SOCIAL NETWORK ANALYSIS PROJECT

Veronika Ivanova

Network Summary

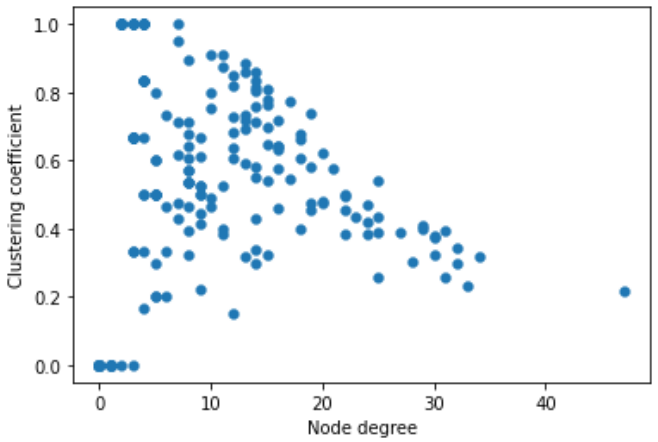
Node attributes

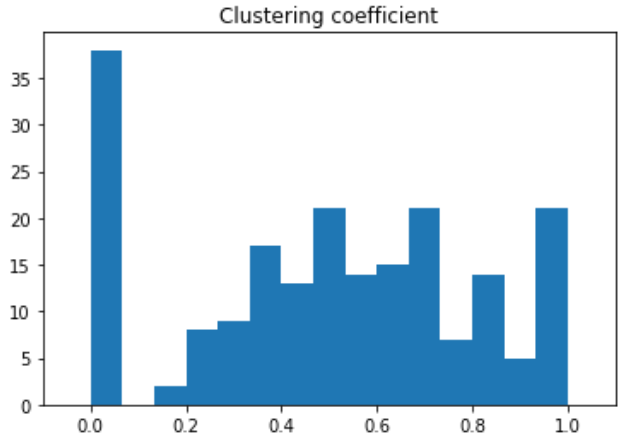
- Label
- Name
- Surname
- Nickname
- Screen Name
- Sex
- Photo
- Relation
- BDate

- Size = 205
- Order = 1028
- Diameter = 6
- Radius = 4

Clustering Coefficient

- Average local coefficient = 0.4936
- Global coefficient = 0.4609

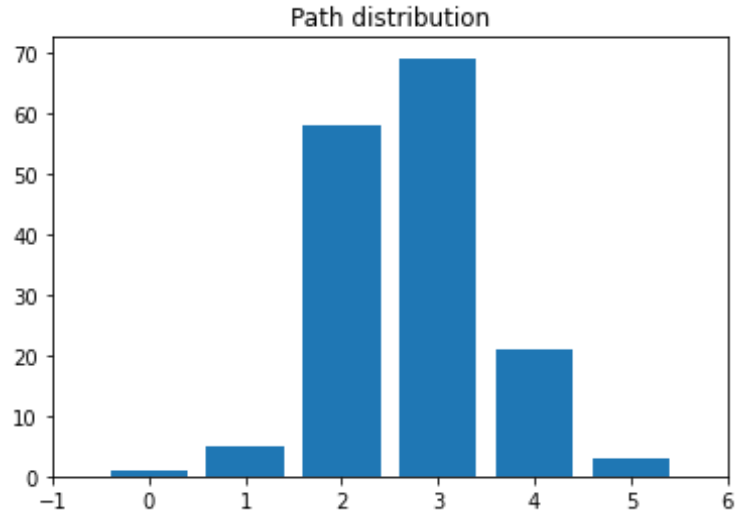




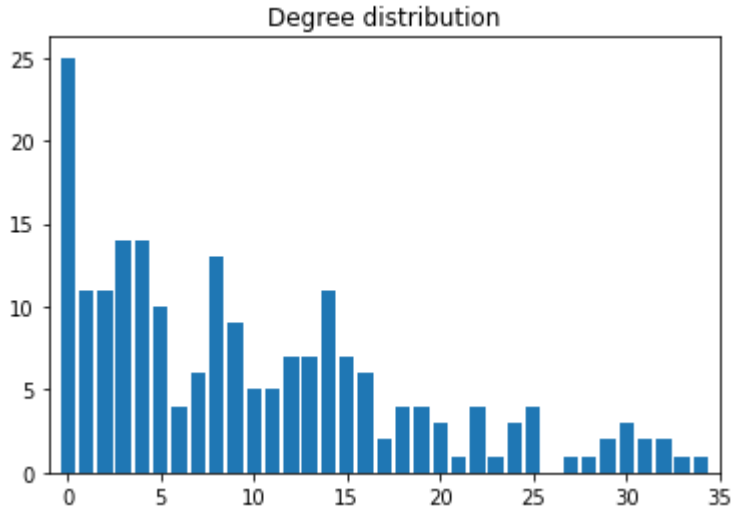
Network Summary

Average path length

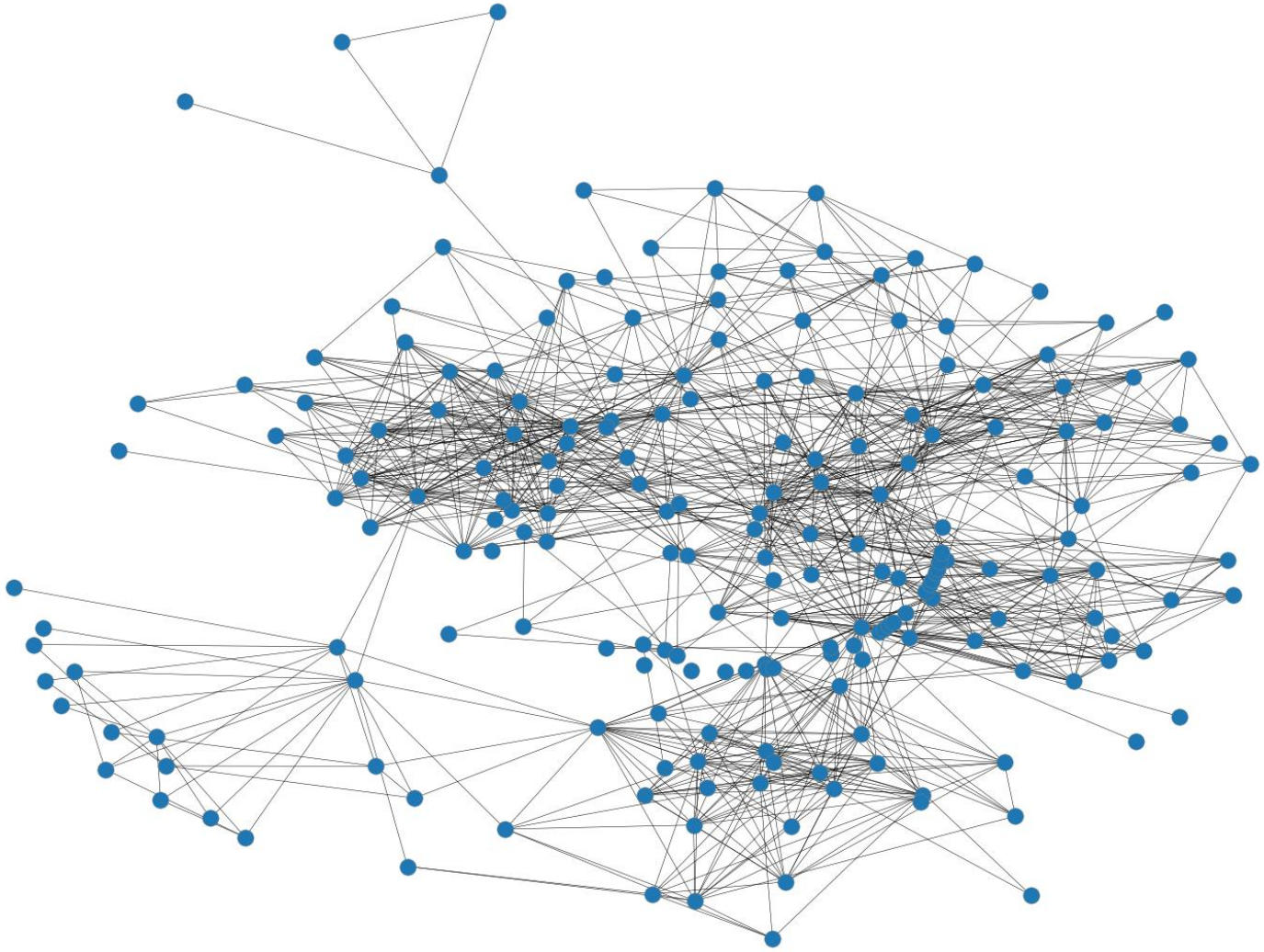
- Average shortest path length = 2.7832



Degree distribution



Network Summary



Structural Analysis

The closest random graph model

1. My network
- diameter = 6
- clustering coefficient = 0.4936
- average_degree = 10

2. Random network
- diameter = 4
- clustering coefficient = 4
- average_degree = 10

3. Preferential attachment
- diameter = 4
- clustering coefficient = 0.1180
- average_degree = 10

4. Small world
- diameter = 6
- clustering coefficient = 0.4918
- average_degree = 10

5. Configuration model
- diameter = 4
- clustering coefficient = 0.1047
- average_degree = 9

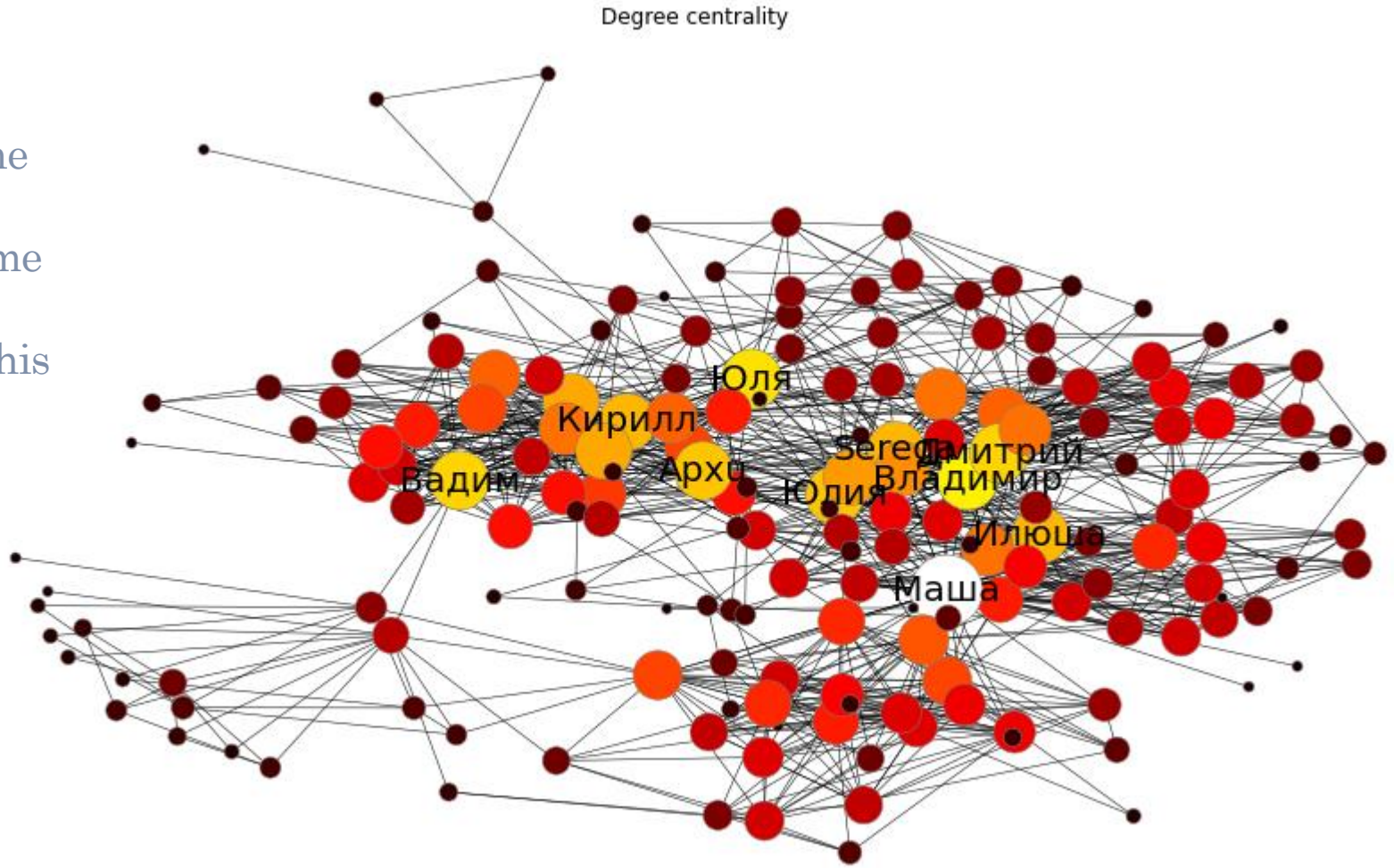
The best model is small Small world

Structural Analysis

Centrality measures: degree centrality

Top 5 nodes:

1. Маша – friend from the first school, also studied together in the second school and the university.
2. Владимир – studied in the same group in the second school, same university. He was a профорг in his group.
3. Юля – same school, same university.
4. Вадим – was a староста in my group in the university.
5. Дмитрий – studied in the same group in the second school, same university. He was Маша's colleague.

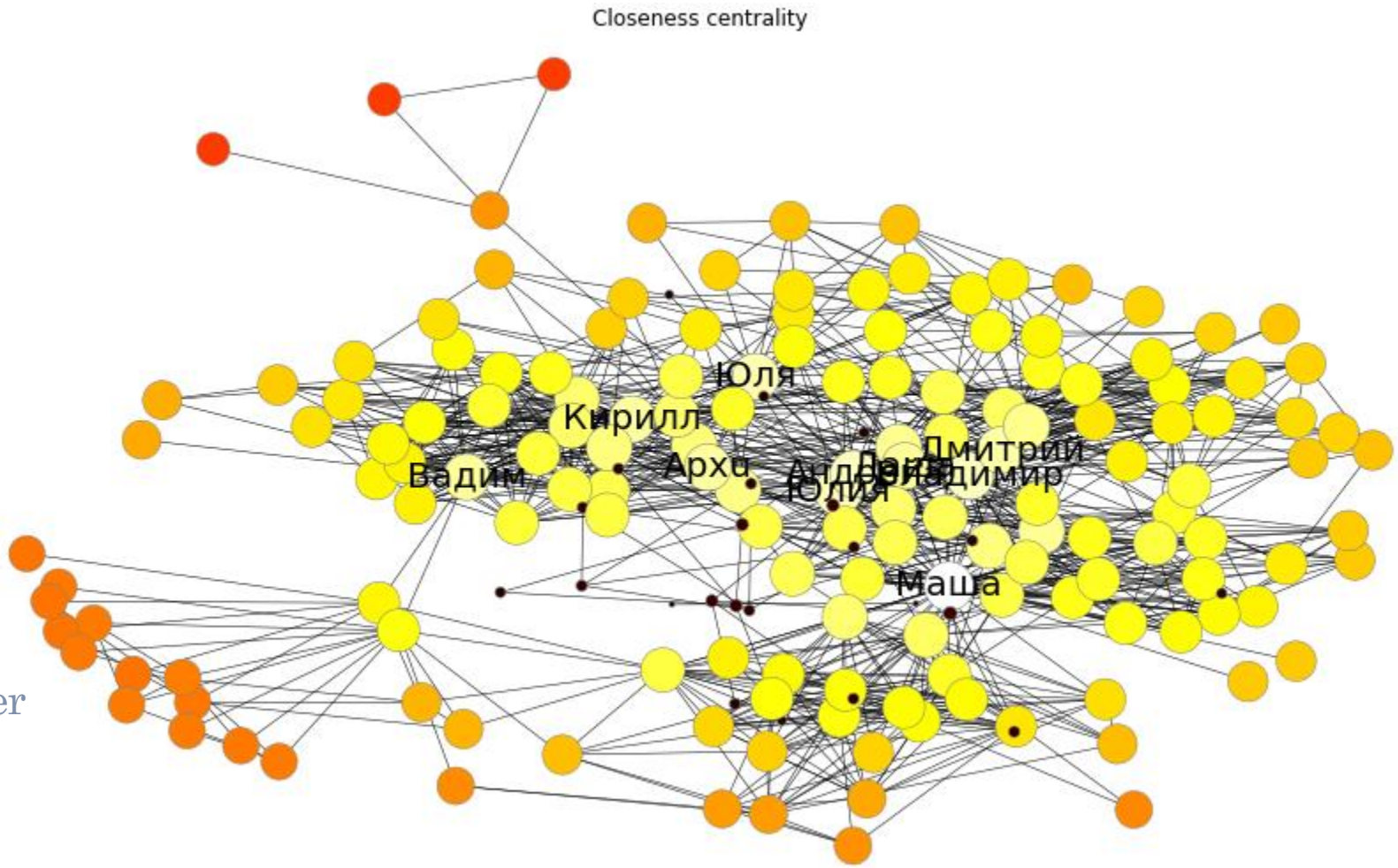


Structural Analysis

Centrality measures: closeness centrality

Top 8 nodes:

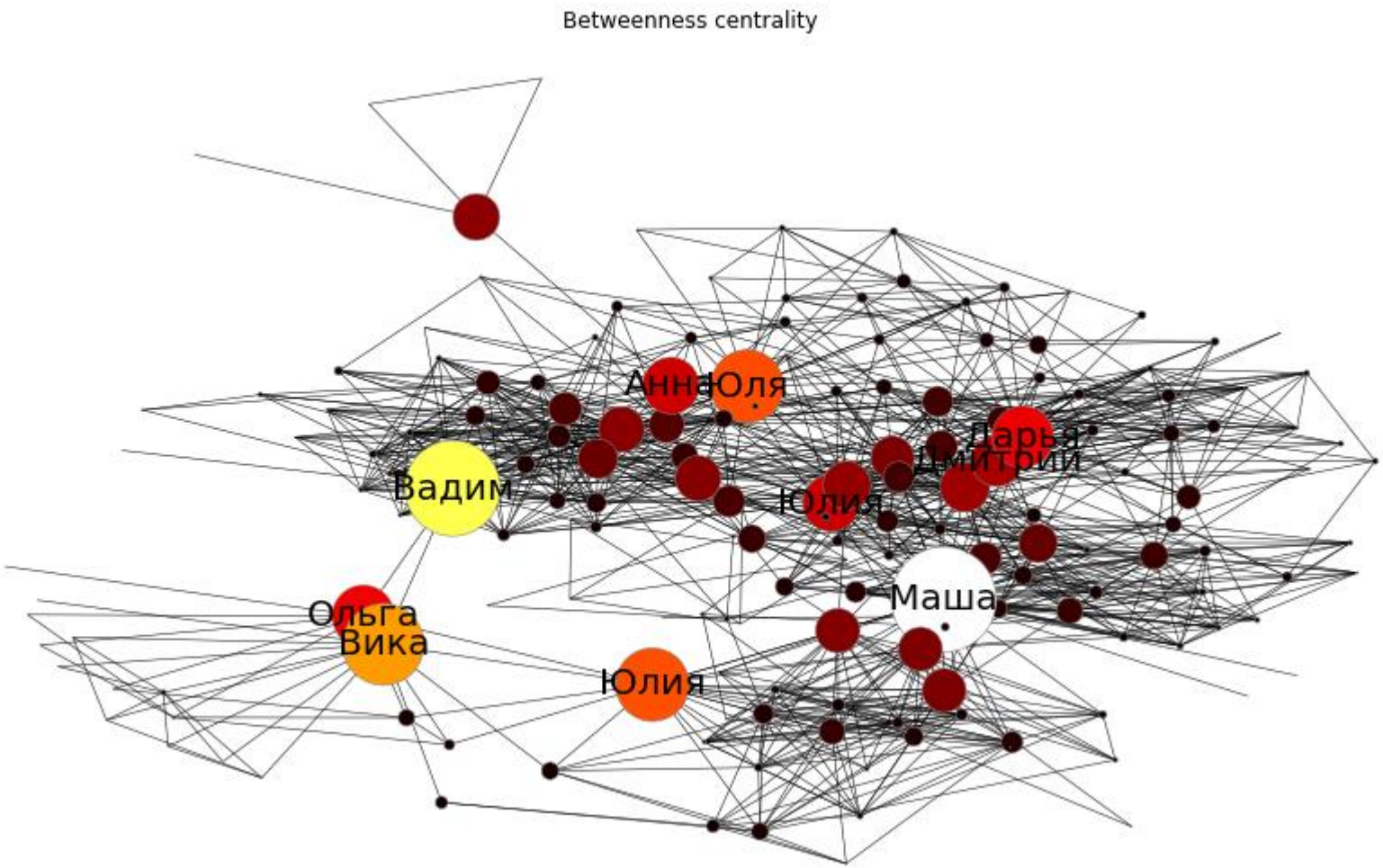
1. Маша
2. Владимир
3. Андрей – same school, same university. Studied in the same group as Маша in school and university.
4. Юлия М – same university.
5. Юля
6. Дмитрий
7. Архи – same school, same group in university.
8. Кирилл – same school, same group in university, studied together with Архи in the school.



Structural Analysis

Centrality measures: betweenness centrality

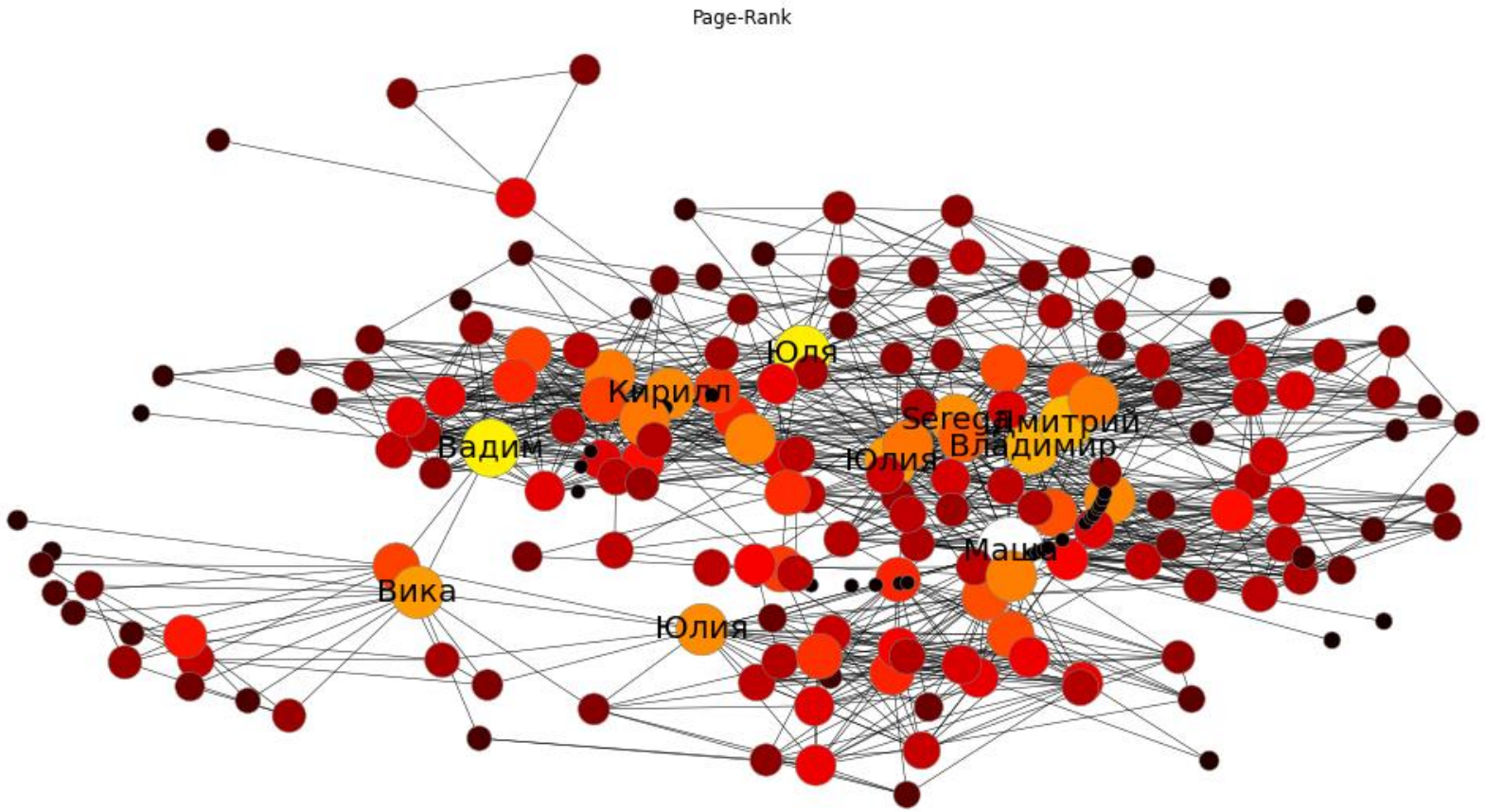
Top 7 nodes:
1. Маша
2. Вадим
3. Вика – my sister.
4. Юлия Г – best friend from the first school but we studied in different universities.
5. Юля
6. Ольга – close friend, studied together with Юлия Г .
7. Дарья – studied in the same group in the second school, same university. In the university she studied together with the guy from my first school.



Structural Analysis

Page rank

Top 10 nodes:
1. Маша
2. Вадим
3. Юля
4. Дмитрий.
5. Владимир
6. Вика
7. Юлия М
8. Serega – same school, same university.
9. Юлия Г
10. Кирилл



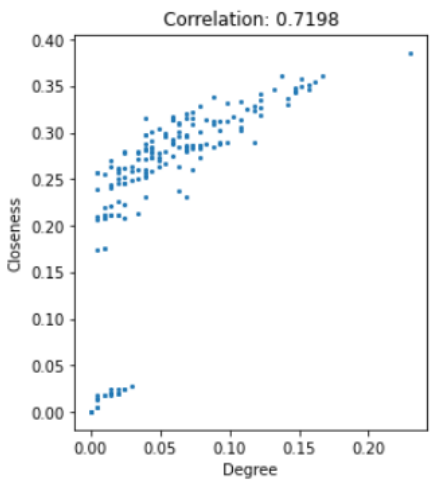
Structural Analysis

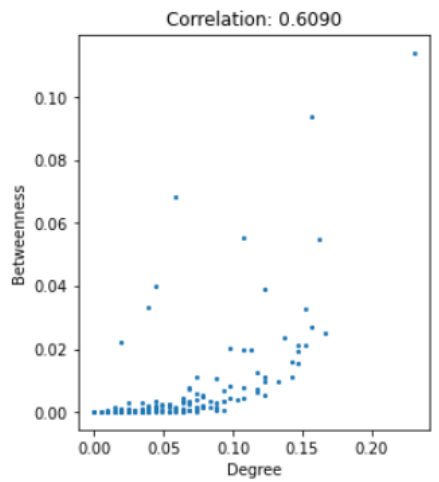
Correlation comparison

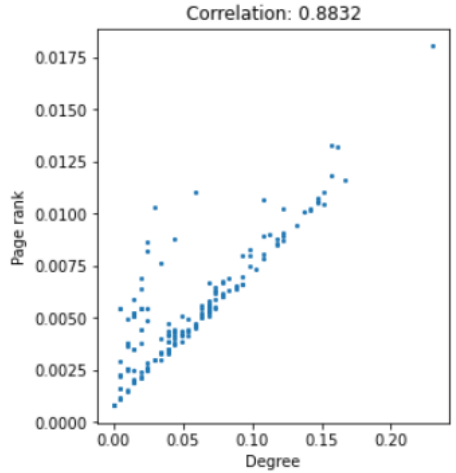
	degree	closeness	betweenness	page rank
degree	1.000000	0.719803	0.608984	0.883192
closeness	0.719803	1.000000	0.339194	0.523375
betweenness	0.608984	0.339194	1.000000	0.686964
page rank	0.883192	0.523375	0.686964	1.000000

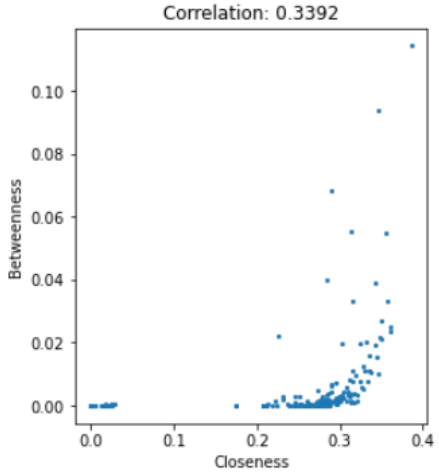
Strong correlation between page rank and degree centrality.

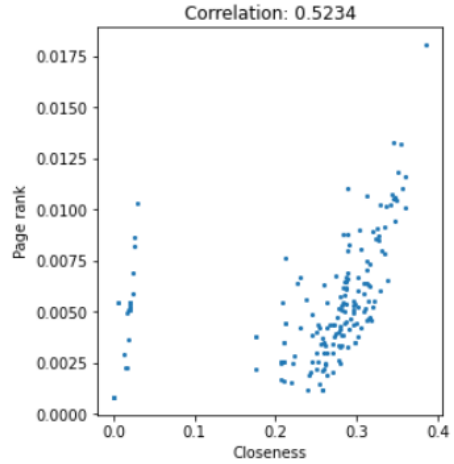
Top nodes:
1. Маша
2. Владимир
3. Вадим
4. Юля
5. Дмитрий.
6. Юлия М

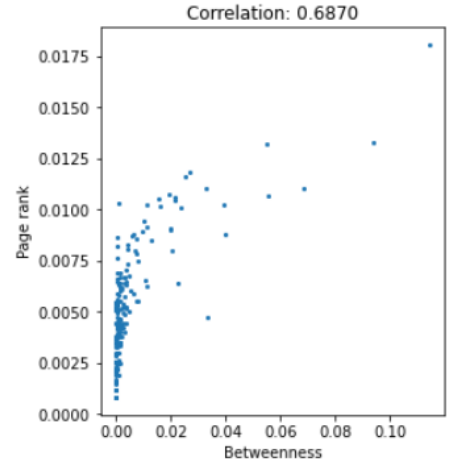








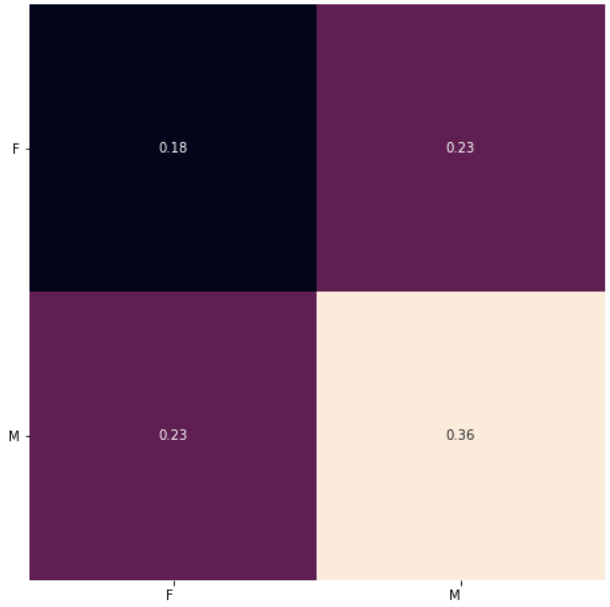




Structural Analysis

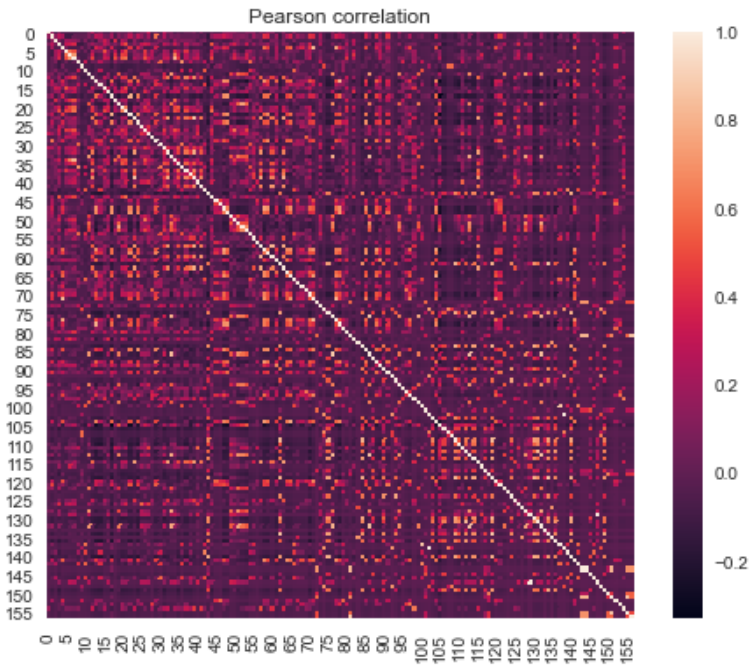
Assortative Mixing

Sex:
F – female
M – male

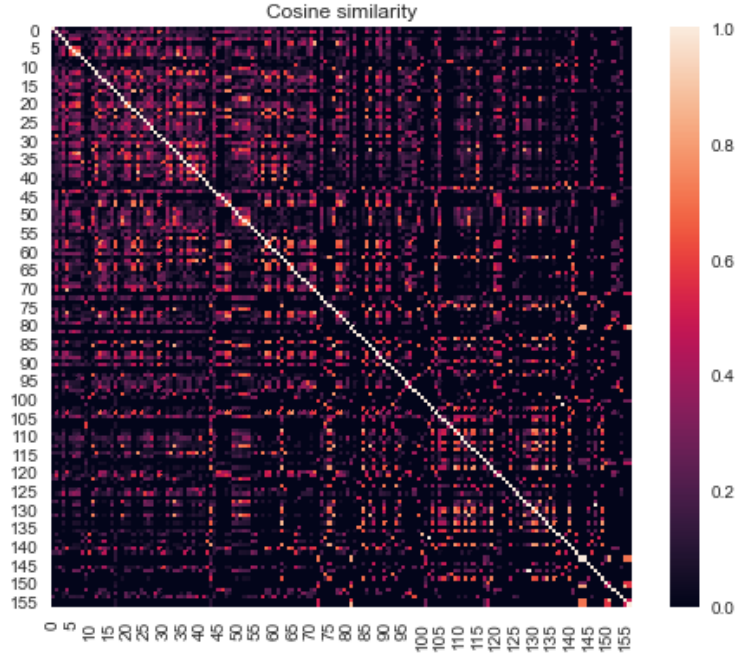


Node structural equivalence

Pearson correlation



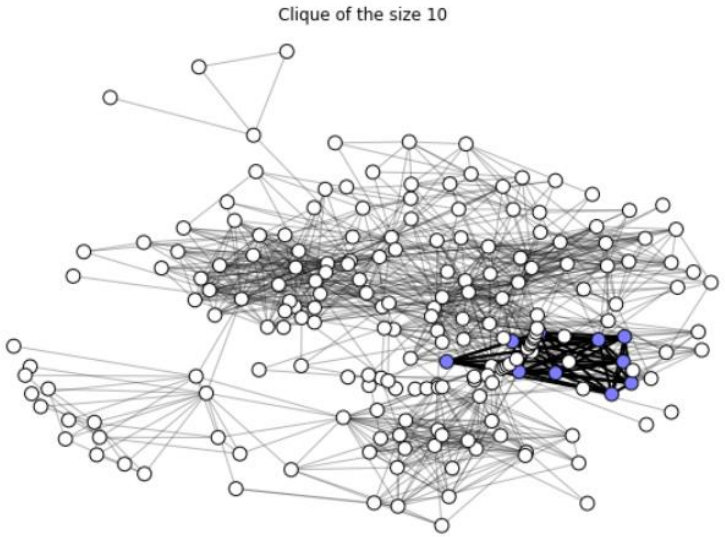
Cosine correlation

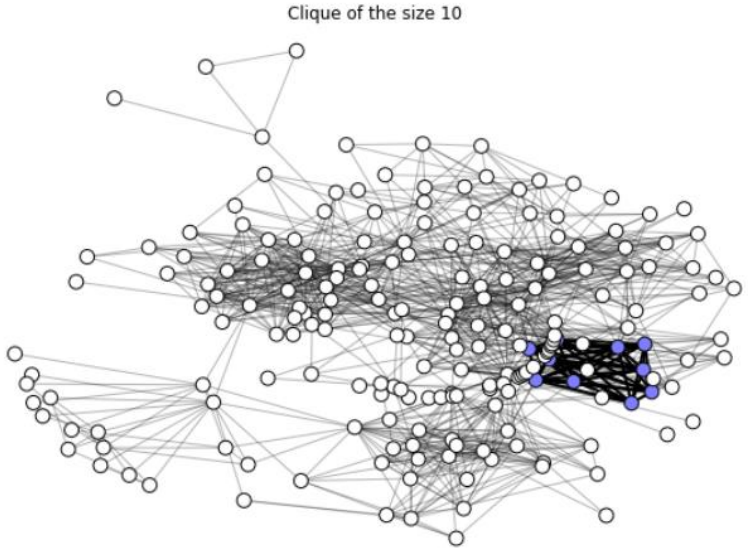


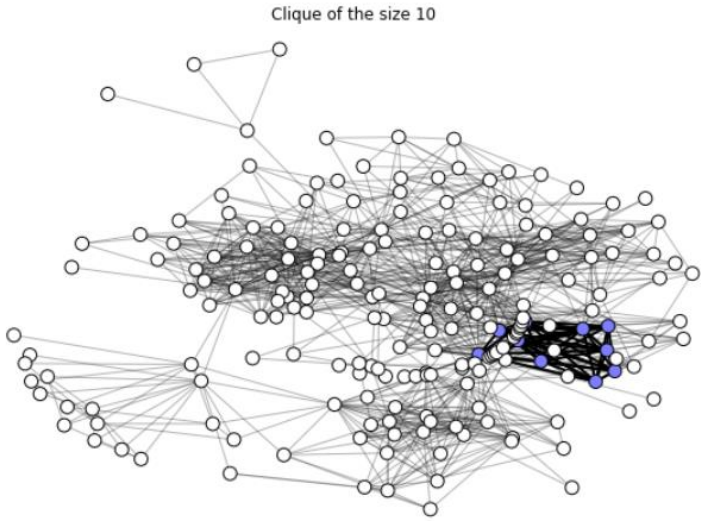
No strong correlation

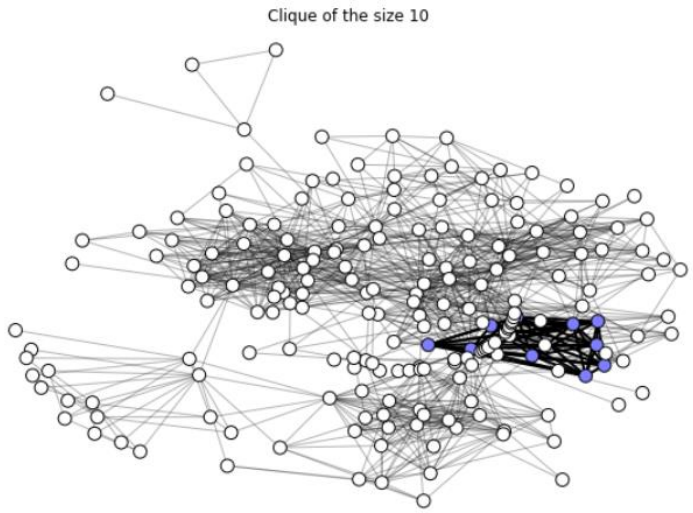
Community Detection

Clique search



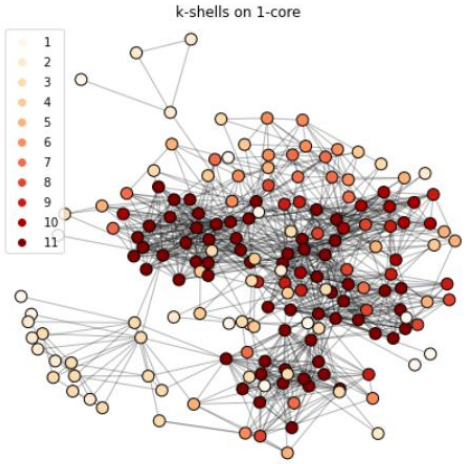


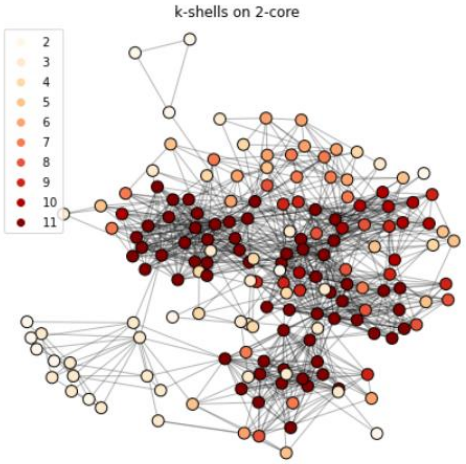


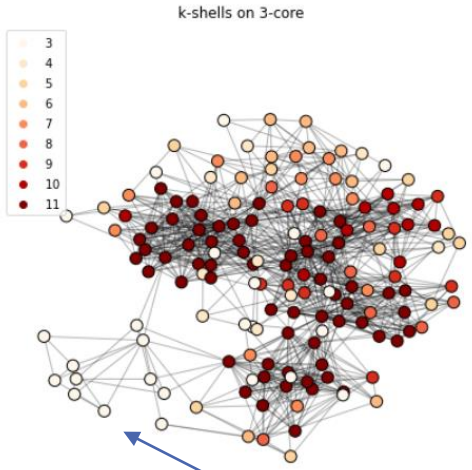


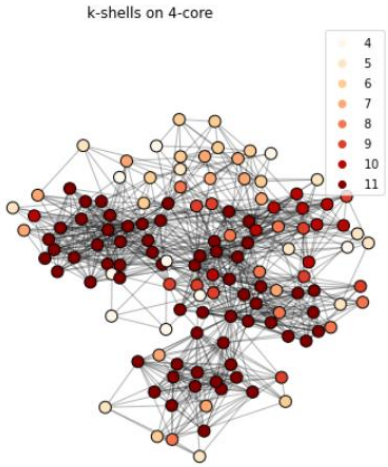
Community Detection

k-cores visualization

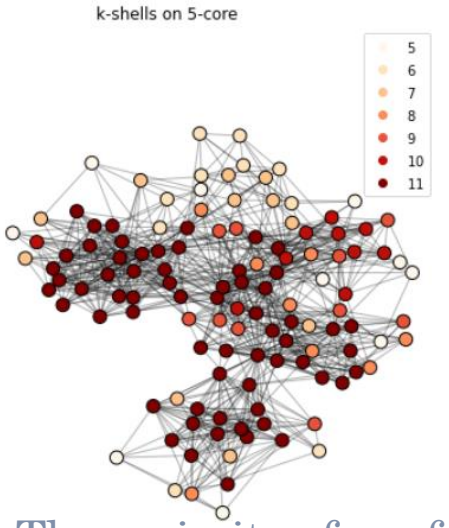


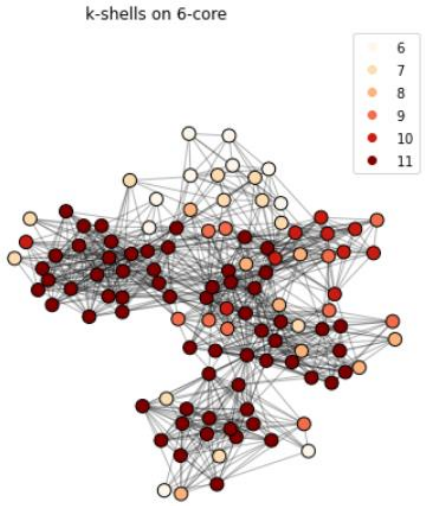


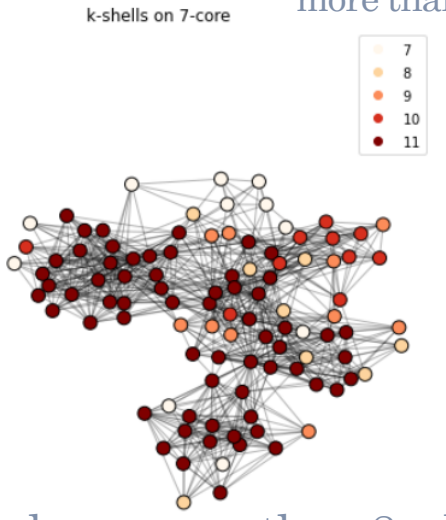


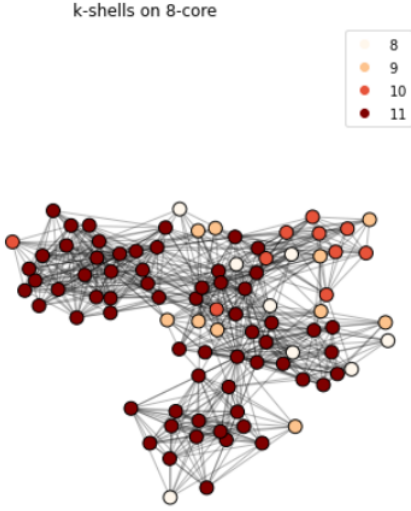


Family members have no more than 3 edges







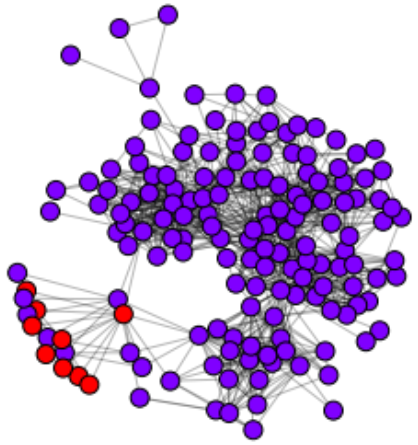


The majority of my friends know each other as most nodes have more than 8 edges

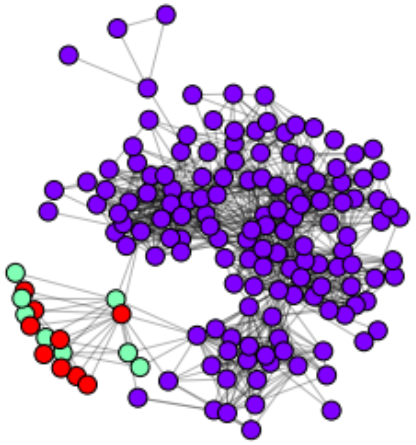
Community Detection

Community detection algorithms: Girvan Newman

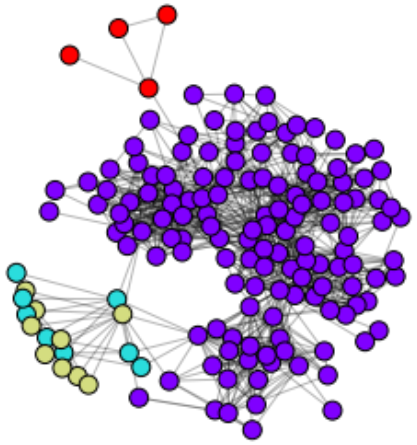
Edge betweenness, 2 communities

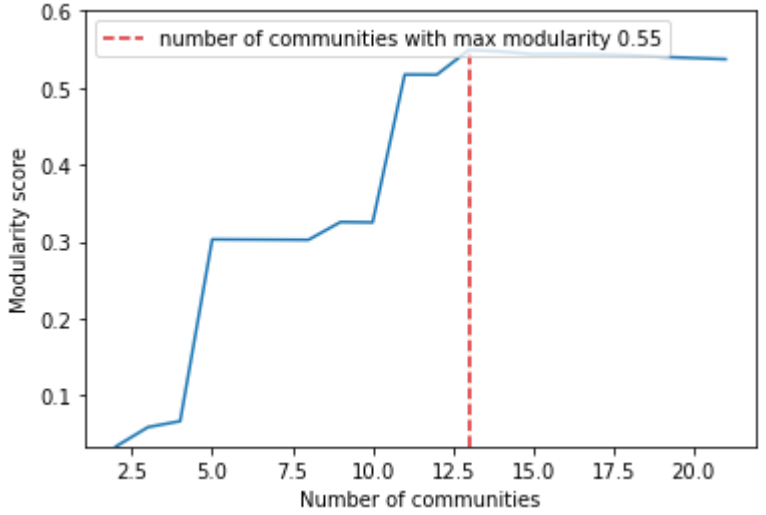


Edge betweenness, 3 communities

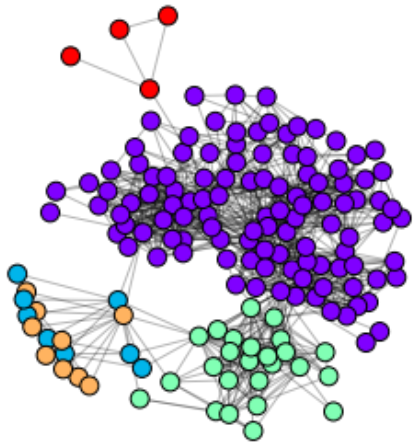


Edge betweenness, 4 communities

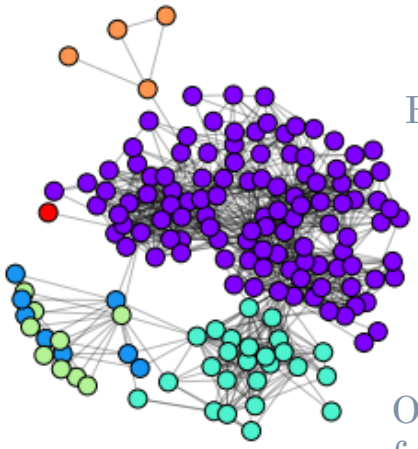




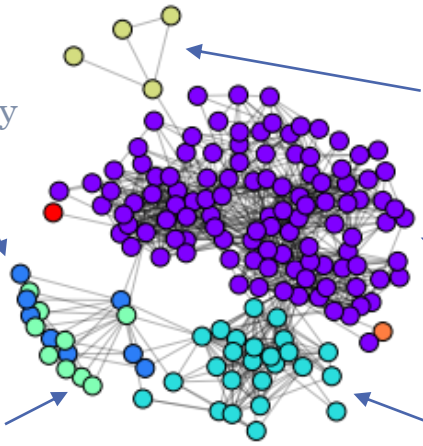
Edge betweenness, 5 communities



Edge betweenness, 6 communities



Edge betweenness, 7 communities



Family

Other friends

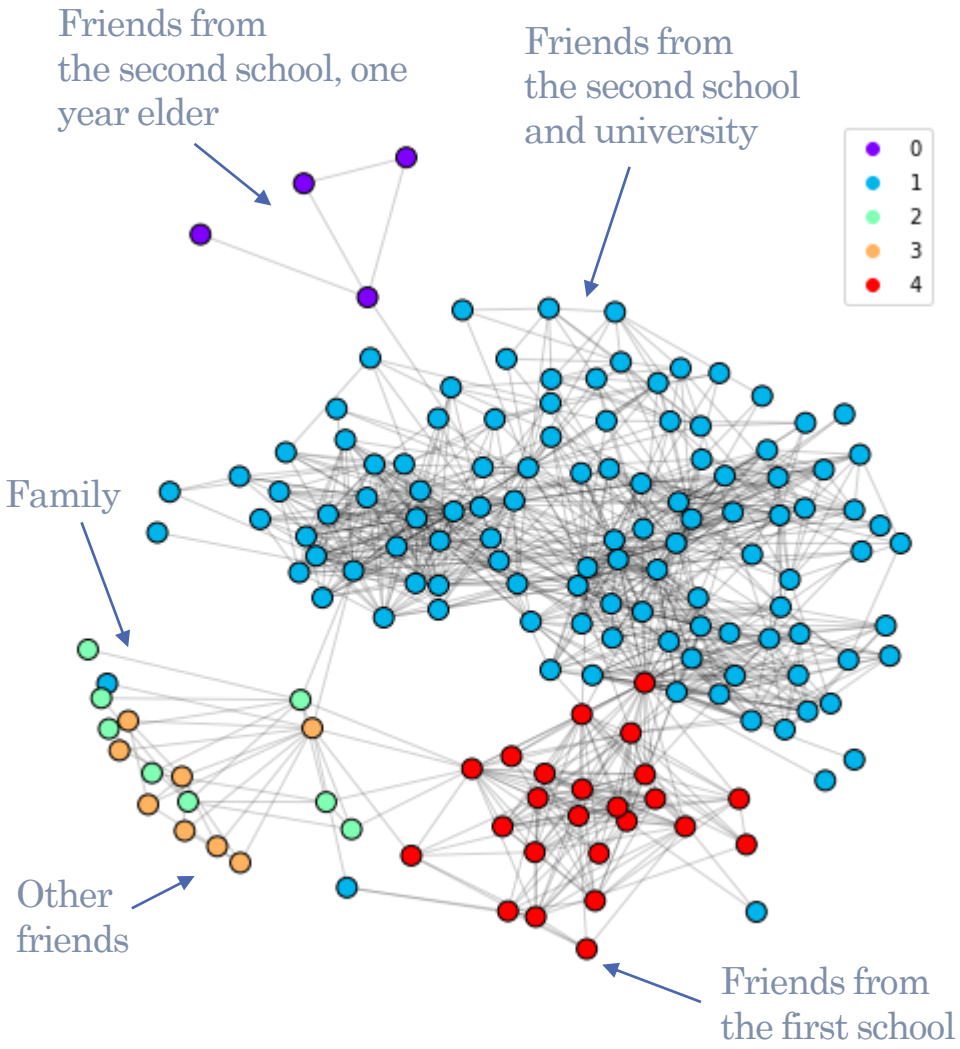
Friends from the second school, one year elder

Friends from the second school and university

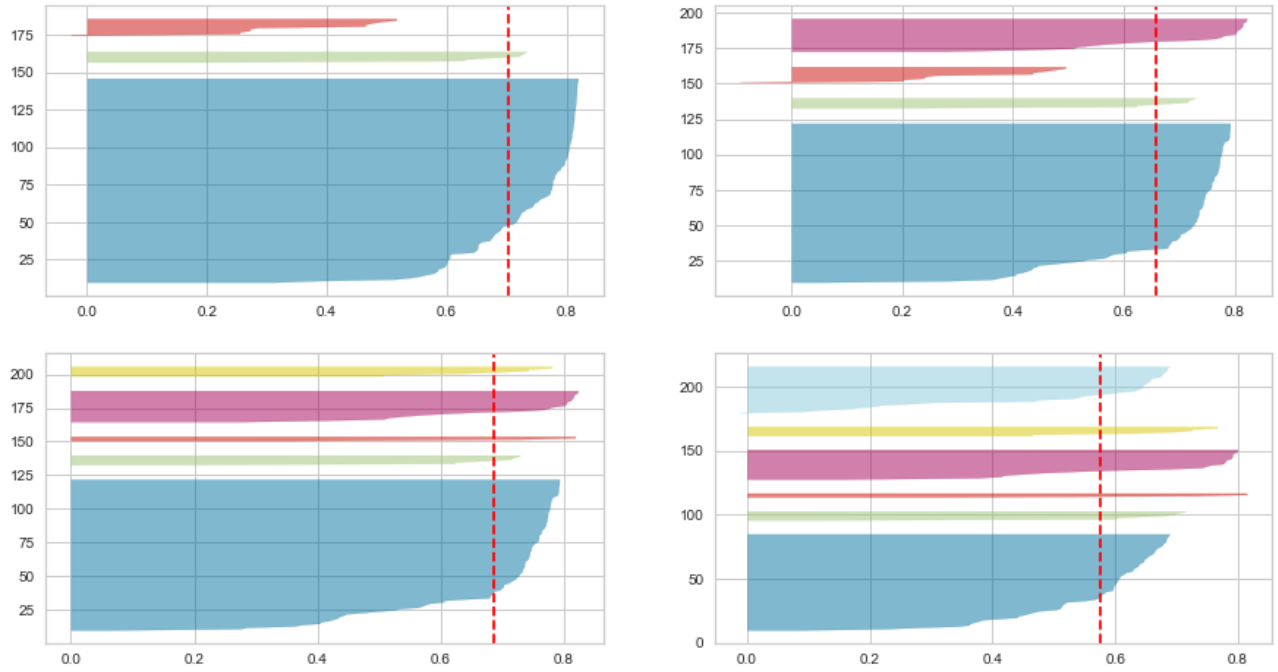
Friends from the first school

Community Detection

Community detection algorithms: Laplacian Eigenmaps



Silhouette Analysis for 3, 4, 5, 6 Clusters



Community Detection

Community detection algorithms: Agglomerative clustering

ground_truth_score = 0.9733