

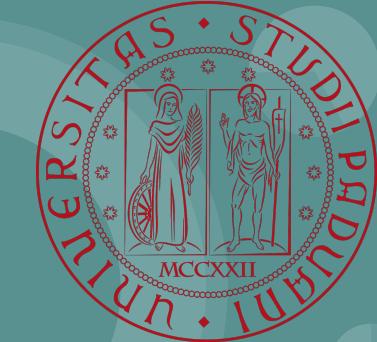
Network Analysis of Tweets' Sentiment

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Network Analysis Course
31-01-2019



DIPARTIMENTO
DI INGEGNERIA
DELL'INFORMAZIONE



FISPPA

DIPARTIMENTO DI FILOSOFIA,
SOCILOGIA, PEDAGOGIA E
PSICOLOGIA APPLICATA

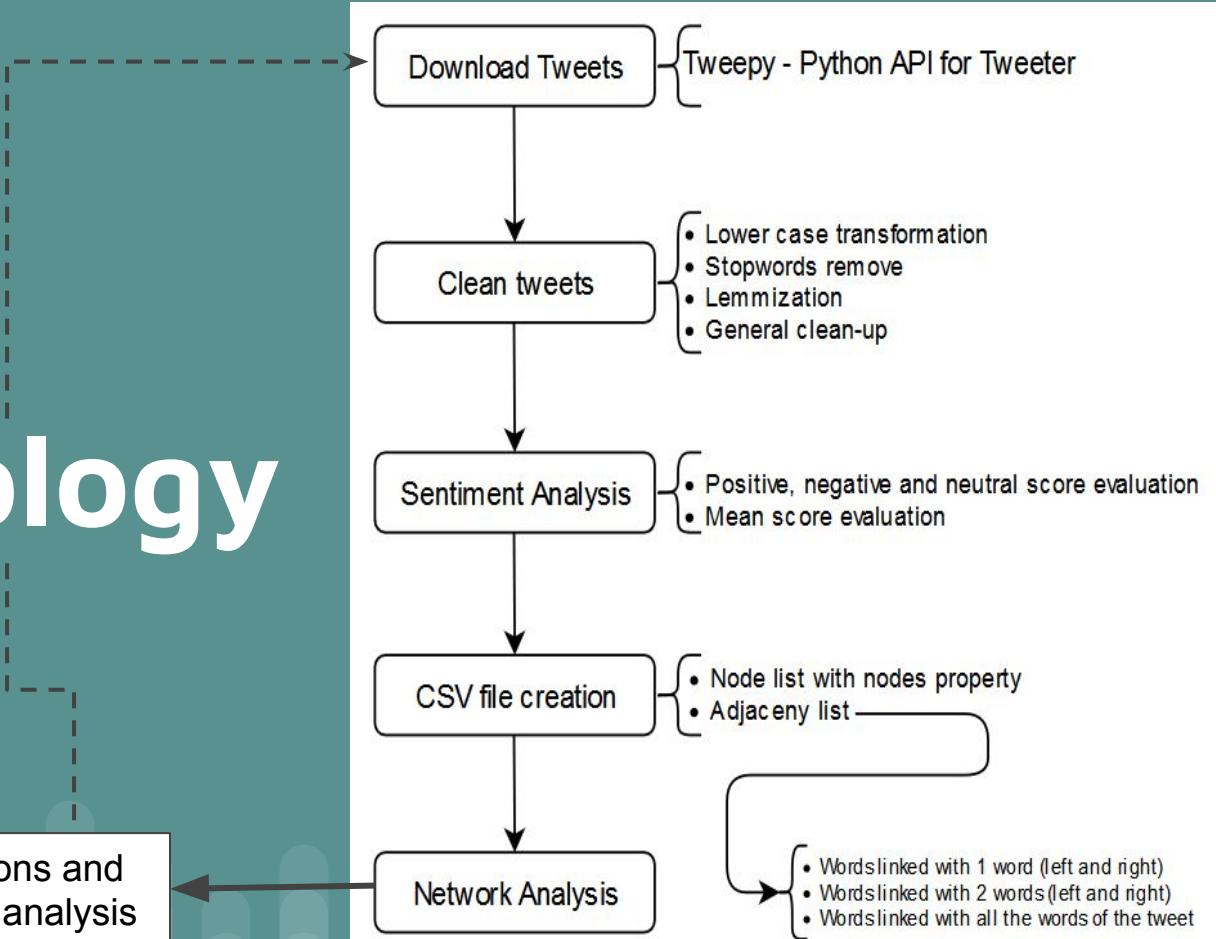
DISL DIPARTIMENTO DI STUDI
LINGUISTICI E LETTERARI

Aims of the projects:

- 1) Investigate the polarity around different twitter accounts
- 2) Use the sentiment score in the statistical analysis
- 3) Combine qualitative and quantitative methods

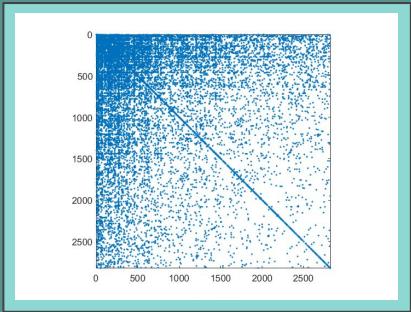
Methodology

Visualizations and qualitative analysis

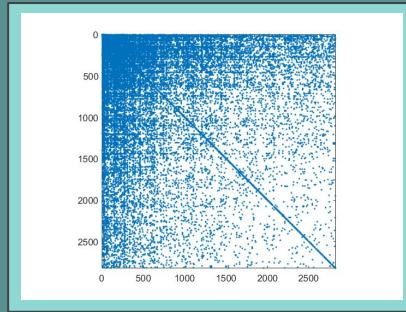




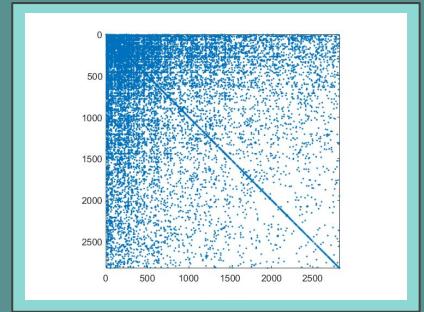
Networks Model



Trump.1



Trump.2



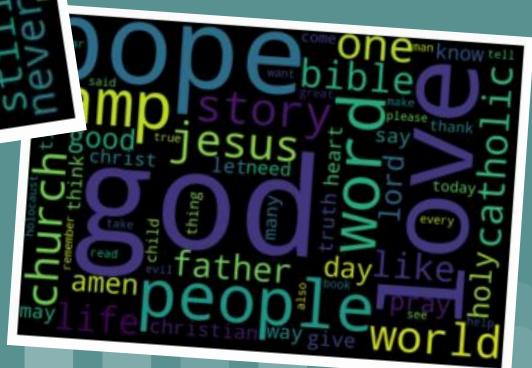
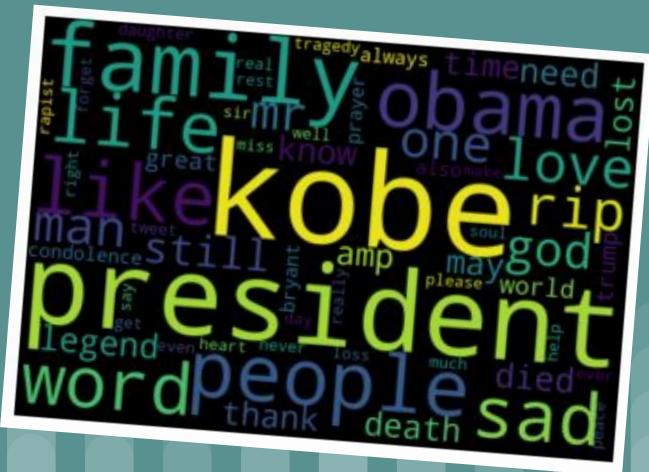
Trump.
all

	Trump.1	Trump.2	Trump.all
Number of nodes	2824	2824	2824
Number of edges	8325	14777	28015
Average degree $\langle k \rangle$	5.896	10.465	19.841
k_{max}	204	333	617
k_{min}	1	1	1
γ	2.379	2.249	2.06
Diameter	15	9	6
Average path lenght	3.96	3.28	2.81

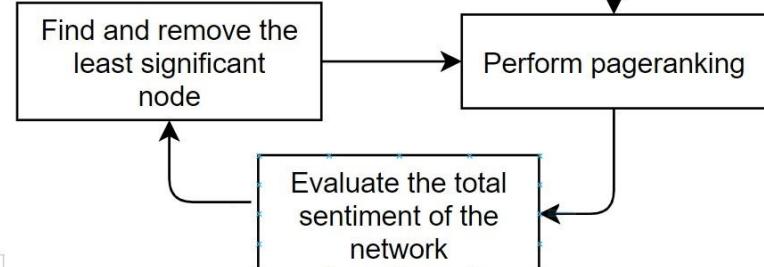
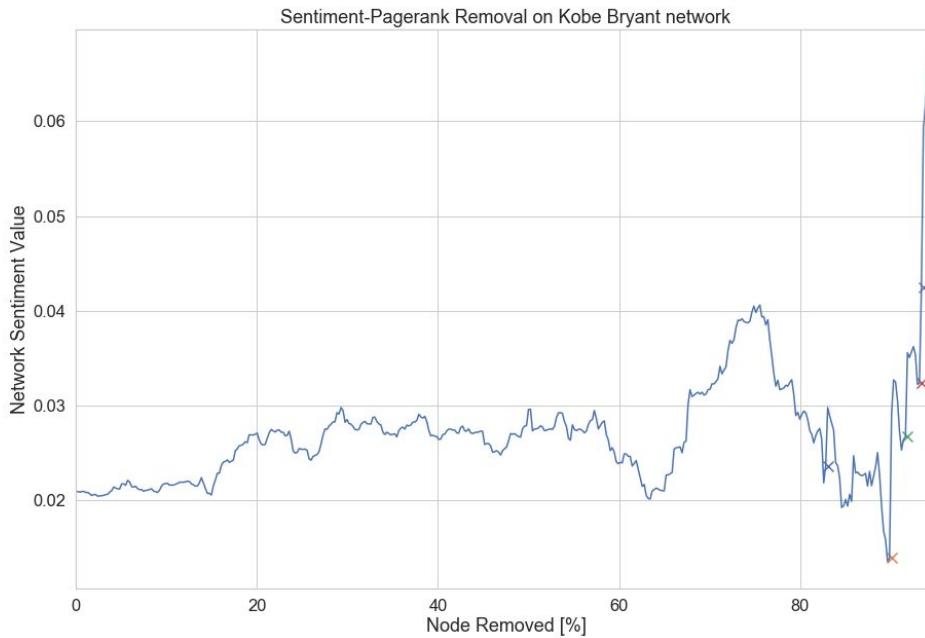


PageRank Analysis

- Detect most important words and common topics between networks



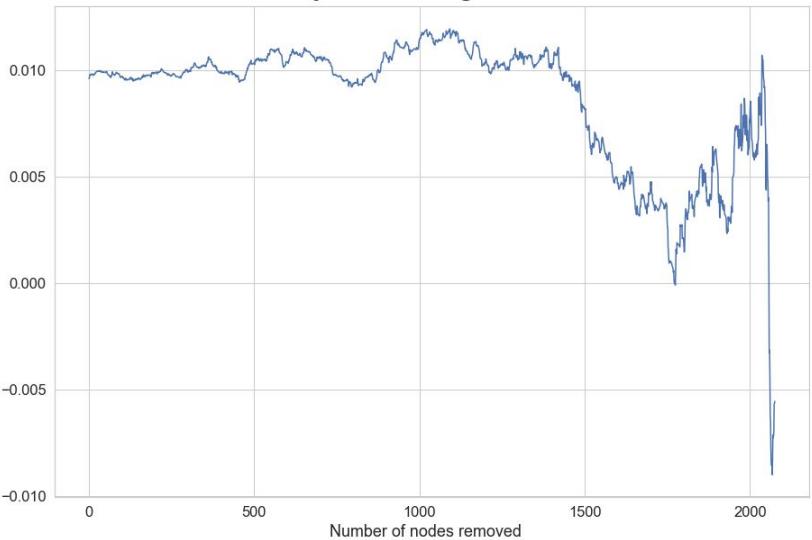
- Perform a sentiment analysis weighted on the pagerank evaluation



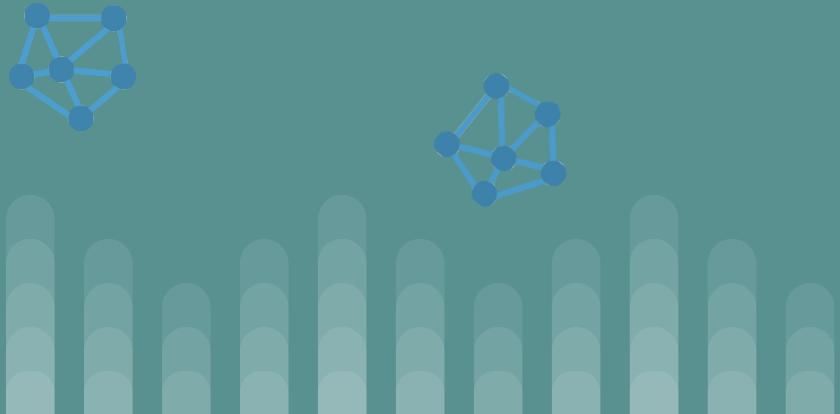
Word	% of removal
moment	83.04
hard	90.09
say	91.85
heartbroken	93.39
rip	93.61

Sentiment-Pagerank Removal on @BarackObama network

Network Sentiment

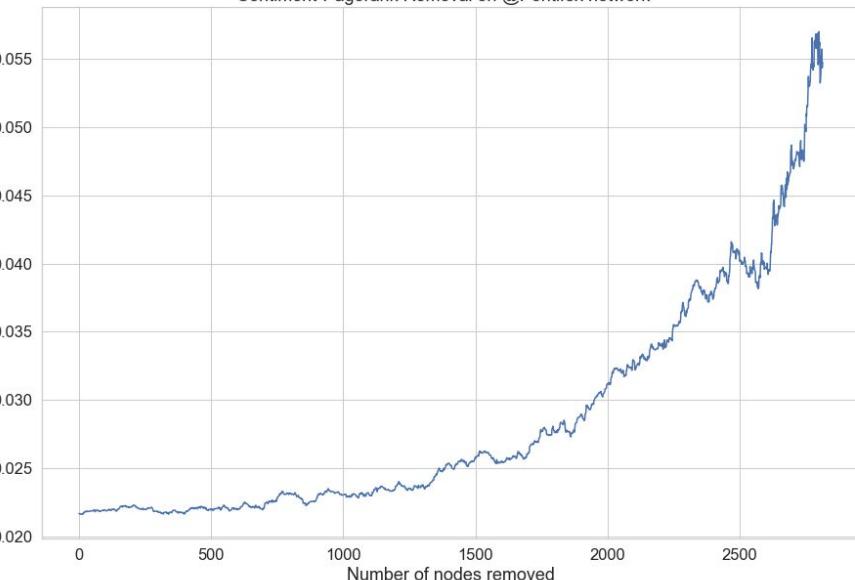


Network Sentiment



Sentiment-Pagerank Removal on @Pontifex network

Network Sentiment



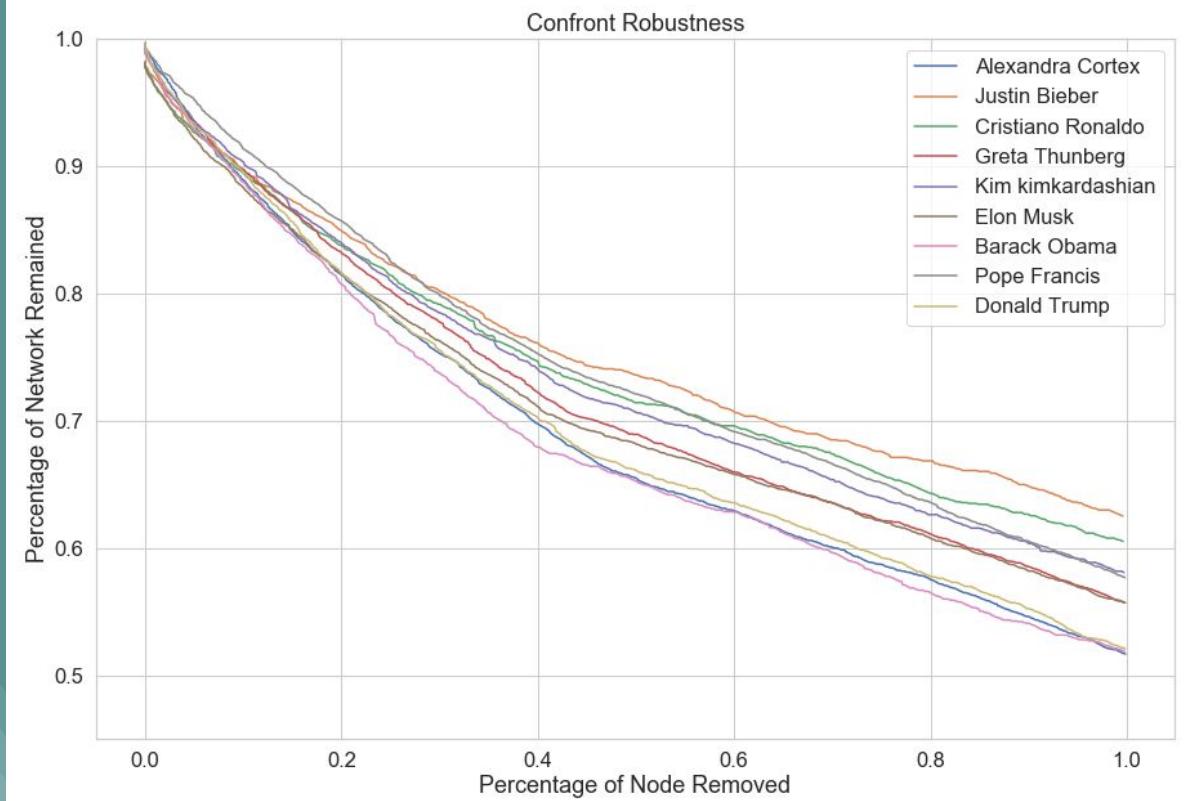
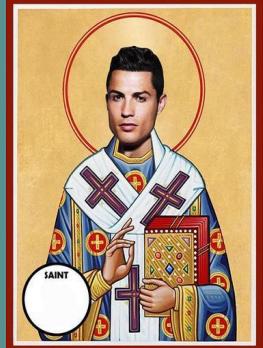
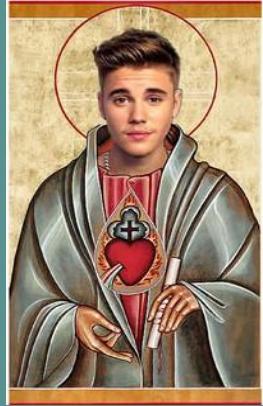
Network Sentiment



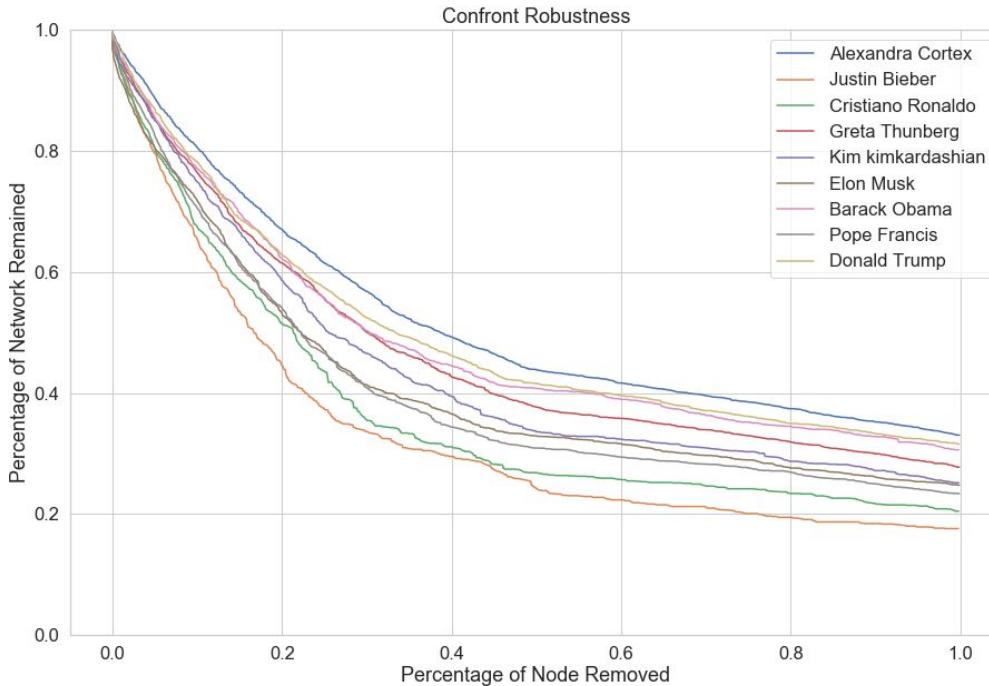
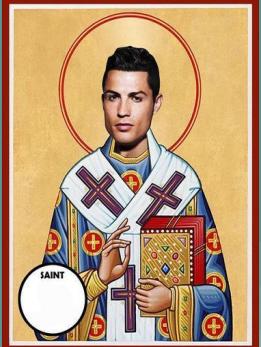
ROBUSTNESS



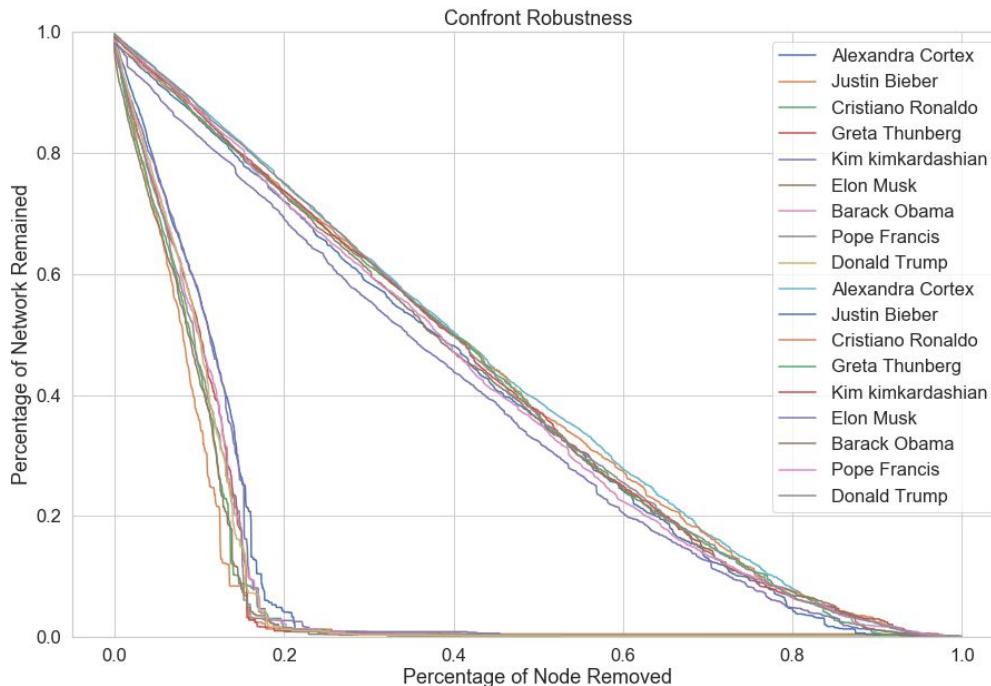
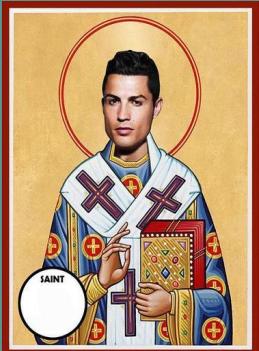
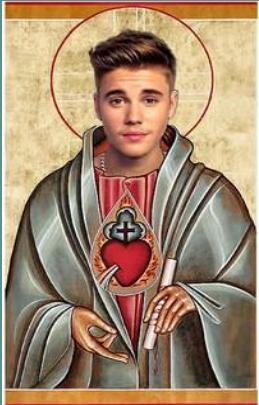
Robustness



Robustness

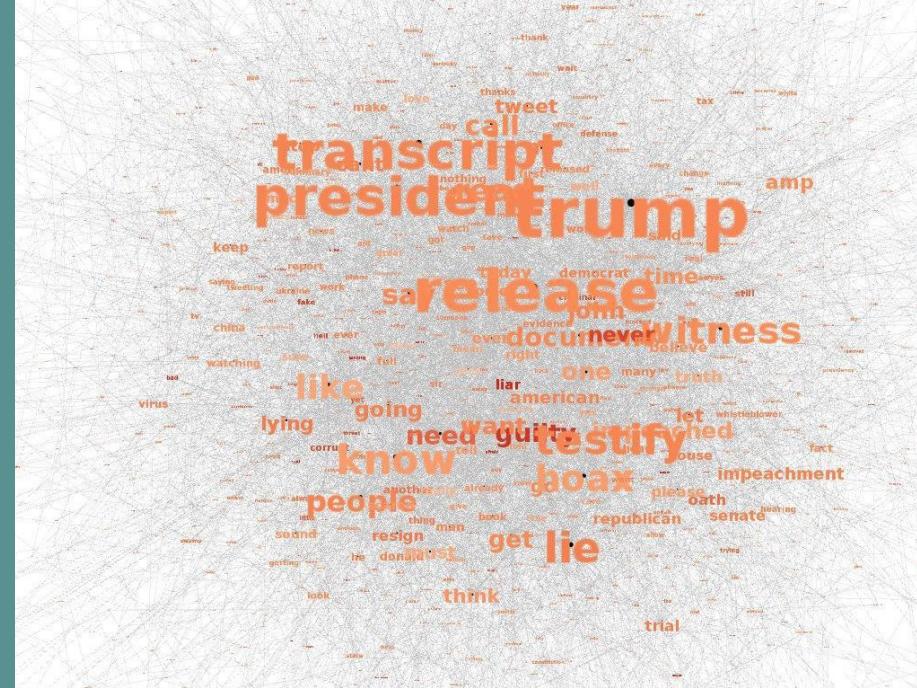
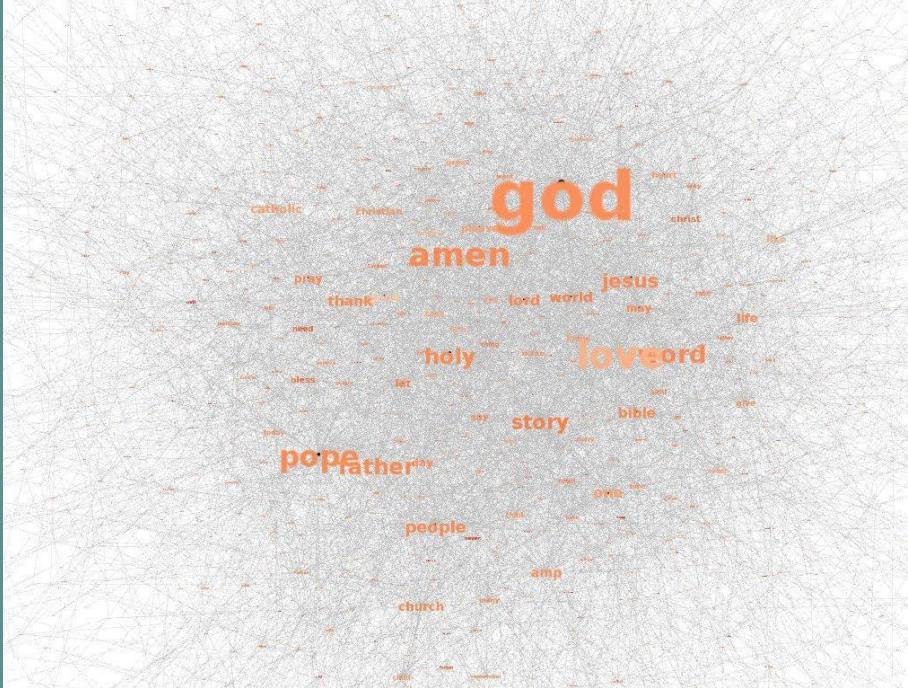


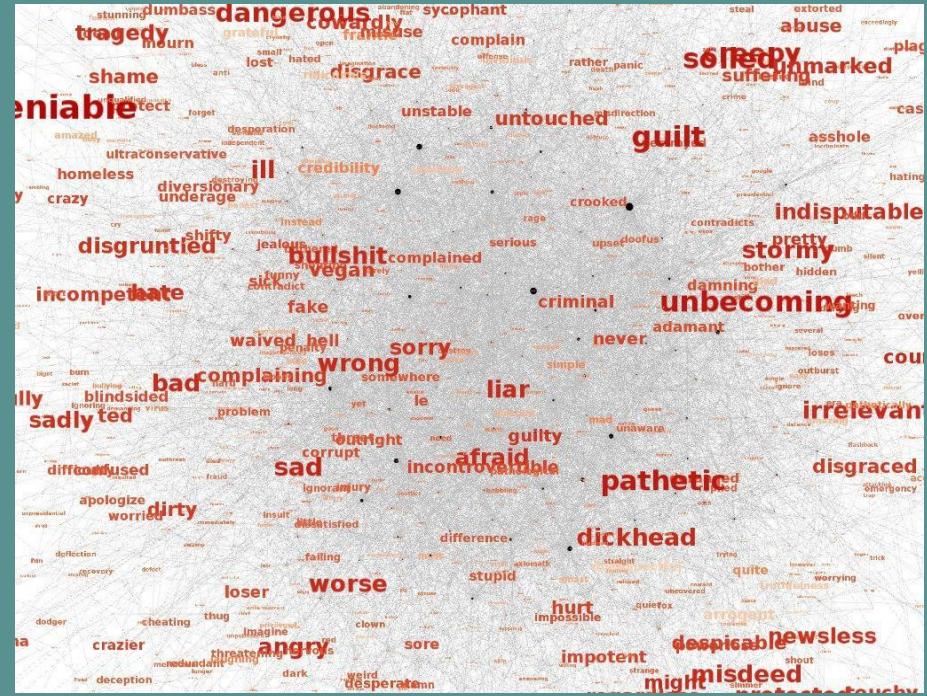
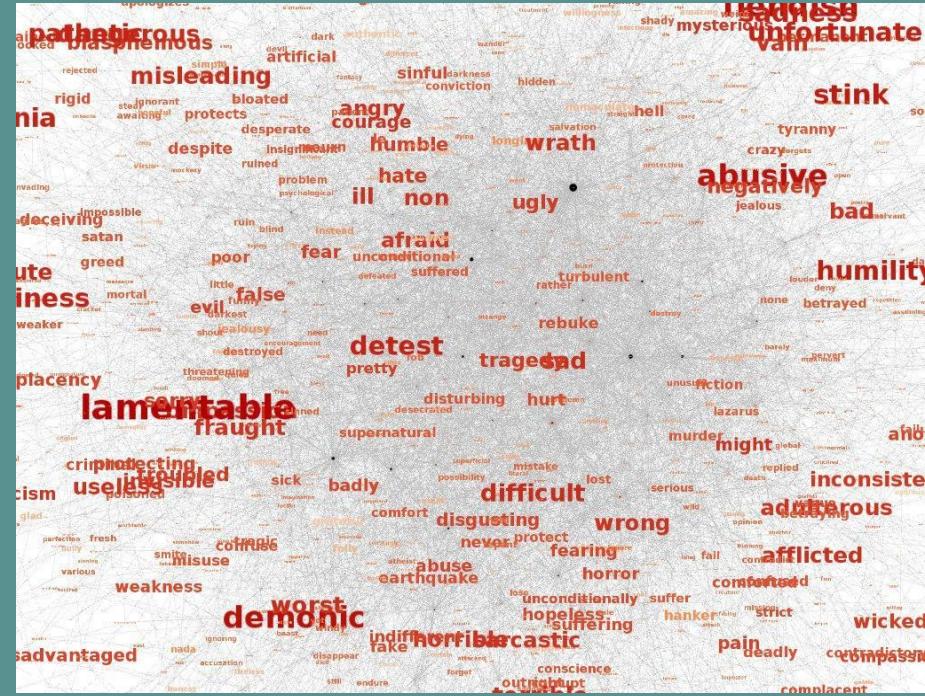
Robustness

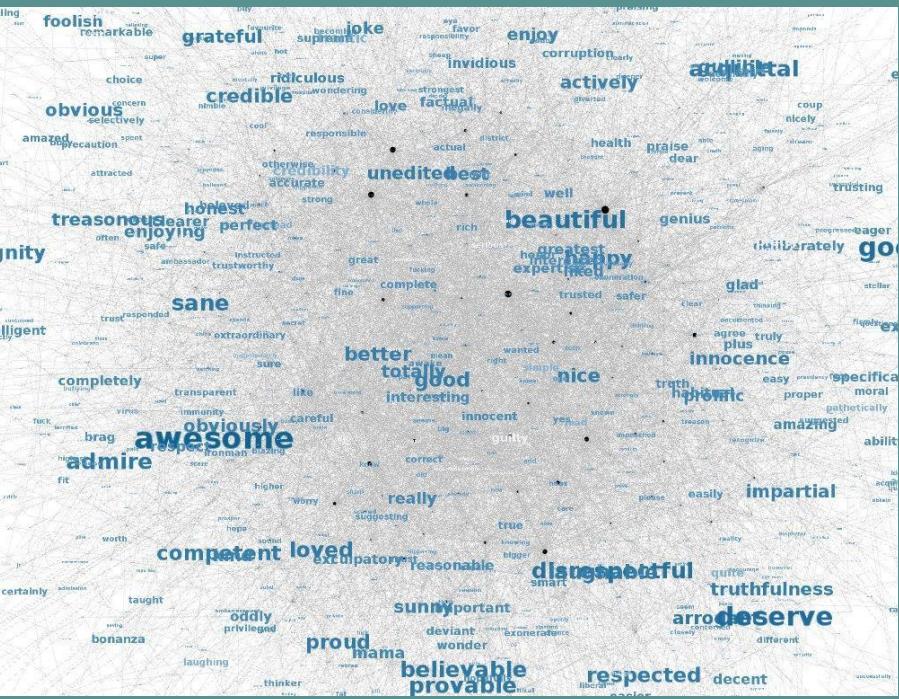
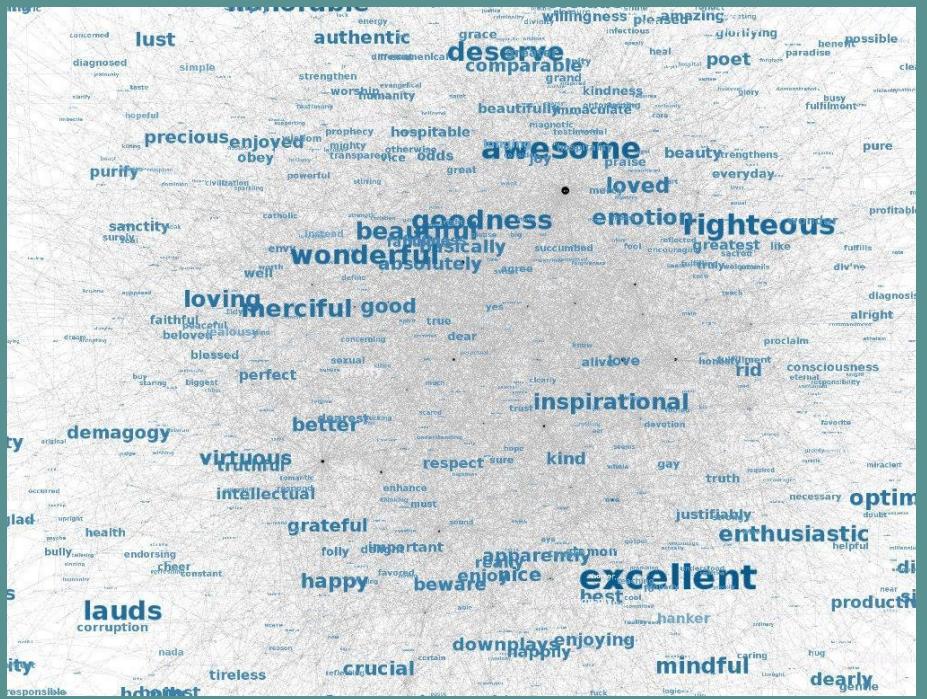


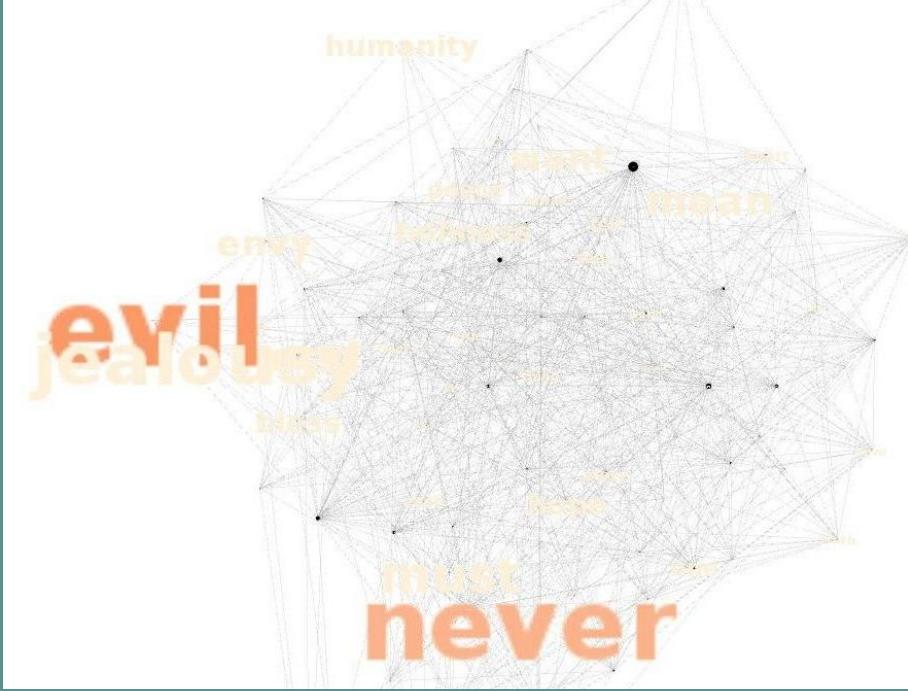
POPE FRANCIS VS TRUMP









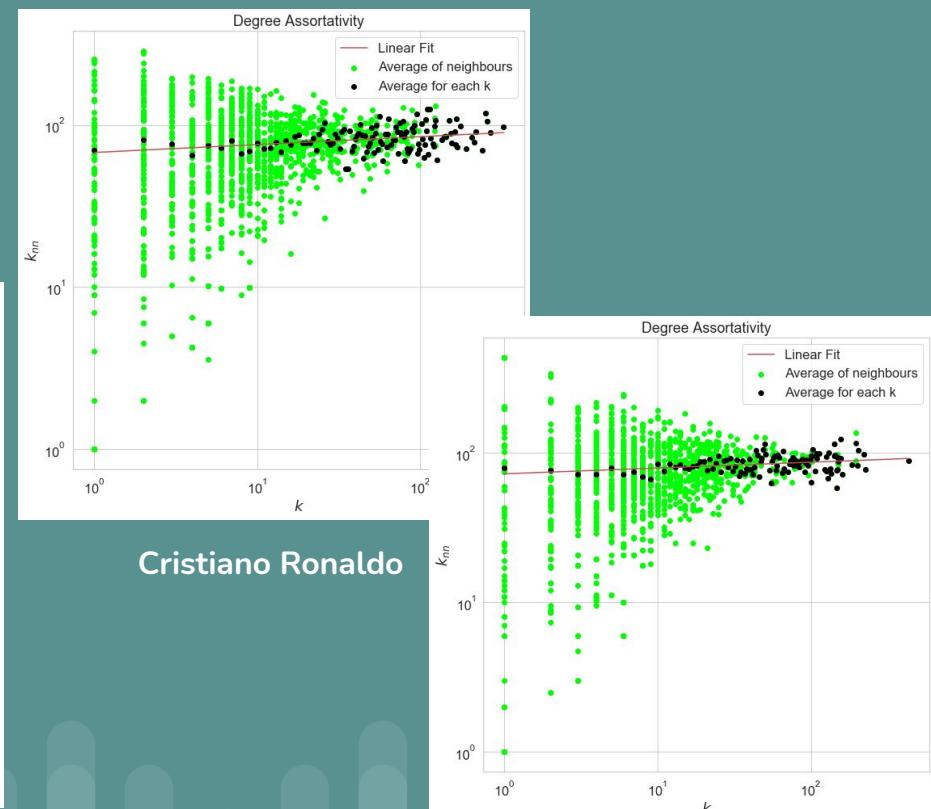
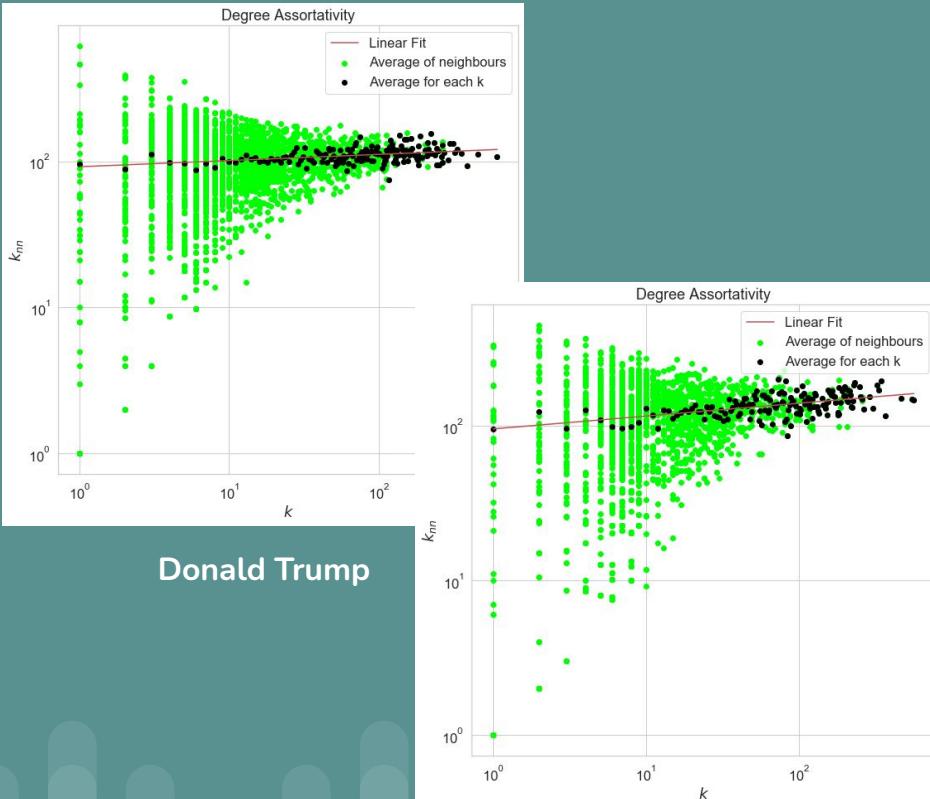


Assortativity

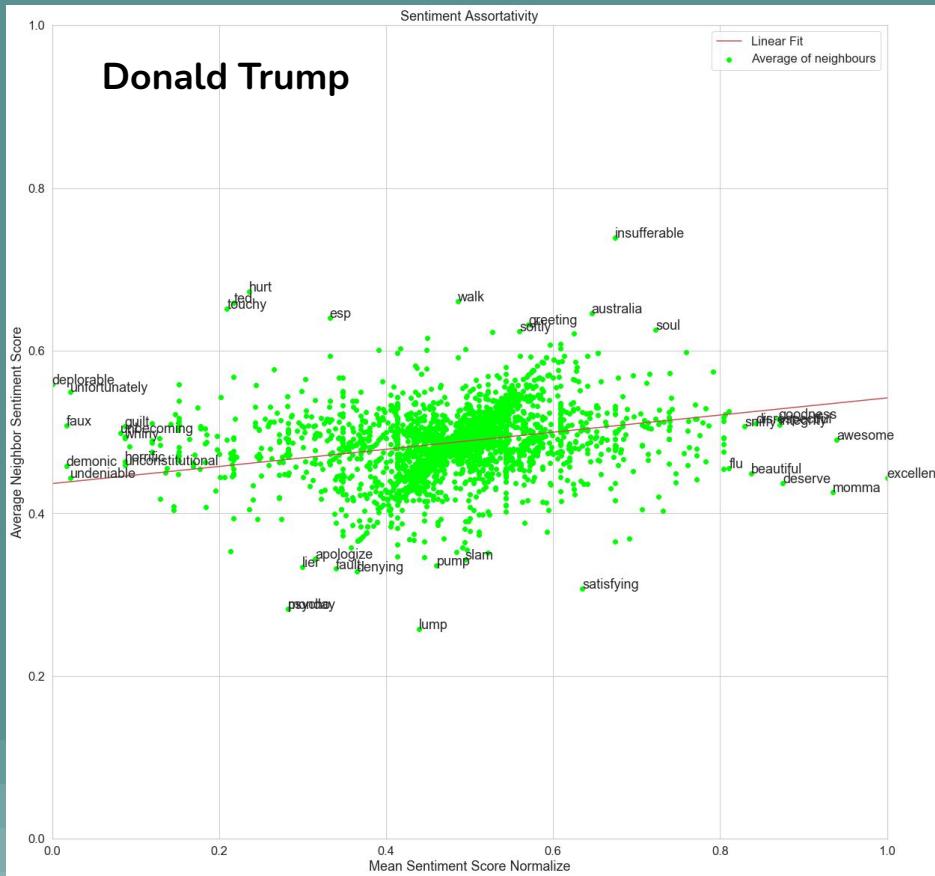
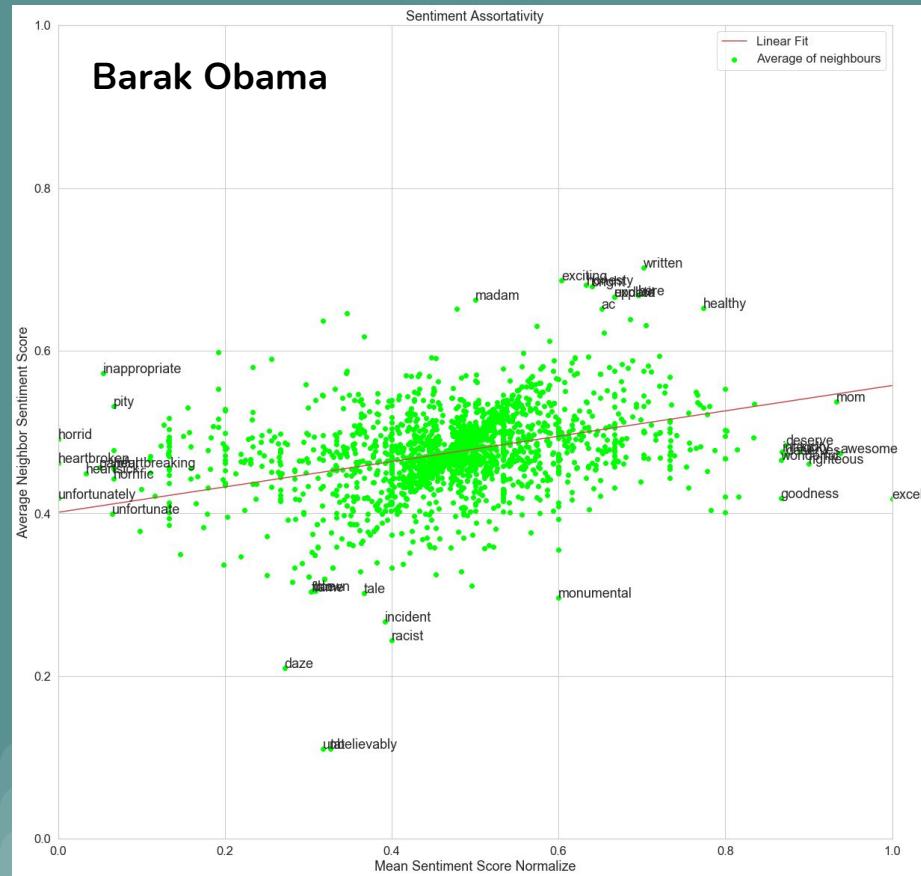
- Degree Assortativity
- Sentiment Assortativity
- Assortativity Factor = [-1,1]:

	Donald Trump	Barak Obama	Cristiano Ronaldo	Justin Bieber
DAF	0.04	0.08	0.05	0.04
PDAF	0.03	0.1	0.05	0.06
NDAF	0.04	0.1	0.08	0.04
SAF	0.11	0.156	0.22	0.23
PSAF	-0.19	-0.27	0.18	-0.09
NSAF	-0.04	-0.13	0.05	0.09

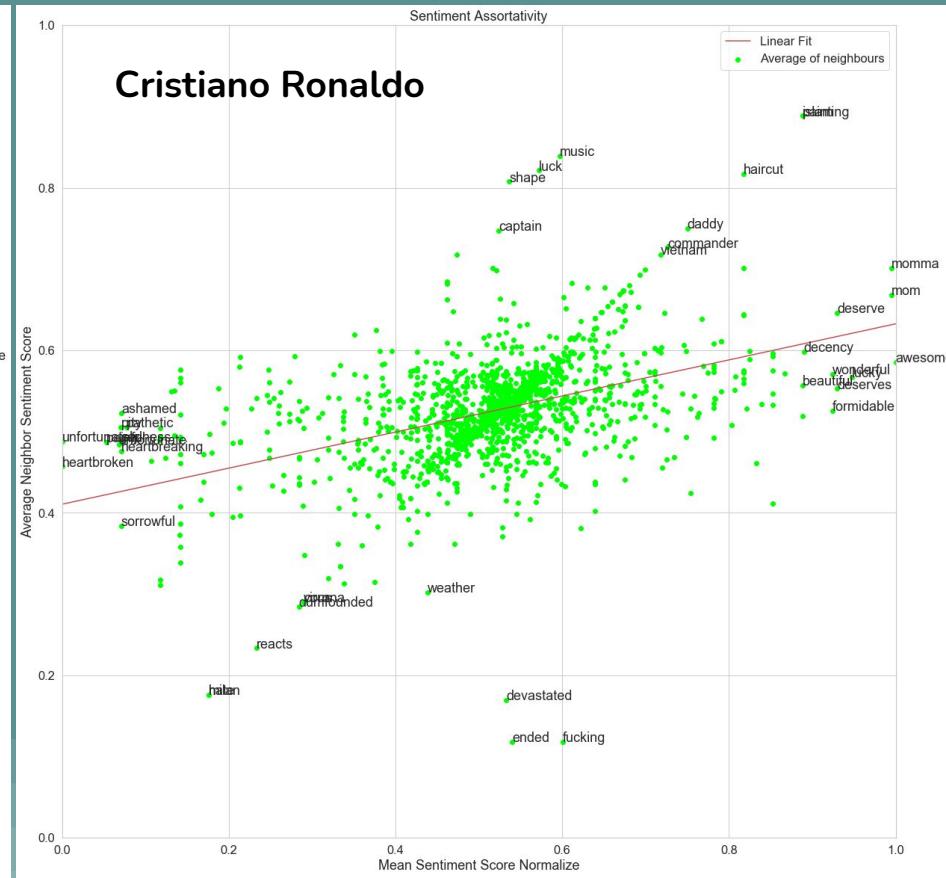
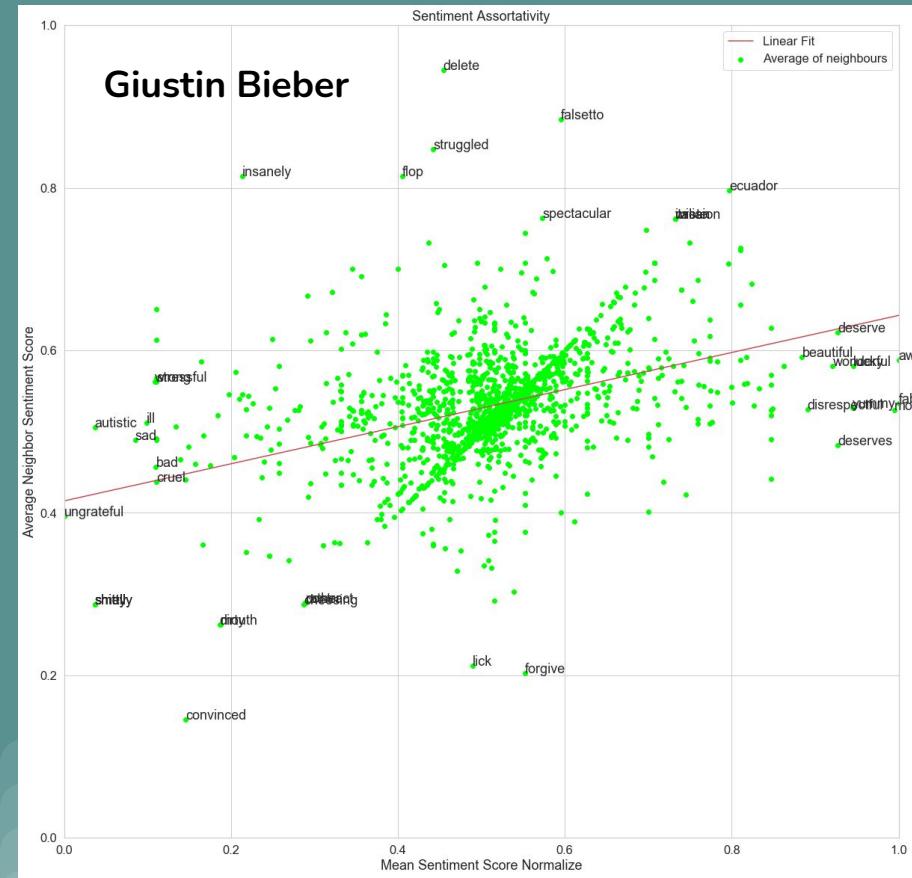
Degree Assortativity



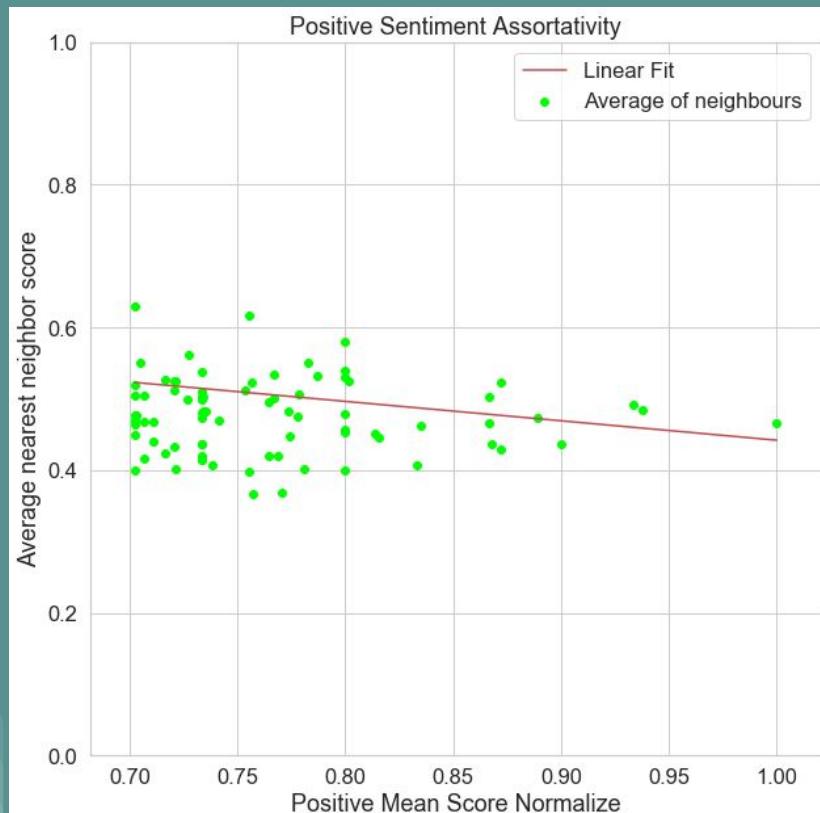
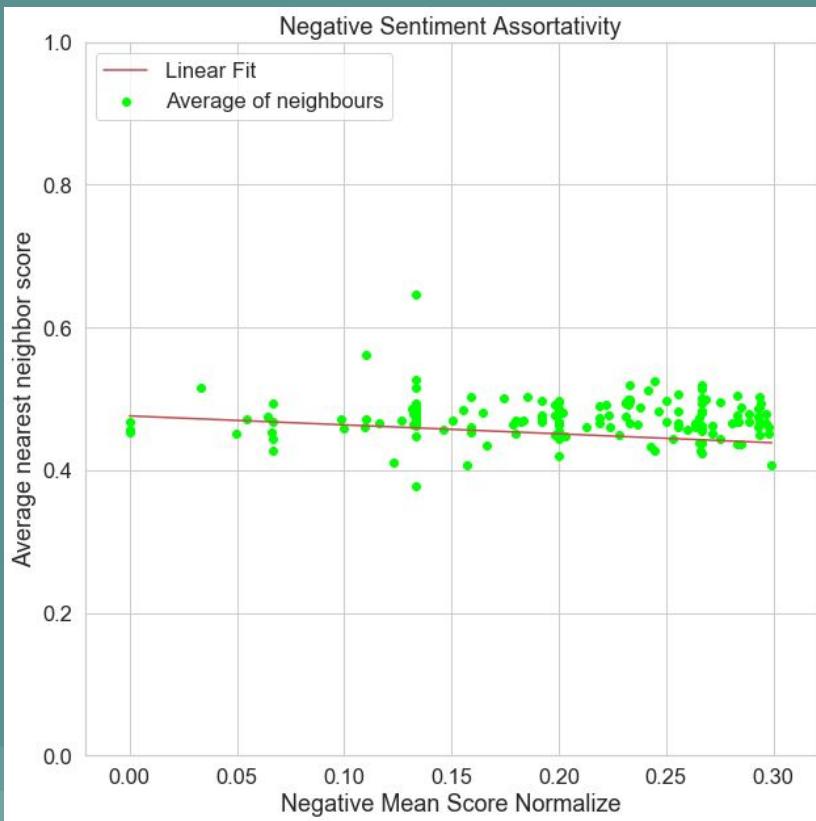
Sentiment Assortativity



Sentiment Assortativity



Local Assortativity



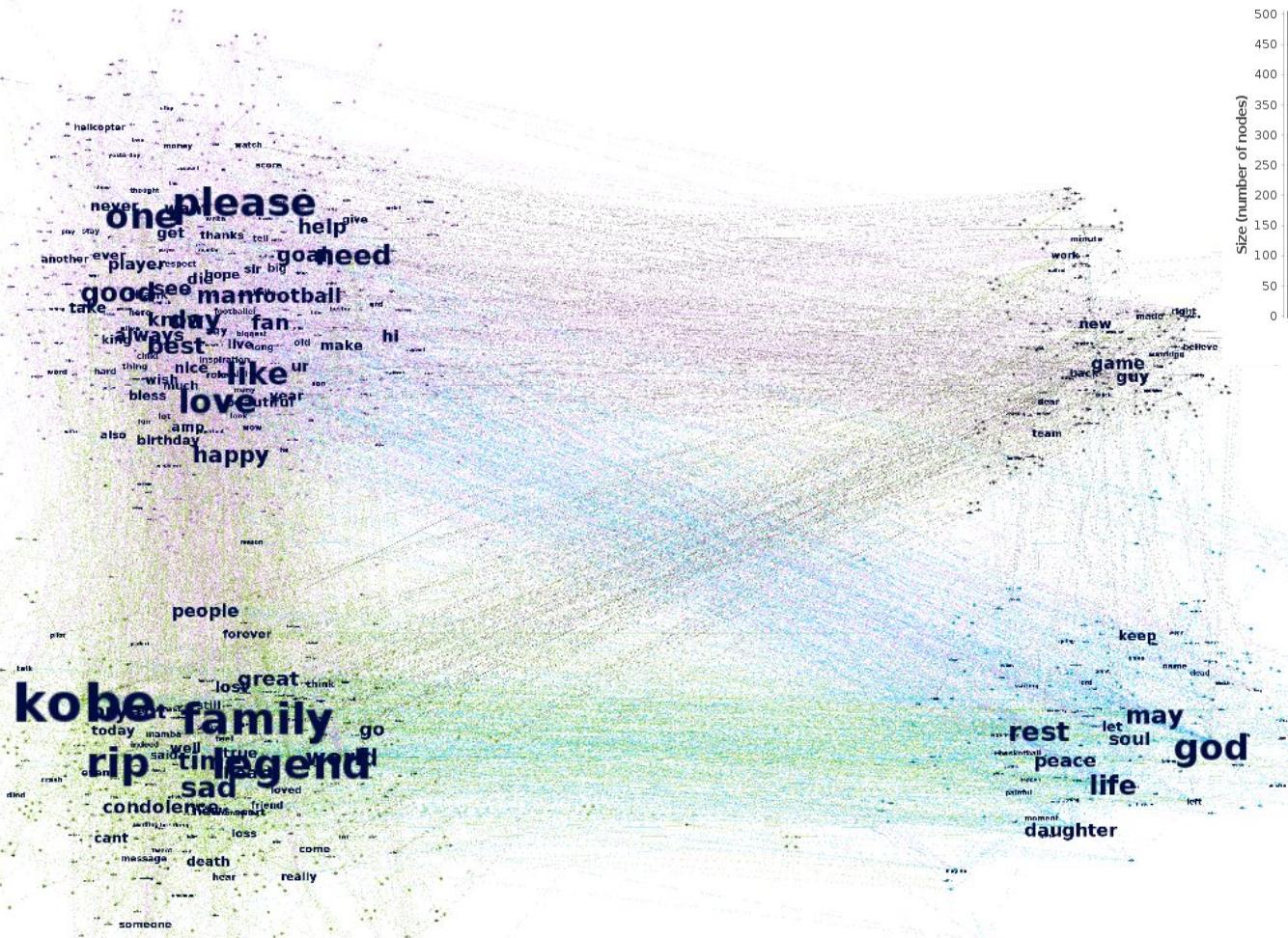
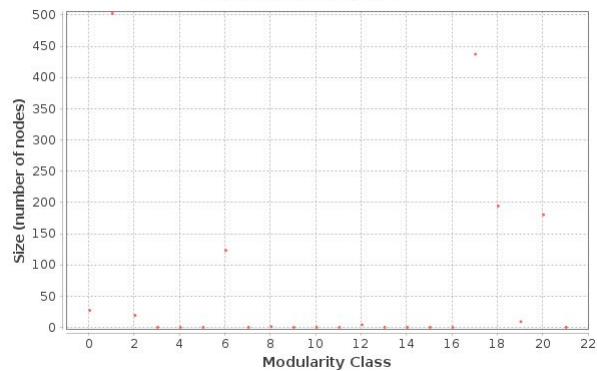
Barack Obama

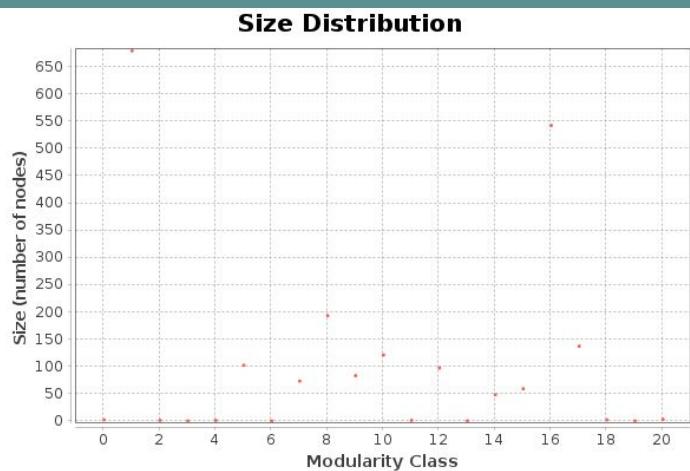
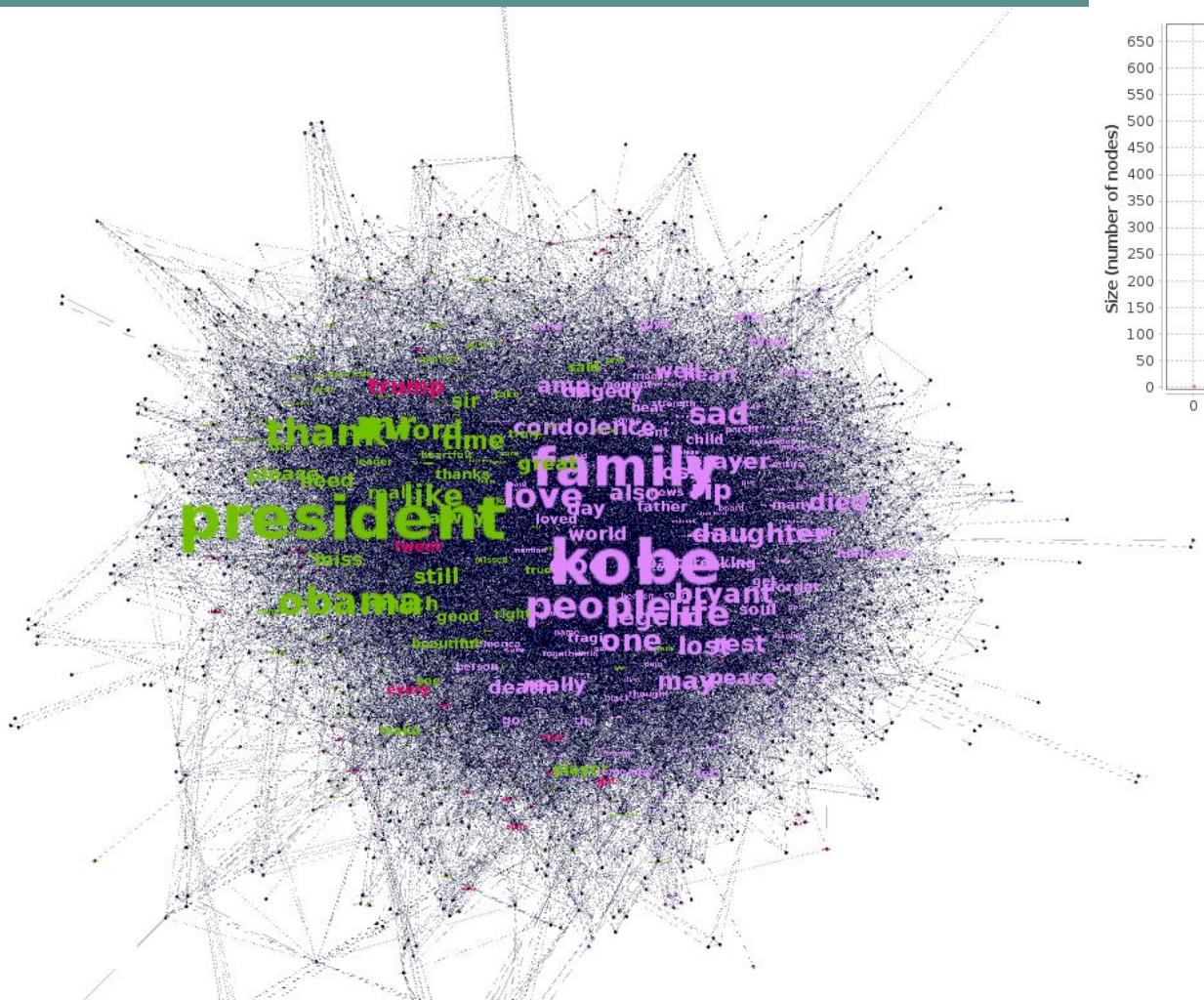
CR7 vs OBAMA

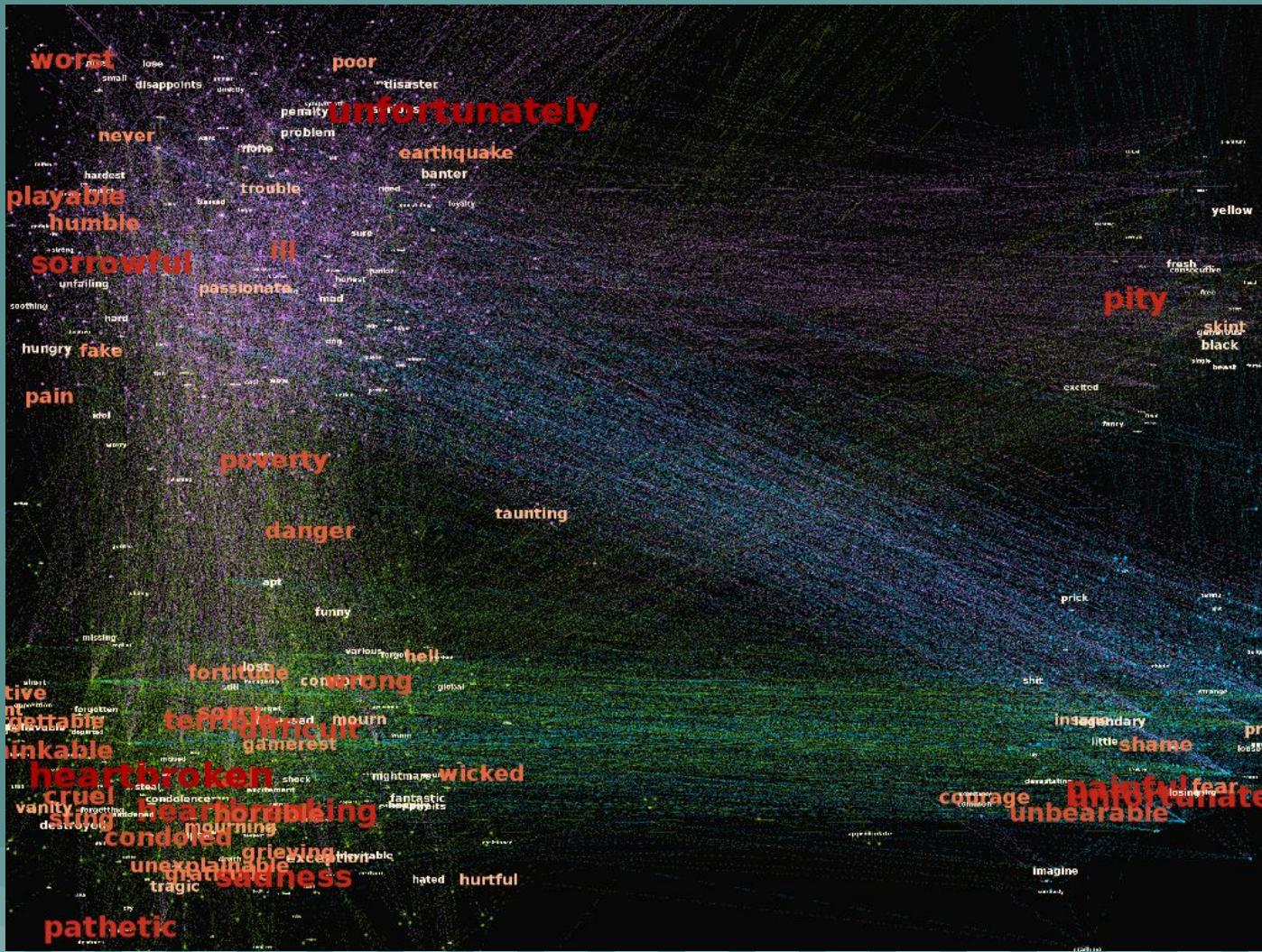


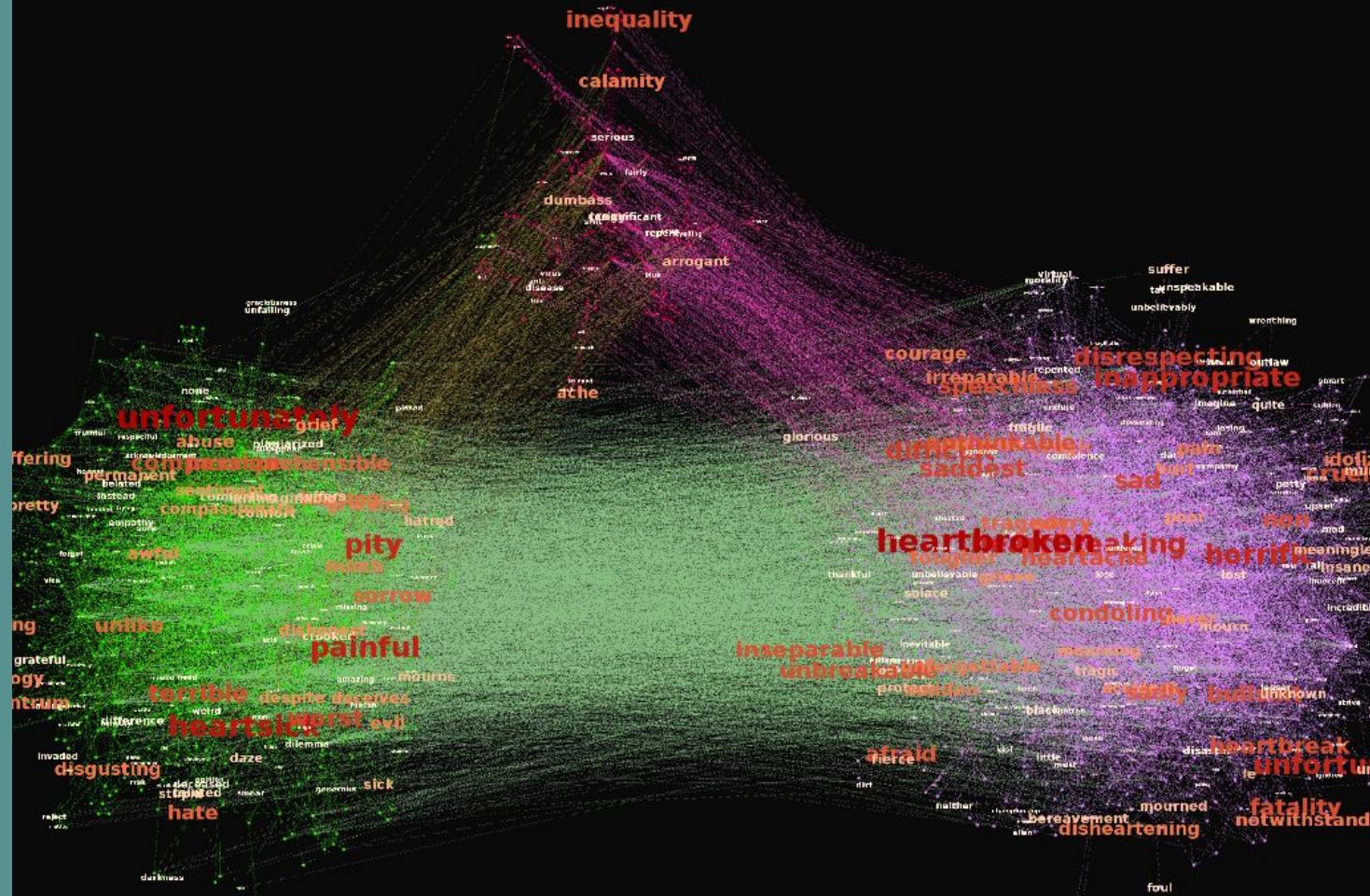
Christopher Johnson / CC BY-SA 2.0

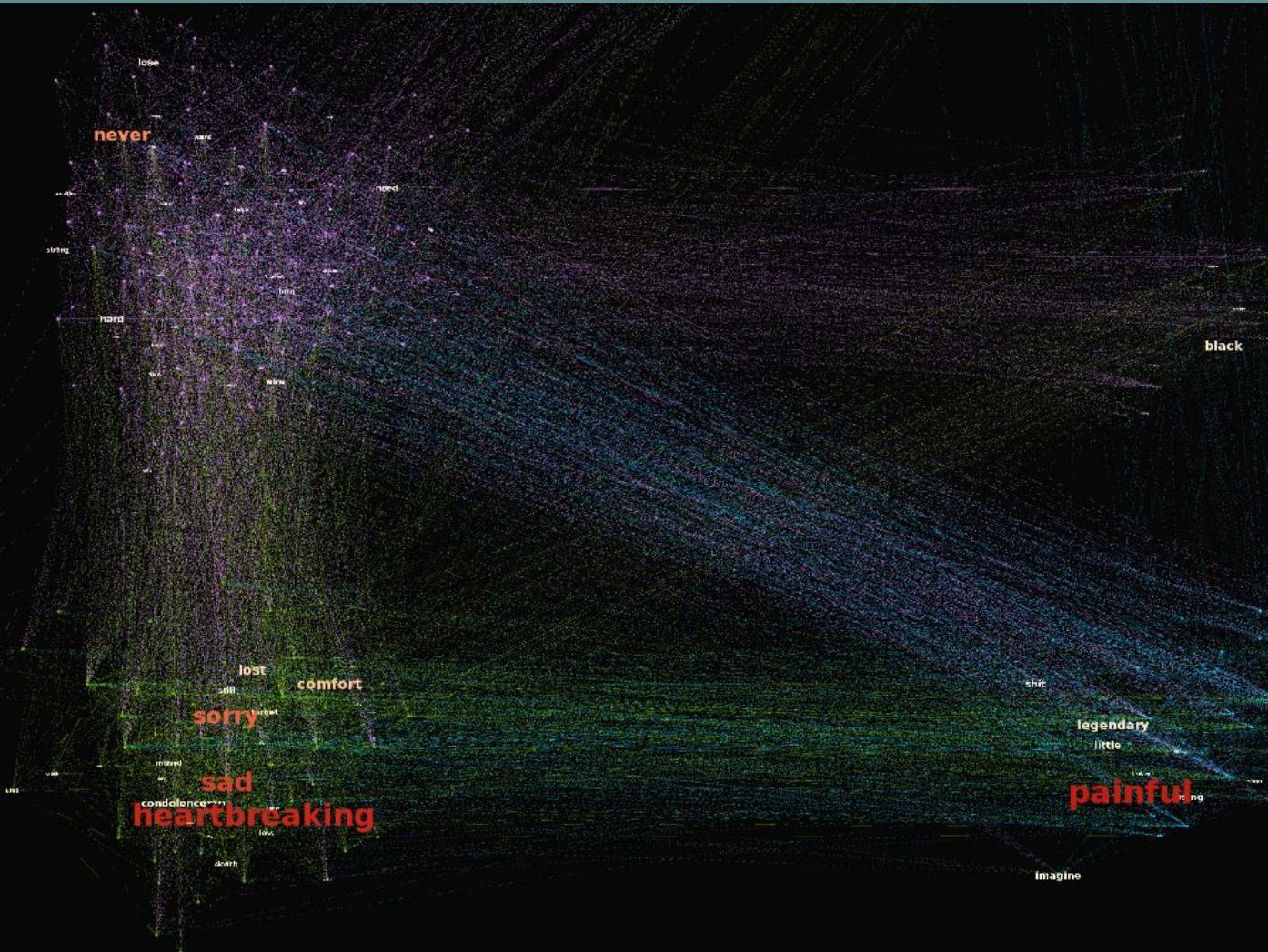
Size Distribution

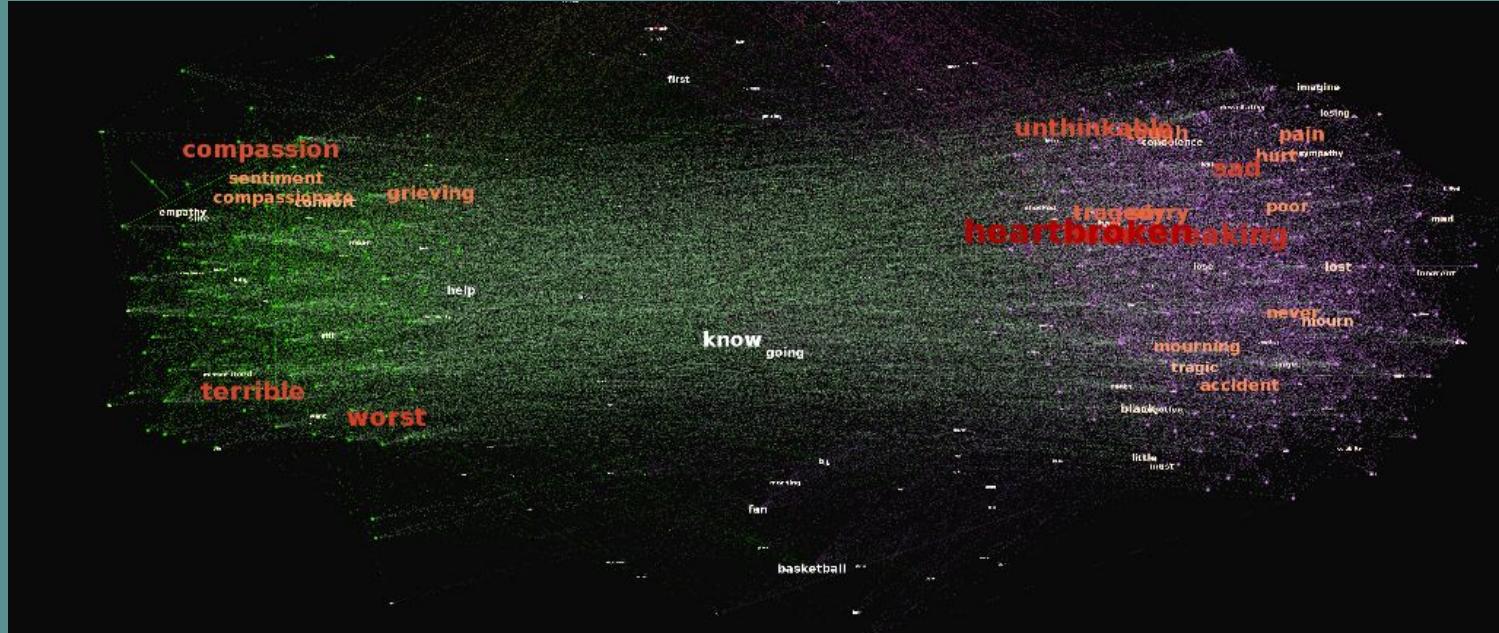








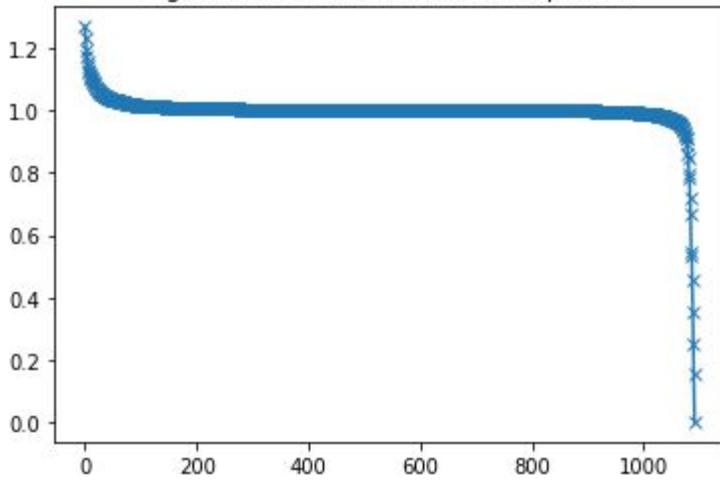




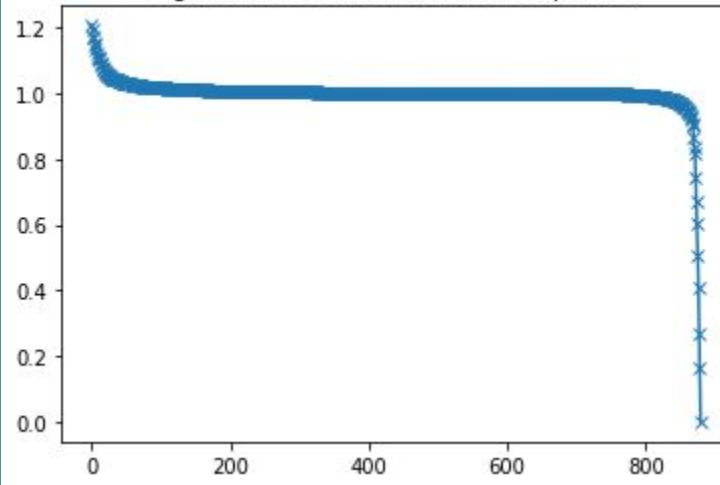
Findings:

- We manage to implement (by ourselves) different network analysis based on the sentiment score.
- We found consistent results across the different analysis performed.
- We have seen different real current events through social networks data.

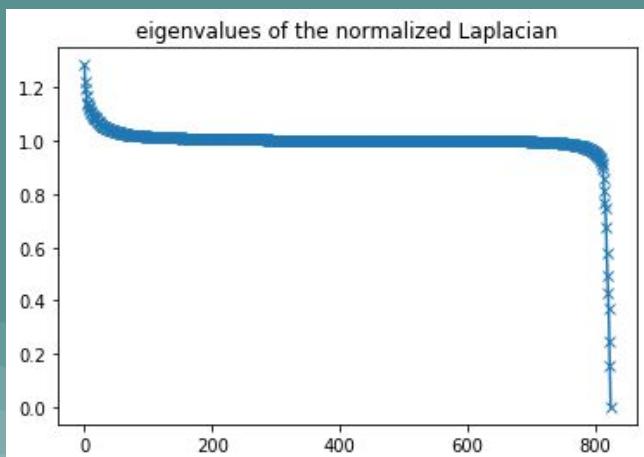
eigenvalues of the normalized Laplacian



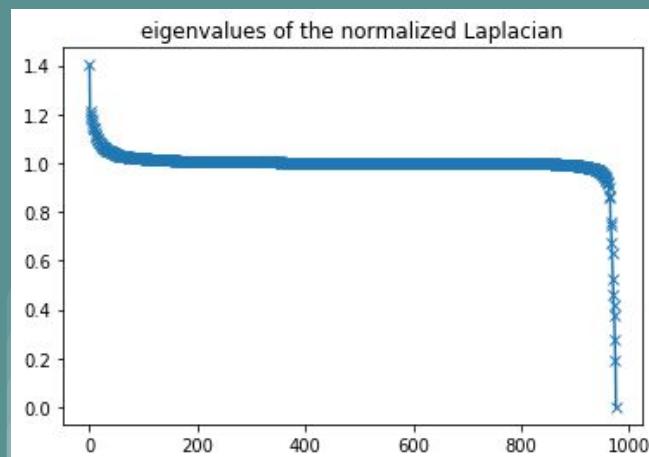
eigenvalues of the normalized Laplacian



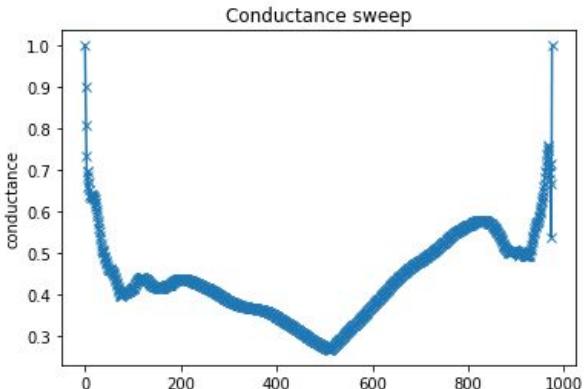
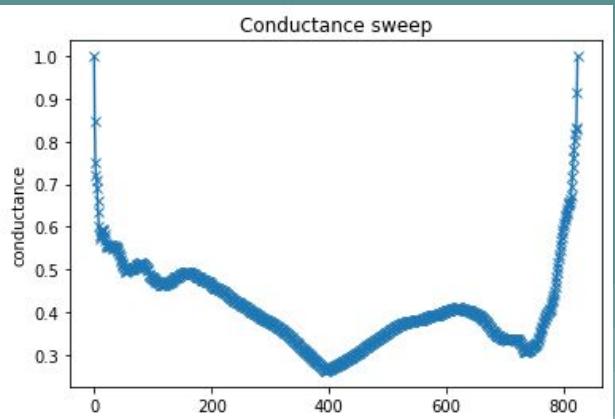
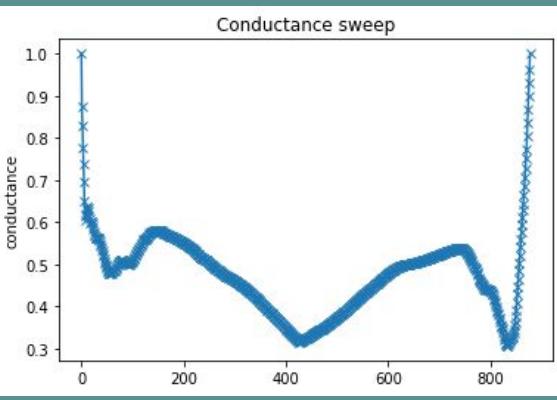
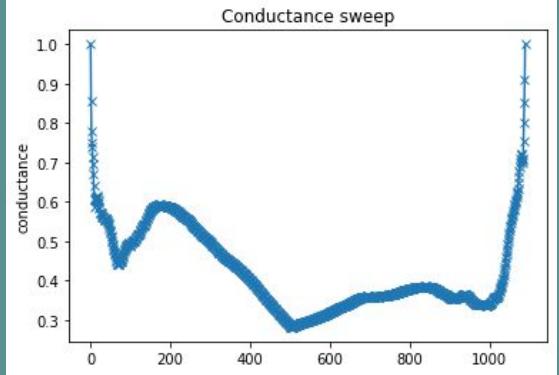
eigenvalues of the normalized Laplacian



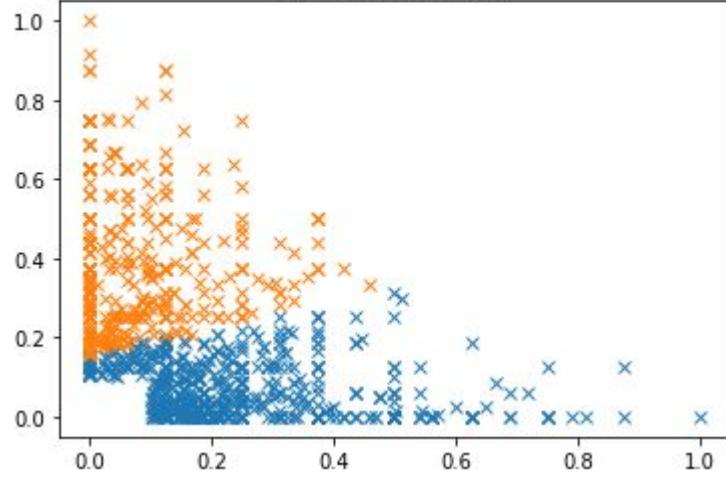
eigenvalues of the normalized Laplacian



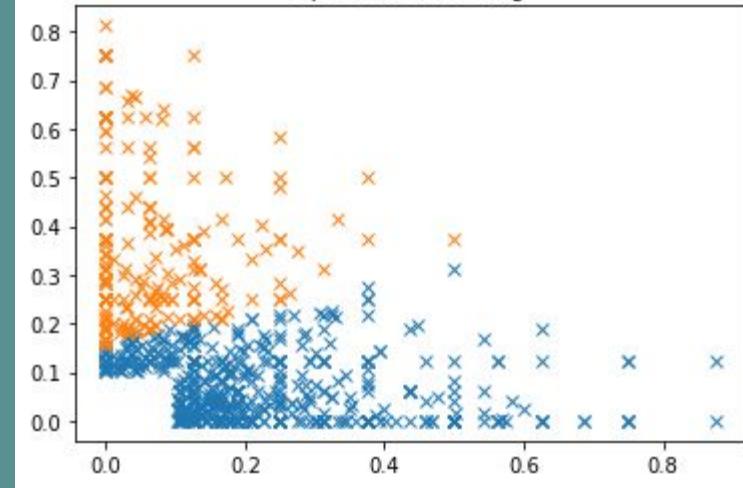
Communities	Obama	Trump	Pence	Il pop	Musk
Minimum Conductance	0.1	0.15	0.25	0.2	0.3
Community 1	400	550	610	450	820
Community 2	400	450	500	600	100



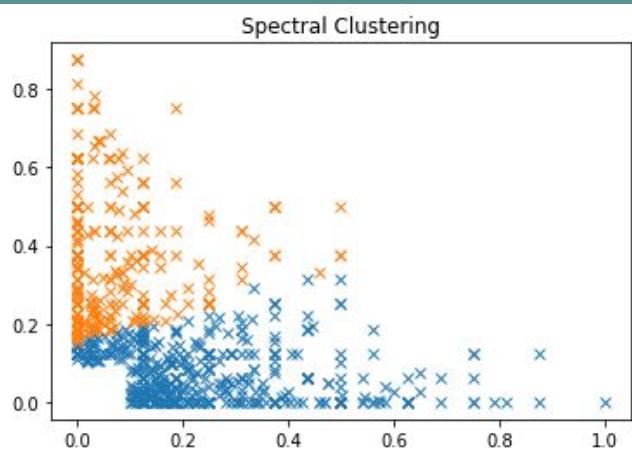
Spectral Clustering



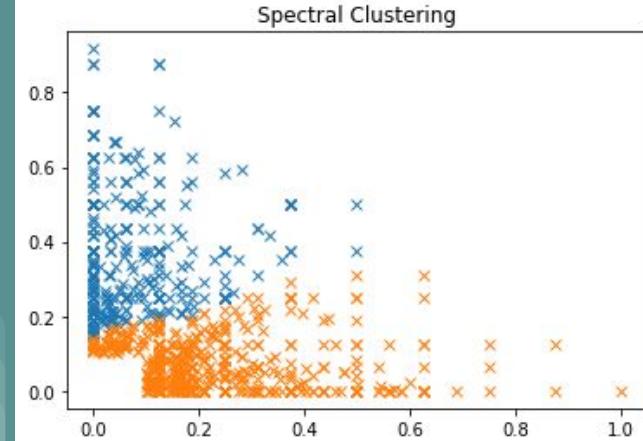
Spectral Clustering



Spectral Clustering



Spectral Clustering



For further researches:

- Retrieve bigger (and more specific) database.
- Focus just on comments.
- Replicate on other platforms.

Role of each student

- Data collection/management and coding : Alberto
- Sentiment evaluation : \all
- Model proprieties and pagerank analysis : Carlo
- Robustness Analysis: Alberto
- Assortativity analysis : Enrico
- Qualitative analysis and Gephi visualization : Salvatore
- Report and Presentation : \all
- Spectral analysis: Abanoub

Thanks for your attention

