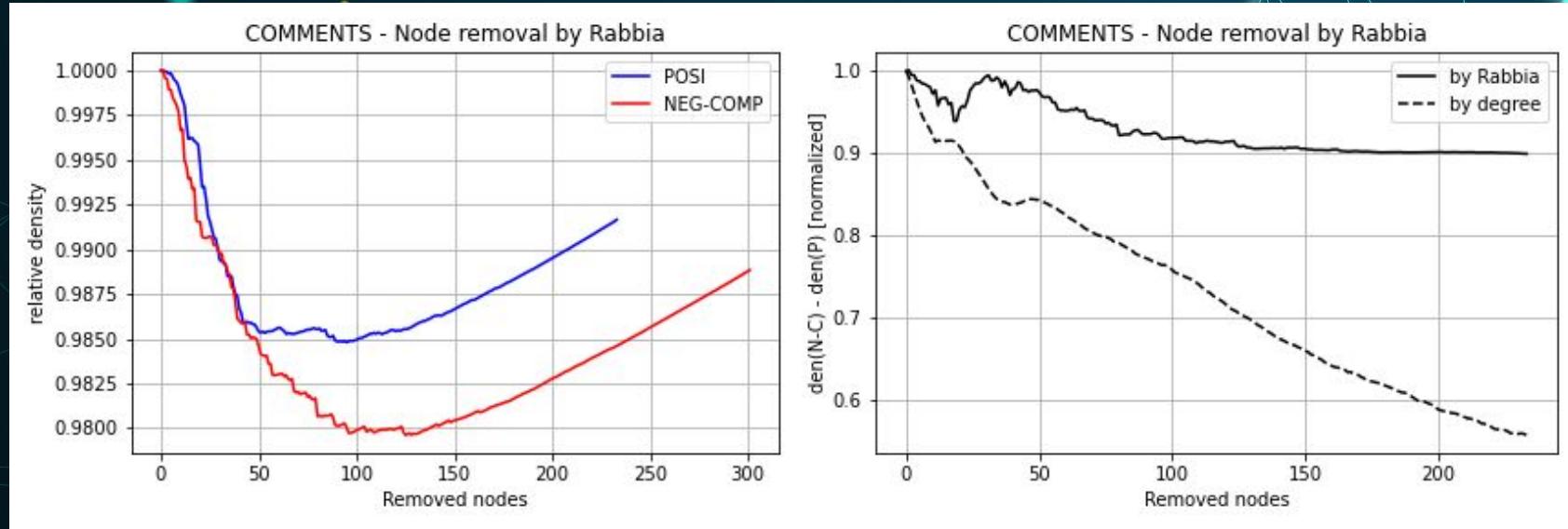
Negative-Comparative and Positive Campaign Comments

Node Removal by Total Negativity:



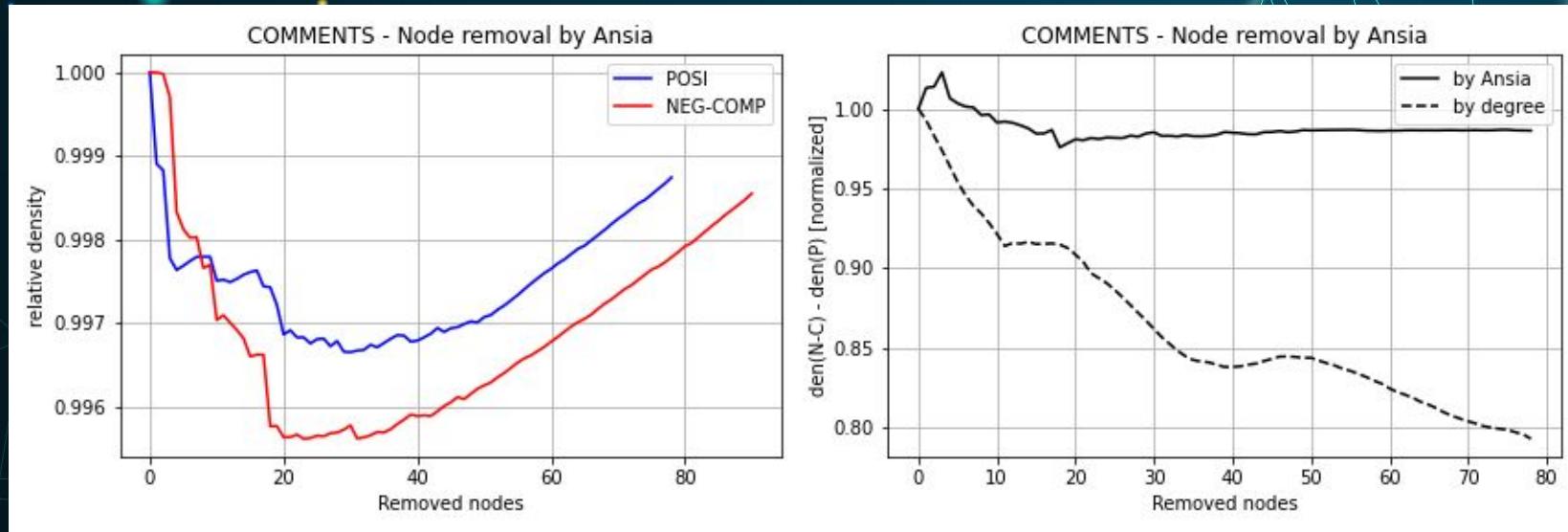
Negative-Comparative and Positive Campaign Comments

Node Removal by Anger



Negative-Comparative and Positive Campaign Comments

Node Removal by Anxiety

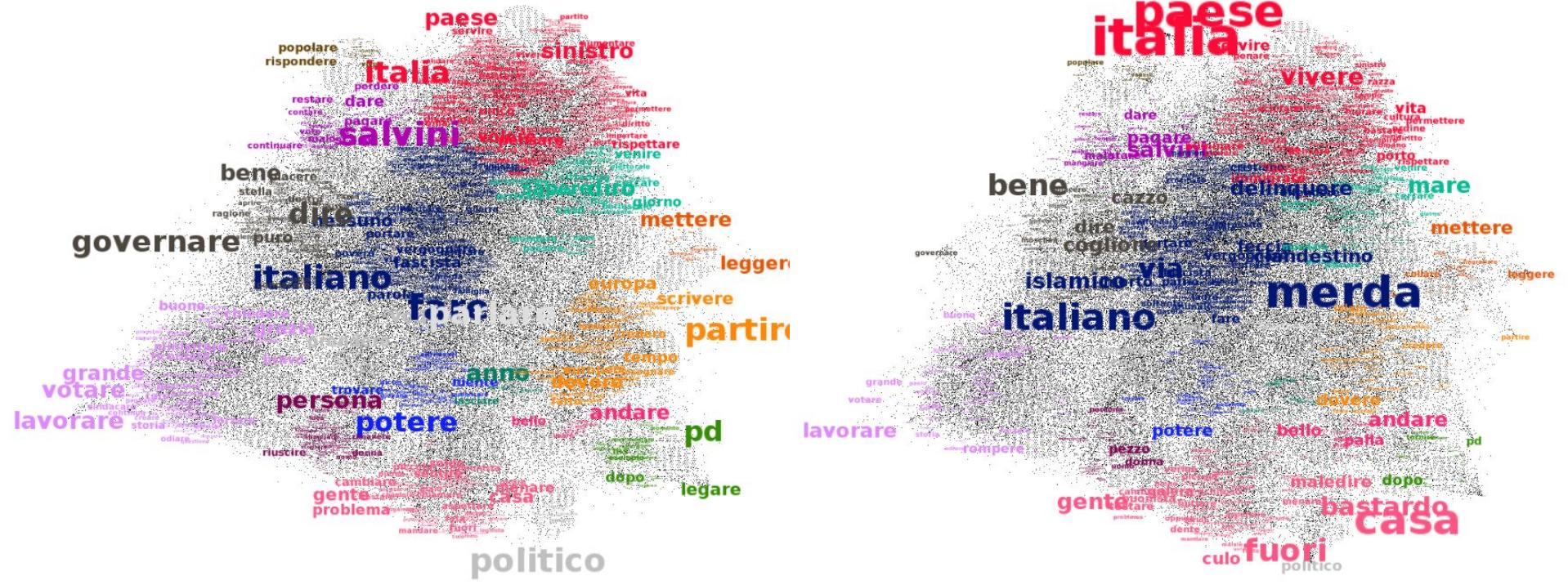


Negative-Comparative Campaign

Modularity Community Detection

By degree

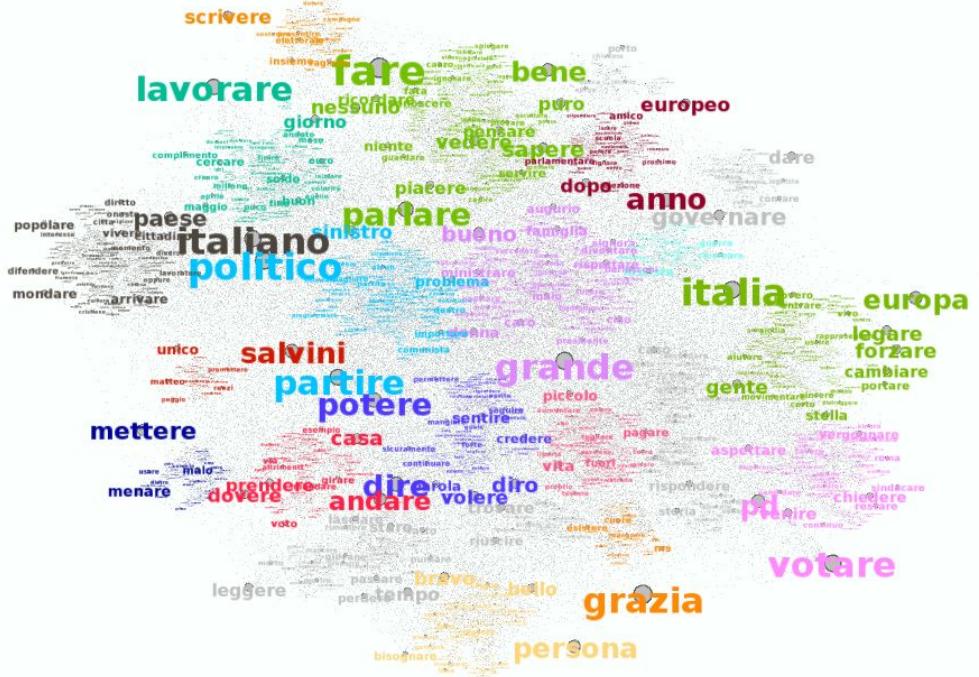
By hate



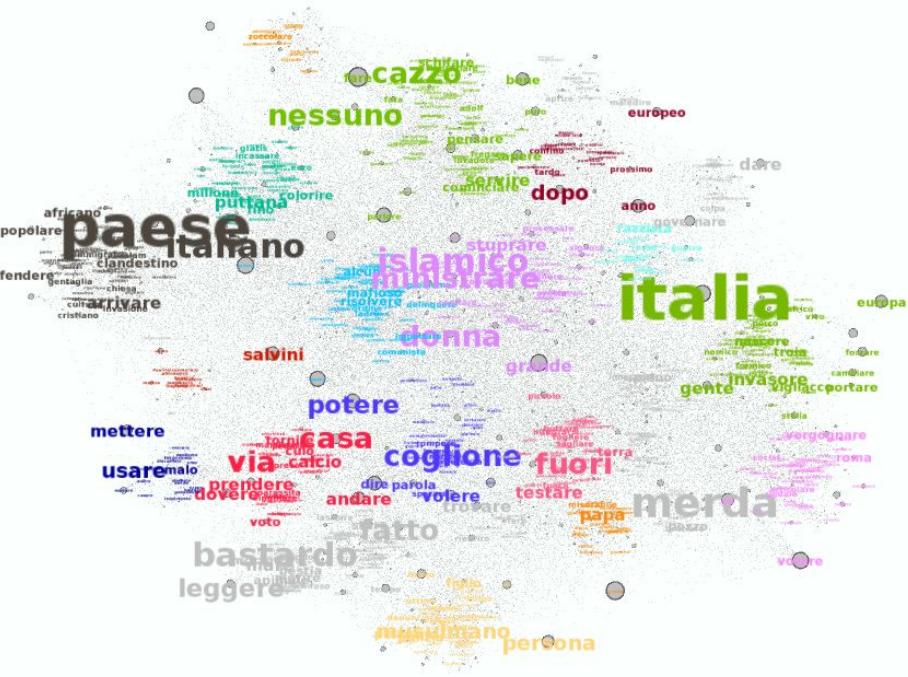
Positive Campaign

Modularity Community Detection

By degree



By hate

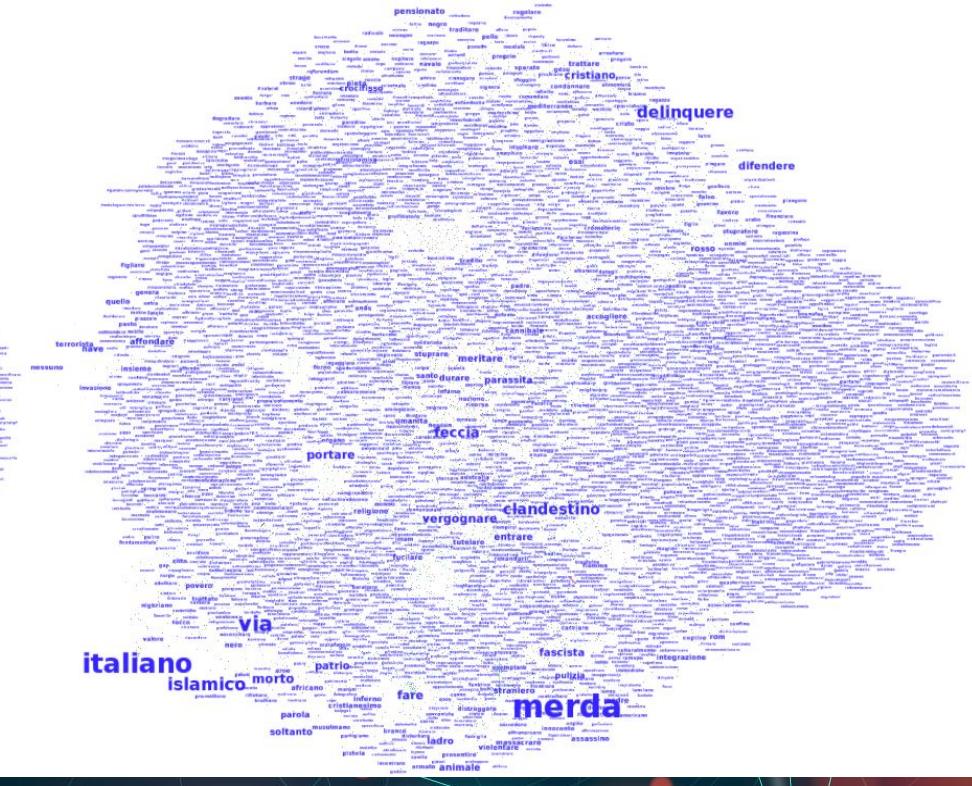
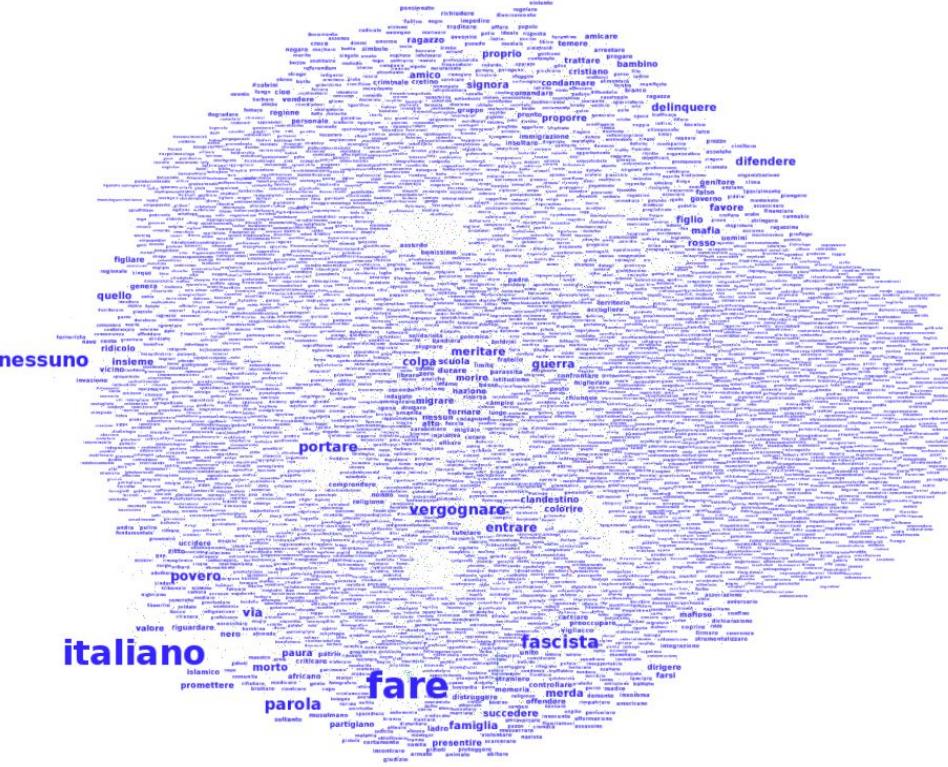


Negative-Comparative Campaign

Community with highest level of hate

By degree

By hate



Negative-Comparative Campaign

Community with highest level of hate

Negative-Comparative Campaign - most hateful cluster

| Pagerank Score | Word | Hate index | Word |
|----------------|-------------------|------------|--------------------|
| 0.02082 | <i>italiano</i> | 24.0 | <i>merda</i> |
| 0.01914 | <i>fare</i> | 20.0 | <i>italiano</i> |
| 0.00815 | <i>fascista</i> | 15.0 | <i>via</i> |
| 0.0779 | <i>nessuno</i> | 12.0 | <i>islamico</i> |
| 0.0063 | <i>povero</i> | 11.0 | <i>delinquere</i> |
| 0.0059 | <i>vergognare</i> | 10.0 | <i>clandestino</i> |
| 0.0058 | <i>guerra</i> | 9.0 | <i>feccia</i> |
| 0.0056 | <i>entrare</i> | 8.0 | <i>morto</i> |
| 0.0054 | <i>via</i> | 7.0 | <i>fare</i> |
| 0.0054 | <i>portare</i> | 7.0 | <i>vergognare</i> |

Table XII: Top 10 words for cluster Page Rank score and hate index in the most hateful cluster in Negative-Comparative campaign comments network.

Positive Campaign

Community with highest level of hate

By degree

By hate

europa

forzare

gente gruppo
cambiare legare

entrare

italia

stella

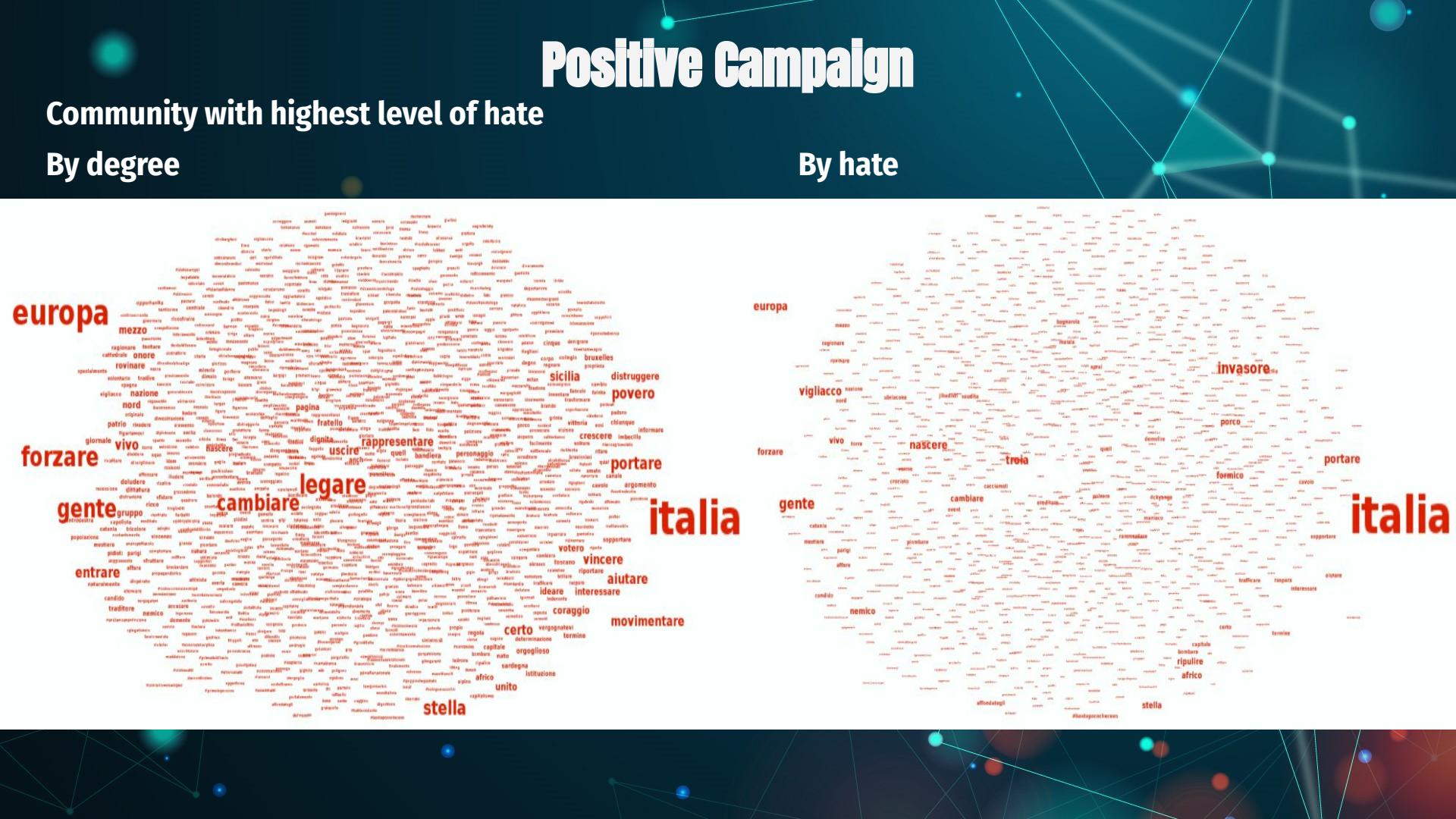
europa

forzare

gente

italia

stella



Positive Campaign

Community with highest level of hate

| Positive Campaign - most hateful cluster | | | |
|--|--------------------|------------|------------------|
| Pagerank Score | Word | Hate index | Word |
| 0.0727 | <i>italia</i> | 15.0 | <i>italia</i> |
| 0.04421 | <i>forzare</i> | 4.0 | <i>gente</i> |
| 0.034 | <i>europa</i> | 4.0 | <i>invasore</i> |
| 0.0249 | <i>legare</i> | 3.0 | <i>troia</i> |
| 0.0233 | <i>stella</i> | 3.0 | <i>europa</i> |
| 0.0202 | <i>cambiare</i> | 3.0 | <i>vigliacco</i> |
| 0.01719 | <i>gente</i> | 3.0 | <i>portare</i> |
| 0.01409 | <i>povero</i> | 3.0 | <i>nascere</i> |
| 0.0139 | <i>movimentare</i> | 2.0 | <i>vivo</i> |
| 0.0121 | <i>vincere</i> | 2.0 | <i>stella</i> |

Table XIII: Top 10 words for cluster PageRank score and hate index in the most hateful cluster in Positive campaign comments network.

Results and Insights

Q1: Do posts belonging to different types of campaign generate more hate speech in political discussion on social media?

Negative-Comparative Campaign posts generate poorer political discussion with more relevant and more central hate-speech words with respect to the Positive Campaign posts.

Q2: Which are the patterns and topics of hate speech for different types of campaign?

Neg-Comp: internal politics issues ranging from immigration, school and education, defense of national borders and family.

Highly correlated with hate-speech targeting migrants and religious minorities.

Attacks on these categories polarize the general political discussion on internal topics.

Positive: political topics such as foreign and internal policies and political confrontation between Italian parties.

Hate-speech words related to internal politics issues such as attacks on opposed parties and just a small part of the discussion is related to migrants and religious minorities

Group and Single Target



Comments analysis:
● Natasia Caria

Group and Single Target

Research questions:

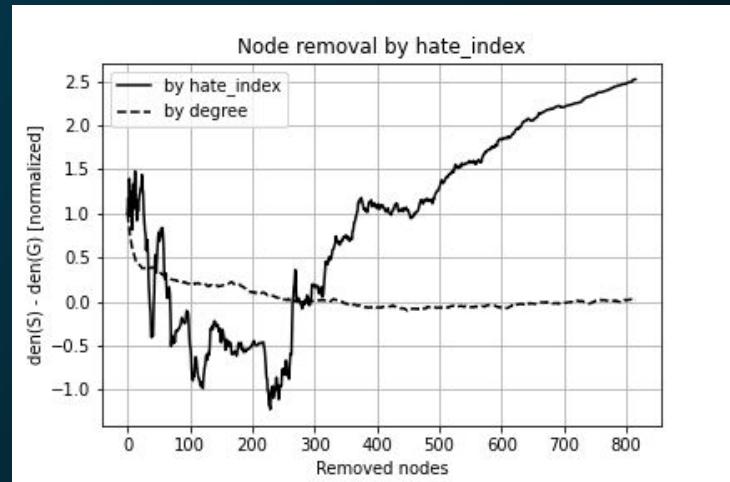
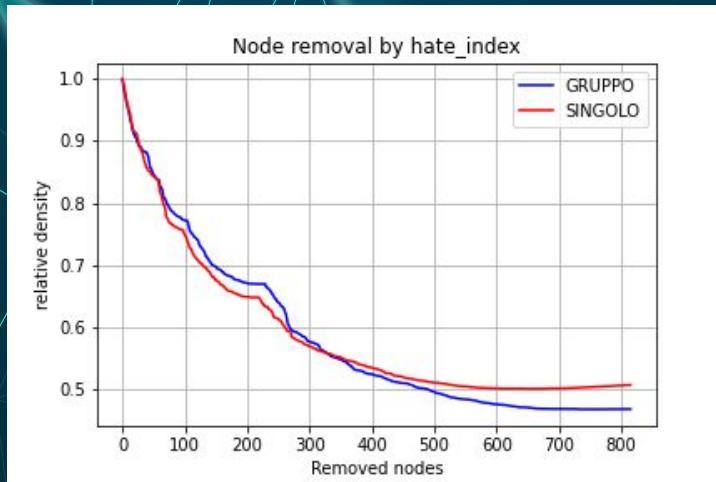
- How does the target type of attack in posts contribute to the spread of hate on their comments?
- How does node removal affect the two types of networks?
- Which type of target creates more hate?

Group and Single Target

- General Description and statistics

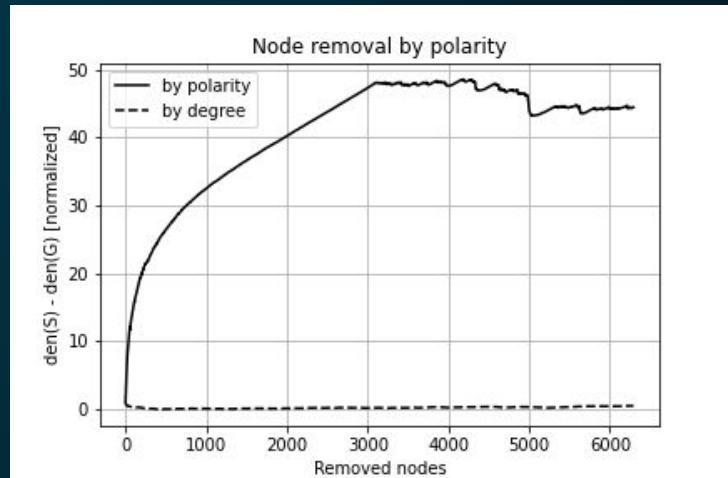
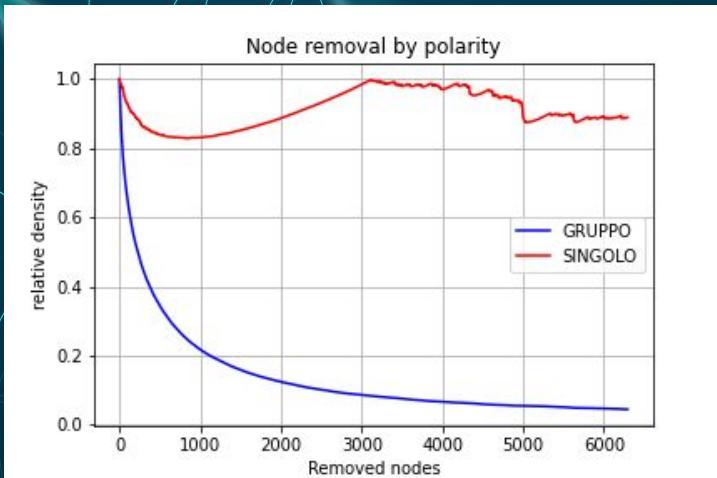
| | Nodes | Edges | Avg Degree | Density | Estim. γ |
|--------|-------|--------|------------|---------|-----------------|
| Group | 20025 | 114768 | 11.4625 | 0.00057 | 2.83 |
| Single | 17260 | 86915 | 10.0713 | 0.00058 | 2.82 |

Nodes Removal Analysis by hate index



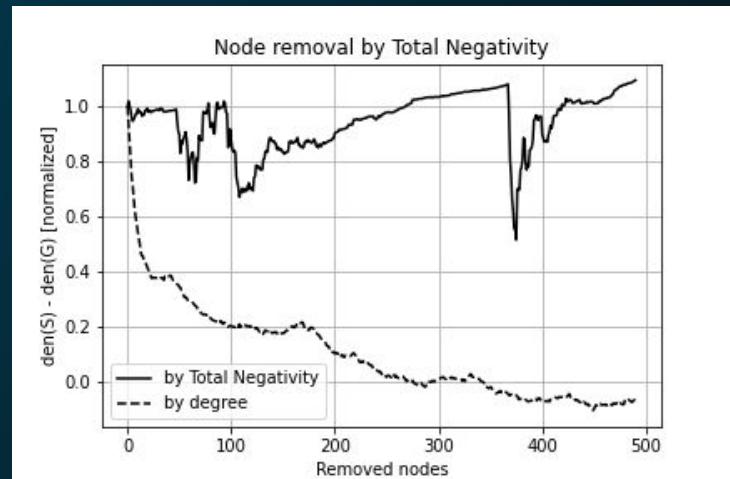
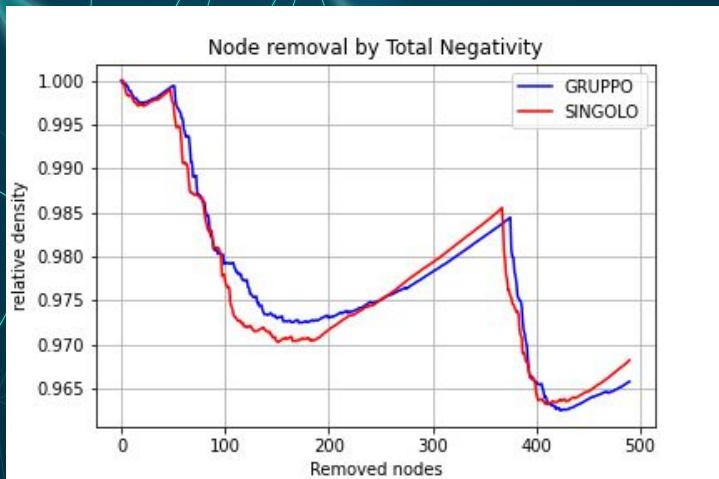
No significant difference between Group and Single Target

Nodes Removal Analysis by polarity



Group Network is less robust on the basis of node removal by polarity.

Nodes Removal Analysis by Total Negativity



No significant difference between Group and Single Target

Networks Clusters Analysis

Group

A word cloud visualization showing the most frequent words in the 'Group' cluster. The words are colored according to their category, forming several distinct clusters. Notable clusters include:

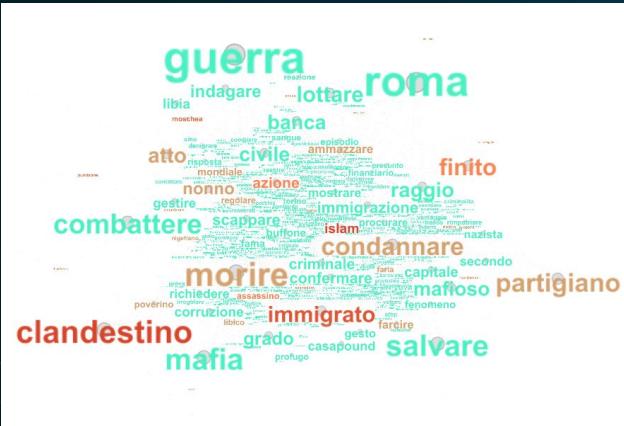
- Pink cluster (top left):** quando, governare, legare, votare, parlare.
- Green cluster (center top):** pd, euro, dire, fare.
- Yellow cluster (center bottom):** sempre, mettere, bene.
- Orange cluster (bottom left):** italiano, politico, partire, nessuno.
- Blue cluster (bottom center):** persona, grande, casa, dovere.
- Red cluster (bottom right):** salvini, grazia.
- Grey cluster (bottom left):** italia, amico, europa.

Single

A word cloud visualization showing the most frequent words in the 'Single' cluster. The words are colored according to their category, forming several distinct clusters. Notable clusters include:

- Pink cluster (center right):** farè, rendere, vedere, salvini.
- Green cluster (center left):** politico, partire.
- Yellow cluster (middle right):** parlare, pensare, problema, europa.
- Blue cluster (middle left):** politico, partire, nessuno.
- Orange cluster (bottom center):** governo, quando, dire, anno.
- Red cluster (bottom right):** paese, italia, andare.
- Grey cluster (bottom left):** persona, grande, brava, grazia.
- Blue cluster (bottom center):** pd, legare, ministrare.

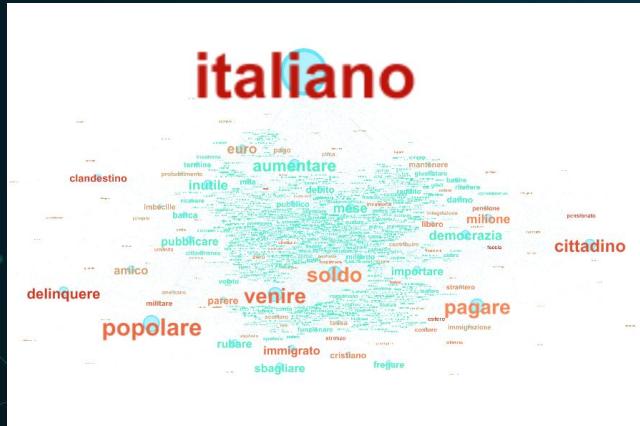
Group Target 'Clandestino' Clusters Analysis



| Sorted by Pagerank | | | Sorted by Hate-index | | |
|--------------------|----------|------------|----------------------|------------|----------|
| Word | Pagerank | Hate-index | Word | Hate-index | Pagerank |
| guerra | 0.00084 | 0 | clandestino | 5 | 0.00058 |
| roma | 0.00079 | 0 | islam | 5 | 0.00023 |
| moriere | 0.00061 | 1 | immigrato | 4 | 0.00040 |
| clandestino | 0.00058 | 5 | punizione | 3 | 6e-05 |
| mafia | 0.00054 | 0 | lanciafiamme | 3 | 2e-05 |
| salvare | 0.00054 | 0 | moschea | 3 | 0.00011 |
| combattere | 0.00050 | 0 | azione | 2 | 0.00026 |
| partigiano | 0.00047 | 1 | finito | 2 | 0.00042 |
| condannare | 0.00045 | 1 | assassino | 2 | 0.00014 |
| finito | 0.00042 | 2 | disinfettare | 1 | 3e-05 |

| Total Hate | Avg Hate | Nodes |
|------------|----------|-------|
| 59 | 0.083 | 712 |

Single Target 'Clandestino' Clusters Analysis



| Sorted by Pagerank | | | Sorted by Hate-index | | |
|--------------------|----------|------------|----------------------|------------|----------|
| Word | Pagerank | Hate-index | Word | Hate-index | Pagerank |
| italiano | 0.00367 | 10 | italiano | 10 | 0.00367 |
| popolare | 0.00131 | 3 | feccia | 6 | 0.0002 |
| venire | 0.00116 | 3 | delinquere | 6 | 0.00077 |
| soldo | 0.00114 | 2 | clandestino | 5 | 0.00052 |
| pagare | 0.00111 | 2 | pensionato | 4 | 0.00022 |
| cittadino | 0.00092 | 4 | cittadino | 4 | 0.00092 |
| aumentare | 0.00088 | 0 | estero | 4 | 0.00024 |
| delinquere | 0.00077 | 6 | essi | 3 | 5e-05 |
| euro | 0.00072 | 1 | pensione | 3 | 0.00028 |
| mese | 0.00070 | 0 | stronzo | 3 | 0.00023 |

| Total Hate | Avg Hate | Nodes |
|------------|----------|-------|
| 168 | 0.144 | 1165 |

Conclusions for Semantic Analysis

- **Hate** and **problematic** indices are more significant in determining the level of **hate** in the comments and posts. This was confirmed when performing the node removal analysis of robustness.
- **Right** parties' posts and comments lose their robustness faster than the **Left** parties' posts and comments → **Hate speech** characterizes **Right** parties discussion and is **more central**.
- **Left-Right** vs **positive-negative** -> **similar behaviors** for node removal by **hate/problematic index**
- **Target division** -> no differences in node removal by hate index and LIWC attributes
- Clustering analysis: **Left-Right** → most hateful cluster in right parties' posts and comments is "immigrants", "ethnicity and religion".
- Most **hateful** cluster is in posts negative type of campaign

FINAL CONCLUSION

AFDSA

Ogni modulo alterna momenti di apprendimento con momenti di esercizio

RIFLESSIONE

Ogni modulo è diviso in due sessioni, dando l'opportunità di riflettere su quanto presentato

CONFRONTO

Gli spunti di riflessione saranno utili per un confronto attivo tra studenti, relatori e professori



GRAZIE!



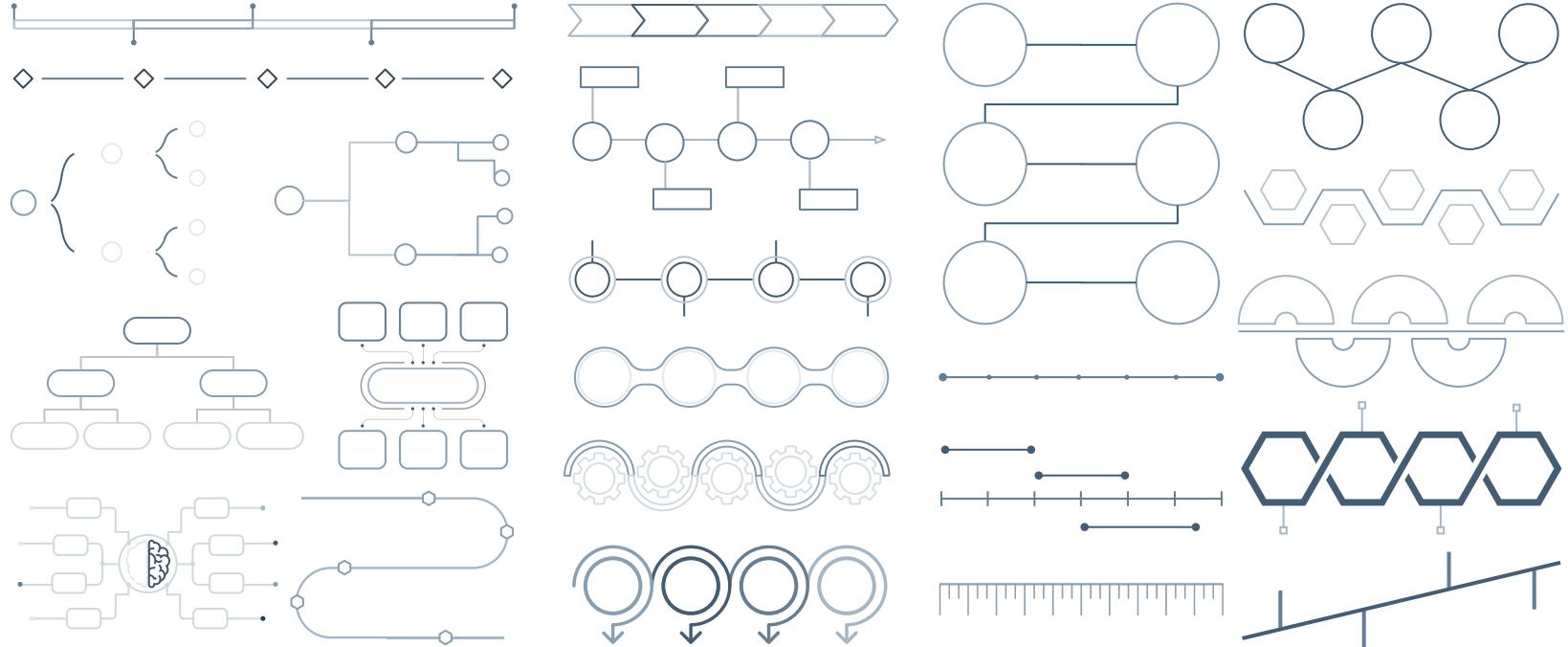
SEO & Marketing Icons



Use our editable graphic resources...

You can easily resize these resources, keeping the quality. To change the color, just ungroup the resource and click on the object you want to change. Then, click on the paint bucket and select the color you want. Don't forget to group the resource again when you're done.





...and our sets of **editable icons**

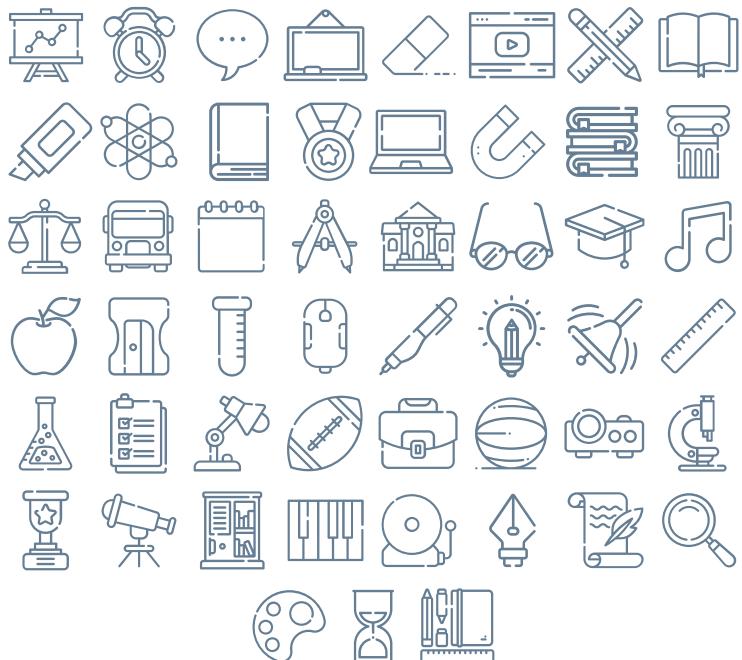
You can resize these icons, keeping the quality.

You can change the stroke and fill color; just select the icon and click on the paint bucket/pen.

In Google Slides, you can also use Flaticon's extension, allowing you to customize and add even more icons.



Educational Icons



Medical Icons





Clauset-Newman-Moore greedy modularity maximization: NetworkX

Left Posts 10th largest community



Size of Word:
Degree

Right Posts 10th largest community





NETWORK STATISTICS GRAPHS (HASHTAG)

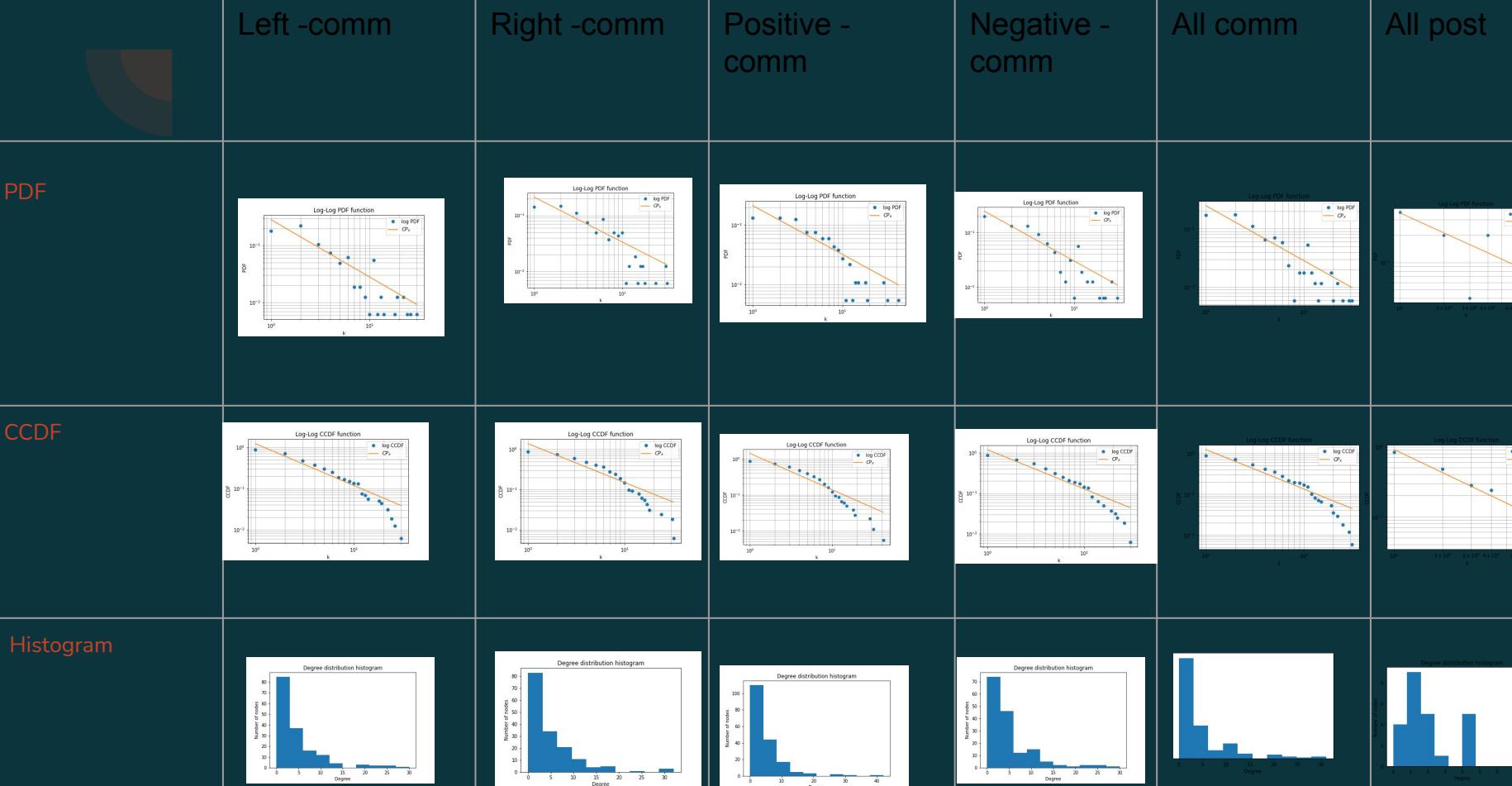
bipartite

| | Left -comm | Right -comm | Positive - comm | Negative - comm | All comm | All post |
|----------------|--|----------------|--------------------|--------------------|----------|----------|
| Robustness | <ul style="list-style-type: none"> - breaking point - Again failures and attacks | | | | | |
| X emo + degree | | | | | | |
| Assortativity | | | | | | |
| Page rank | | | | | | |

NETWORK STATISTICS GRAPHS (HASHTAG) projection



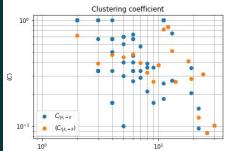
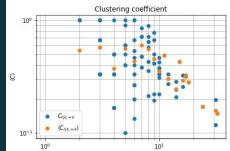
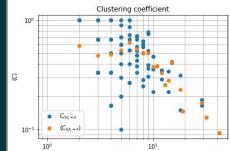
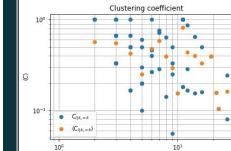
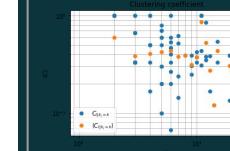
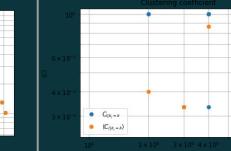
Degree Distributions (Projection)



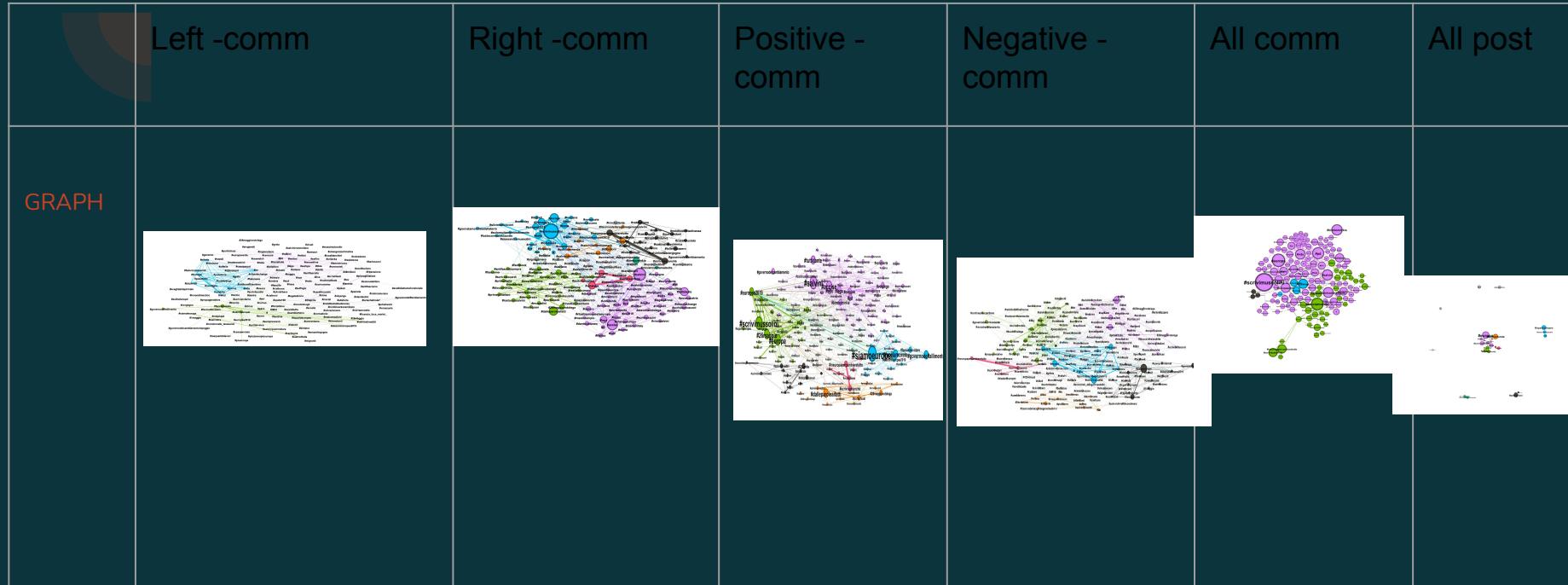
CLUSTER (HASHTAG) bipartite

| | Left -comm | Right -comm | Positive - comm | Negative - comm | All comm | All post |
|-----------------------------|------------|-------------|-----------------|-----------------|----------|----------|
| GRAPH | | | | | | |
| AVERAGE CLUSTER COEFFICIENT | | | | | | |
| | | | | | | |

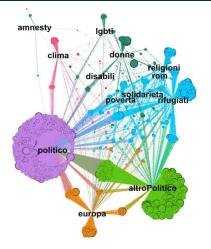
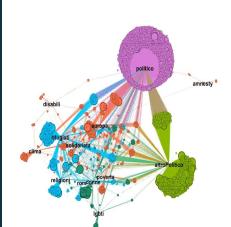
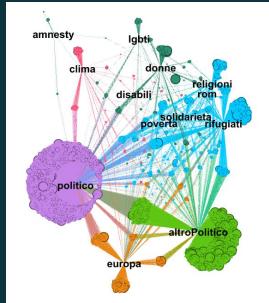
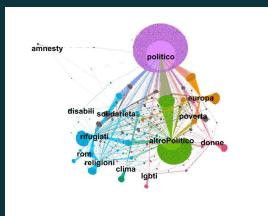
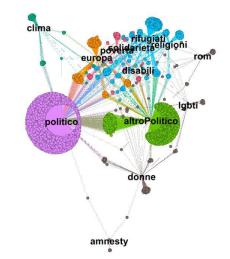
CLUSTER python (HASHTAG) projection

| | Left -comm | Right -comm | Positive - comm | Negative - comm | All comm | All post |
|-----------------------------|---|---|--|---|---|---|
| GRAPH |  |  |  |  |  |  |
| AVERAGE CLUSTER COEFFICIENT | 0.4427 | 0.4064 | 0.4294 | 0.3796 | 0.3284 | 0.2766 |

CLUSTER gephi (HASHTAG) projection



Topic Network - gephi

| | Left -comm | Right -comm | Positive - comm | Negative - comm | All comm | All post |
|--------|---|---|---|---|---|---|
| GRAP H |  |  |  |  |  |  |