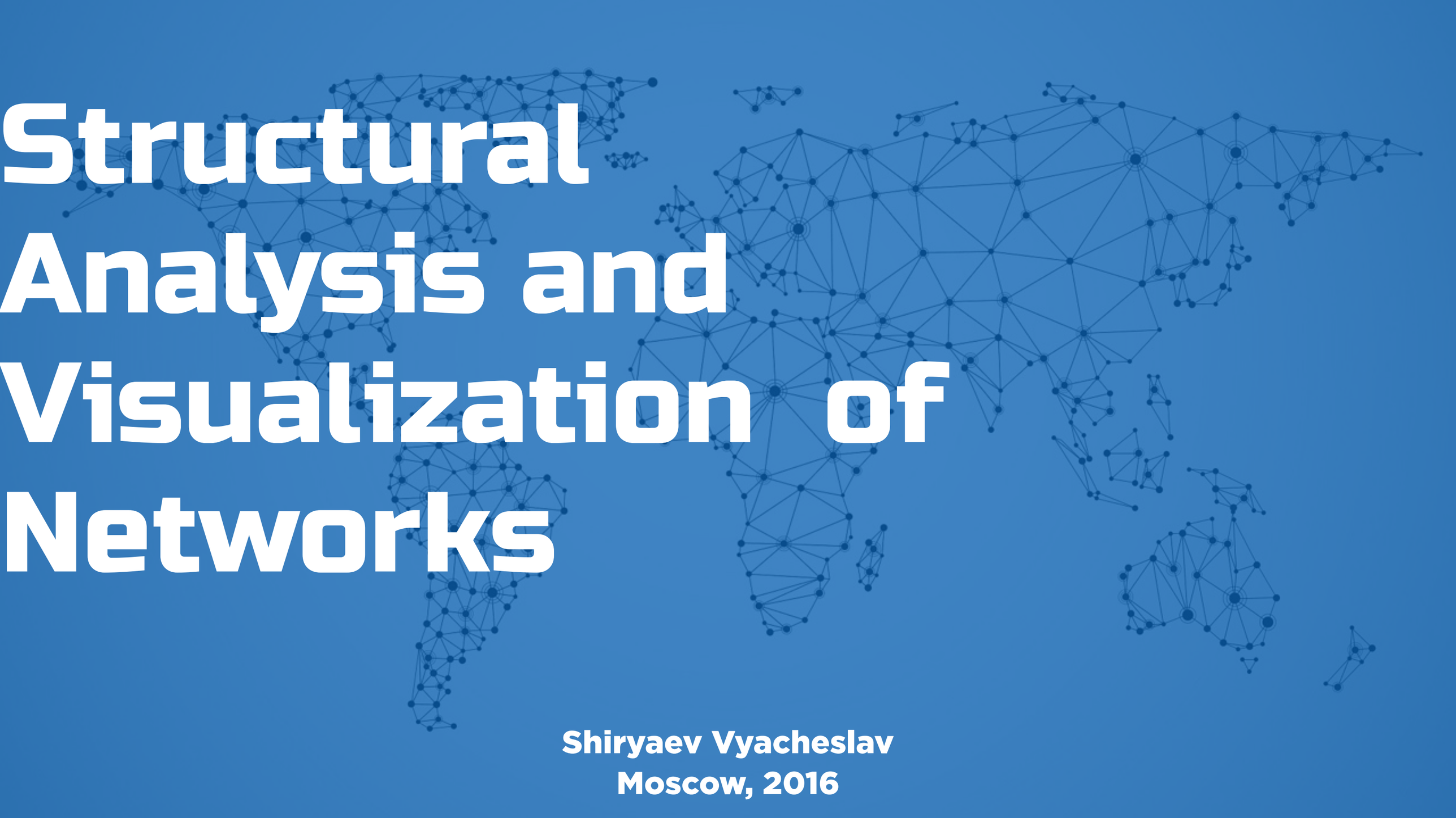

Structural Analysis and Visualization of Networks

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Moscow, 2016

Agenda

1 Network Summary

2 Structural Analysis

3 Communities Detection

Network summary

Network review

Network source: personal friends VK network

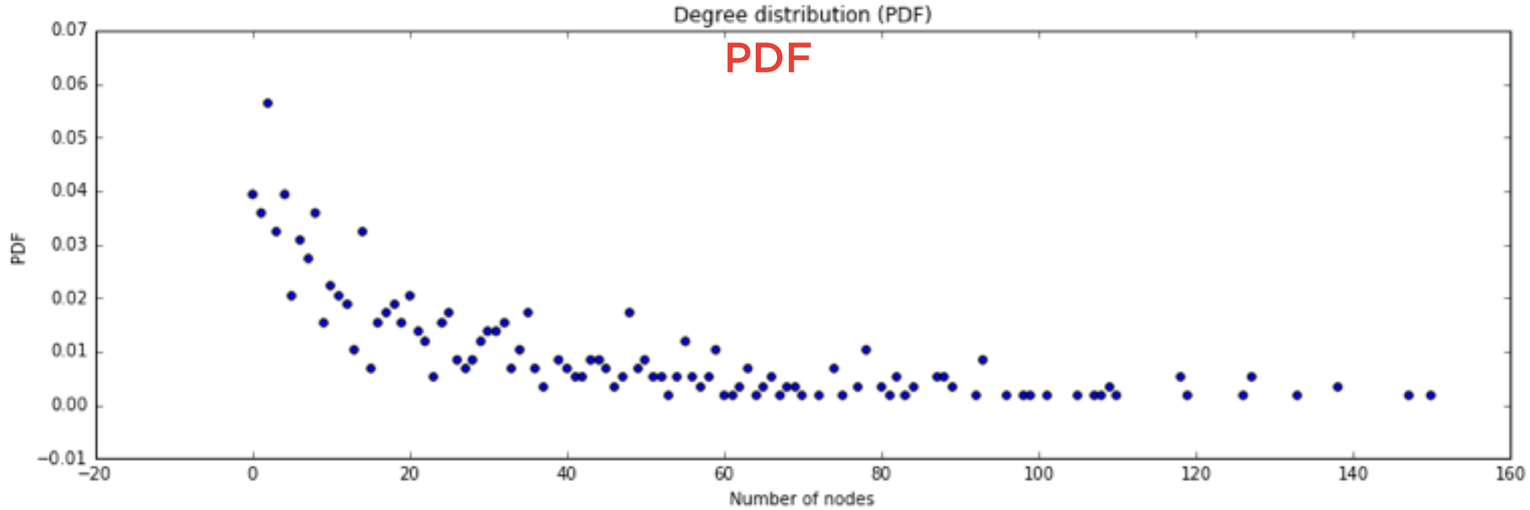
Network order - 583
Edges - 8 390

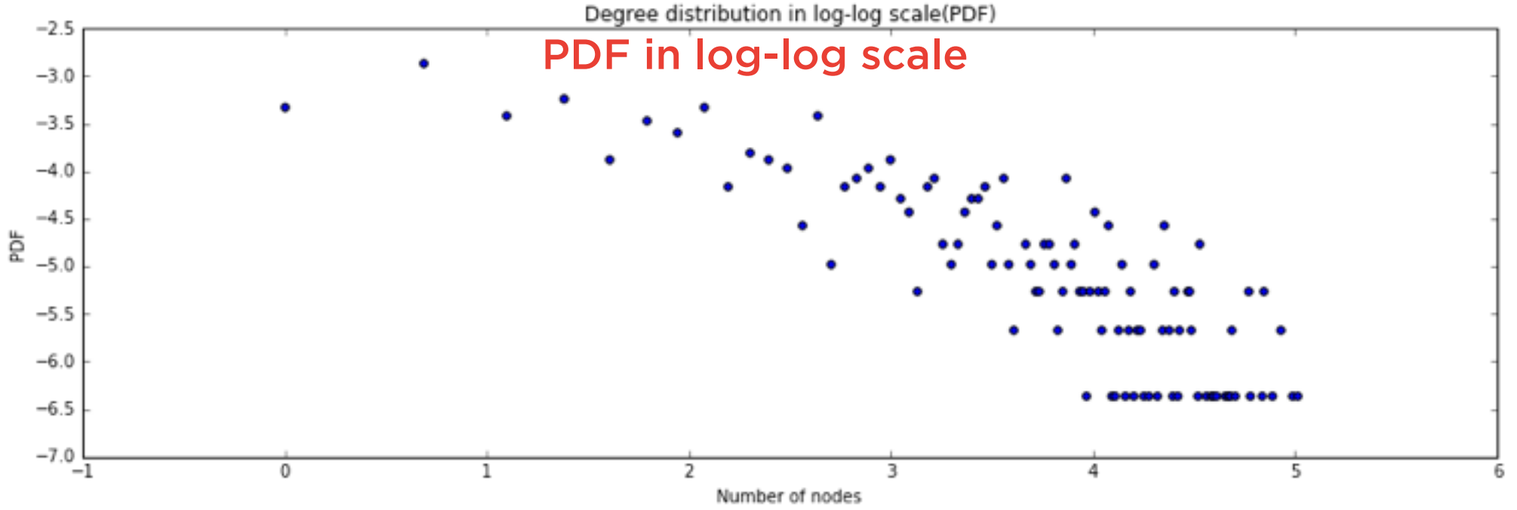
Clustering coefficient - 0.45
Diameter of GCC - 8
Average shortest path length - 3.12

Attributes:

- sex
- city
- name: first and second name
- birthday
- university

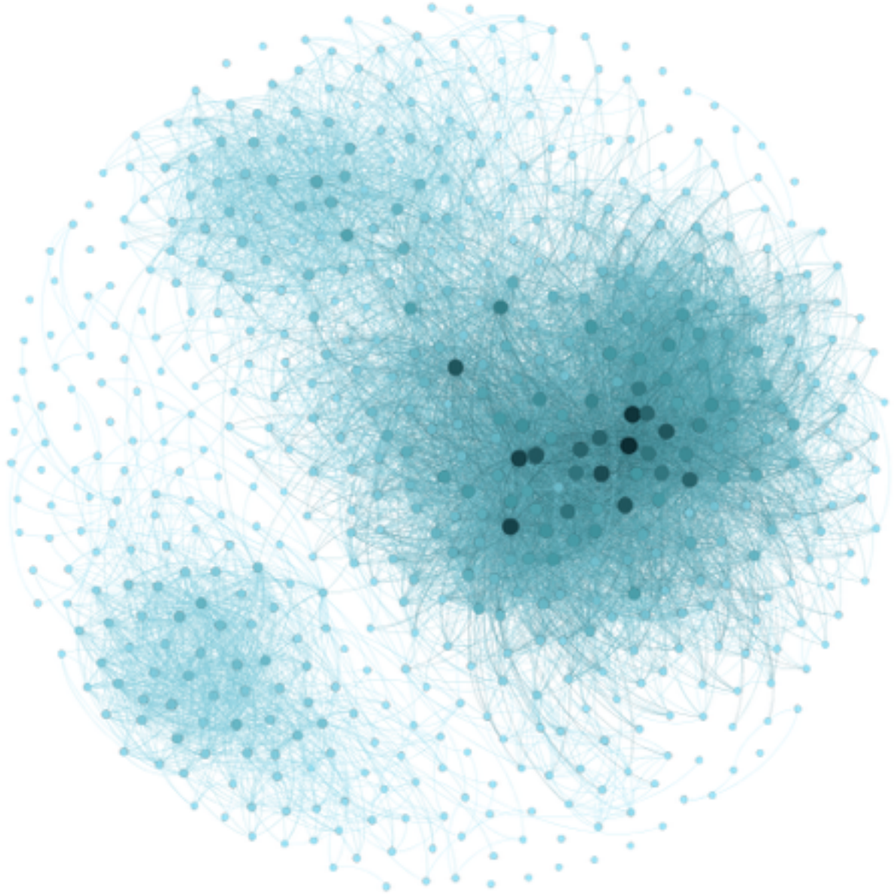
Degree distribution



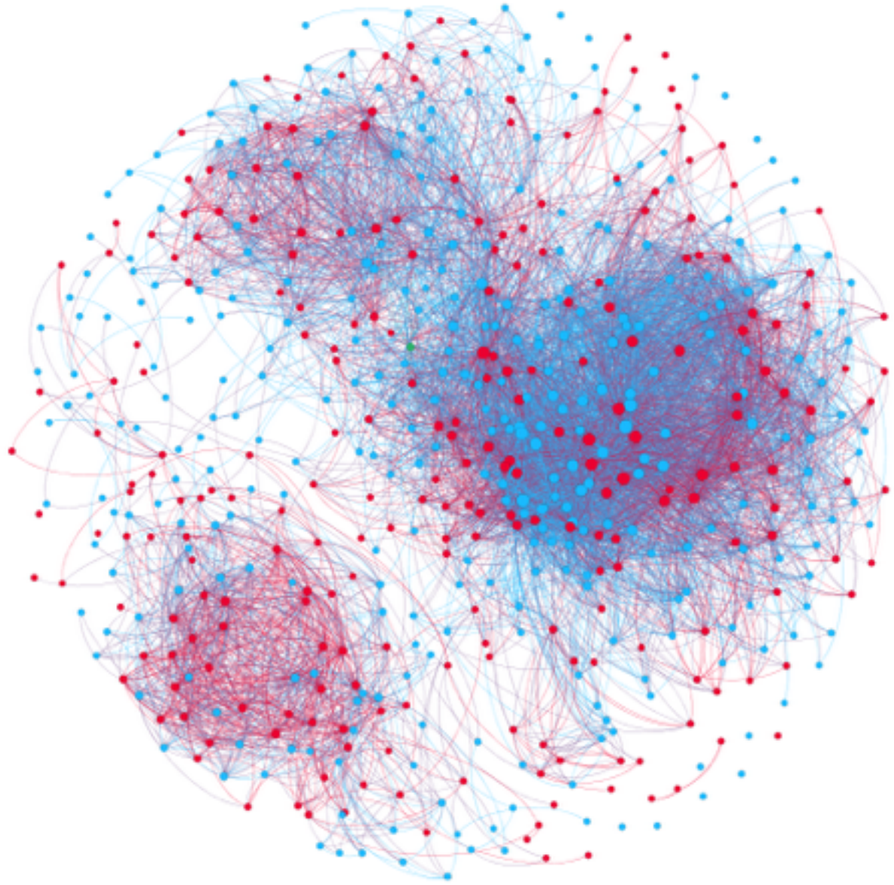


It is looks like the power law. However, it's more like as the Poisson distribution. The main reason, that this network was built by only mutual friends from my vk network.

Network layouts



Node size and node colour by node degree



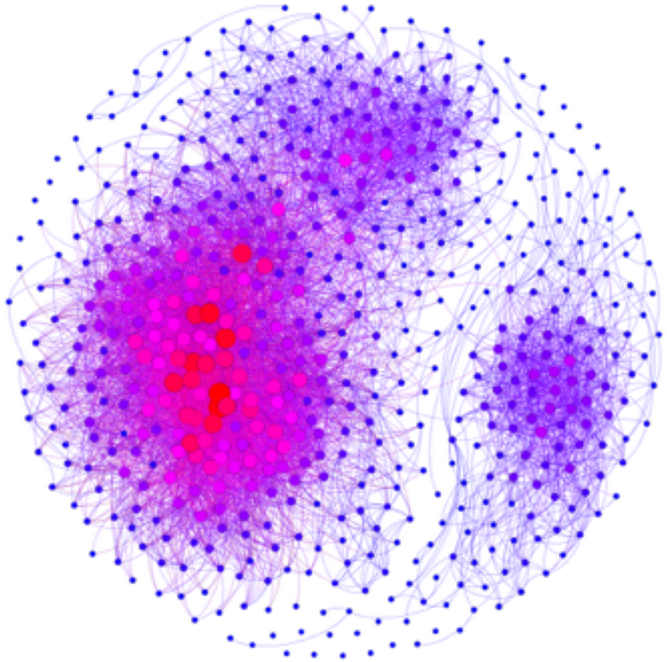
Node size by node degree
Node colour by human gender

female
male

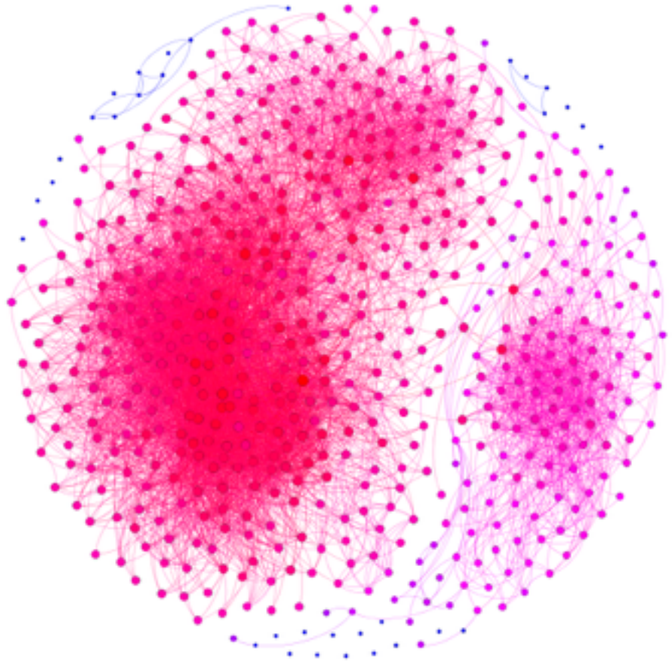
Structural analysis

Centralities

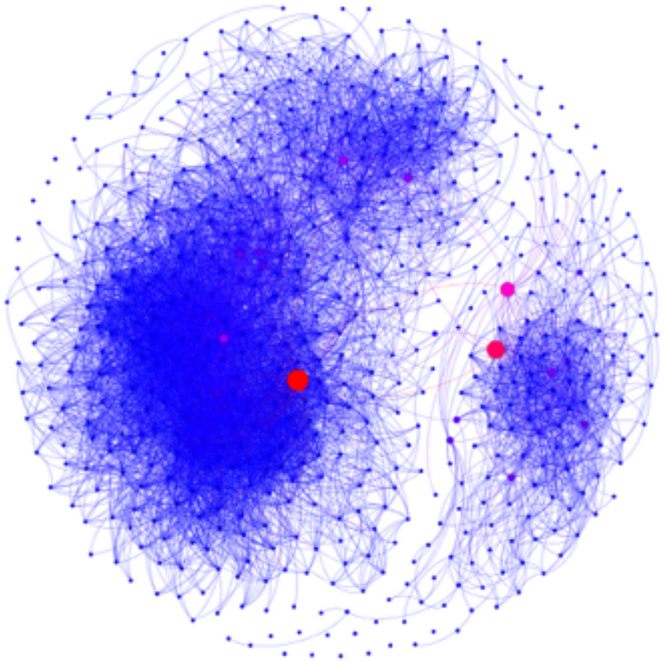
Degree centrality



Closeness centrality

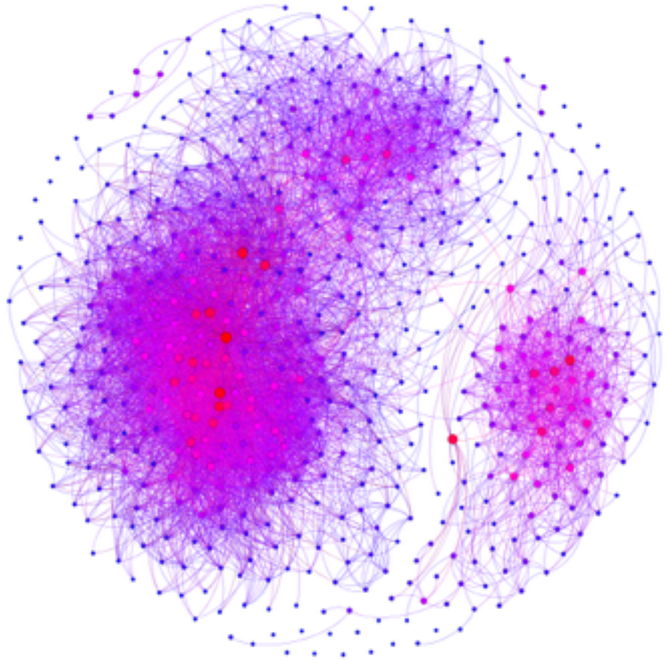


Betweenness centrality

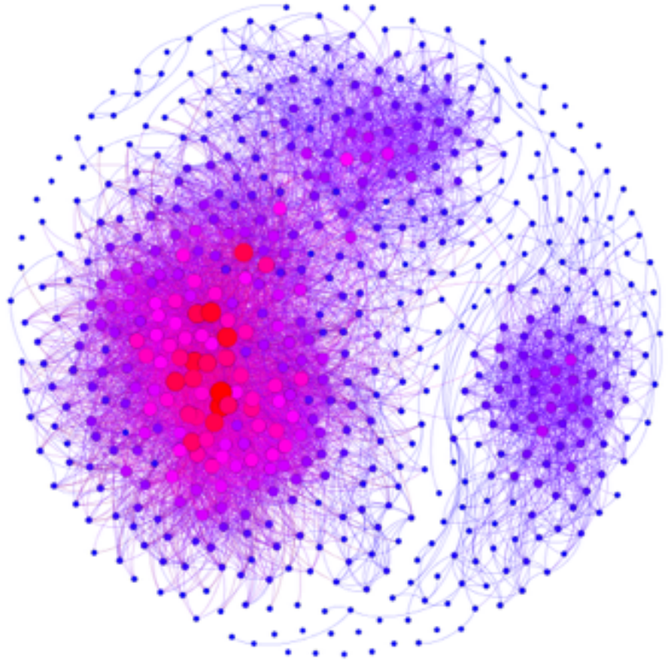


Centralities vs PageRank

PageRank



Degree centrality



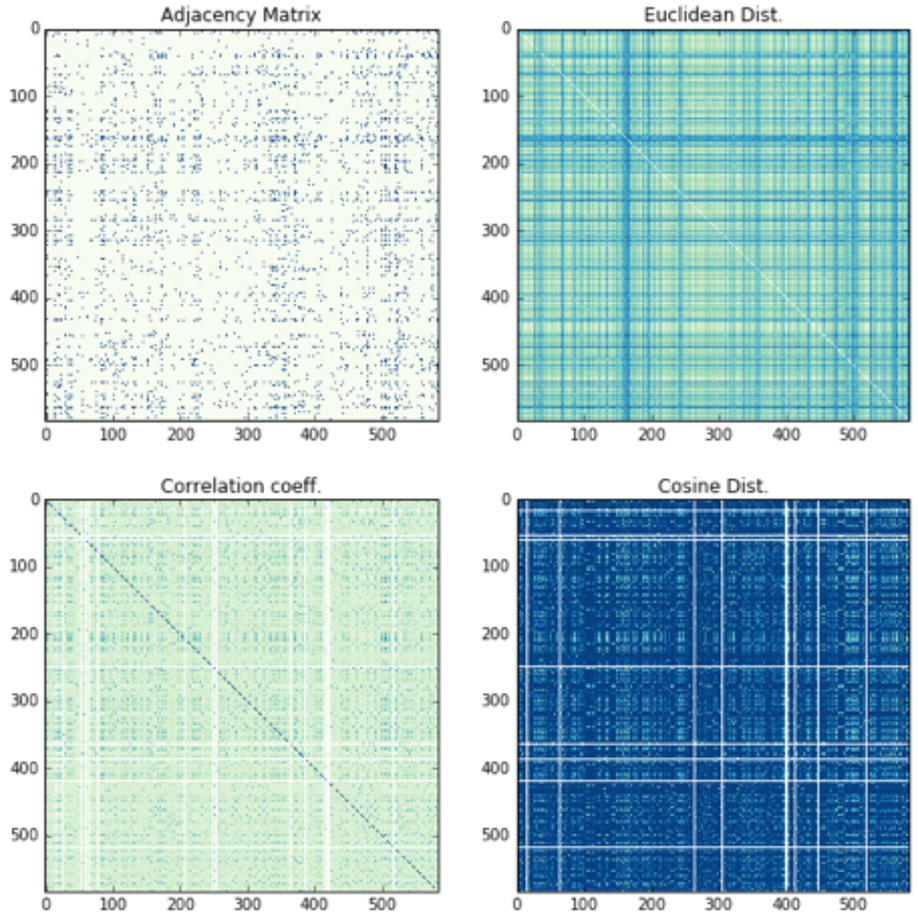
Statistics are quite similar

Assortativity Mixing

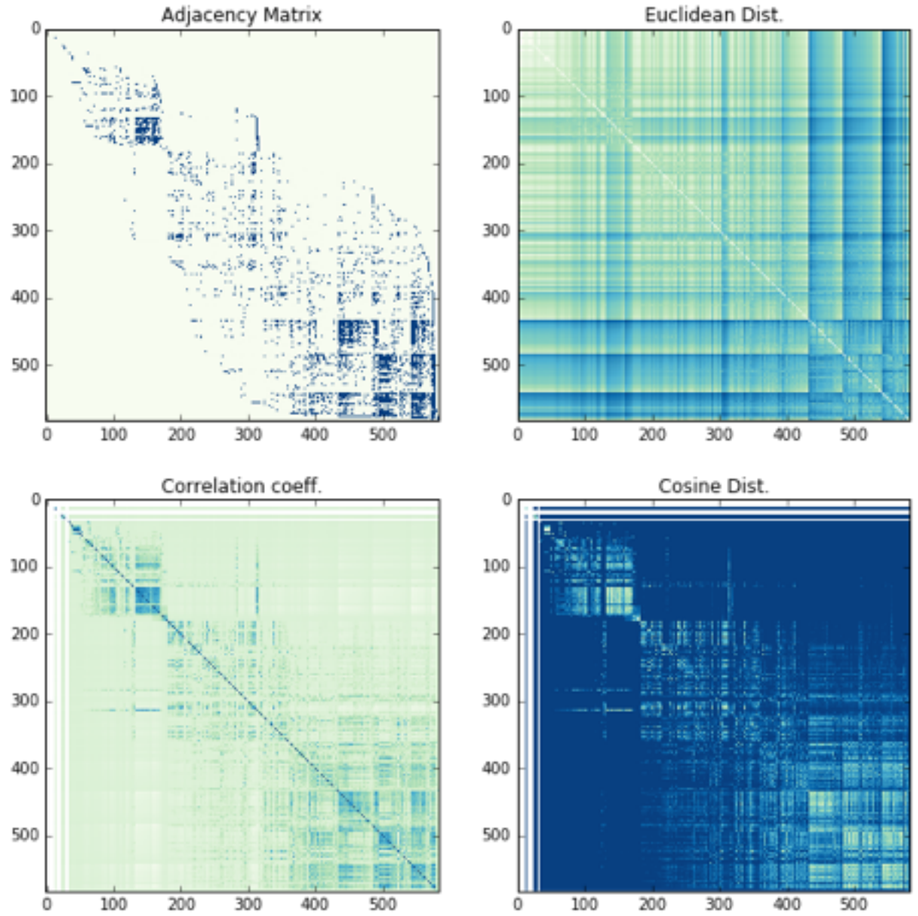
Gender assortativity = 0.011563901371
City assortativity = -0.00796754737261
University assortativity = 0.00113795399325
Degree assortativity = 0.161513649301

Such small values for city and university attributes can be consequence of the following:
many people don’t fill such specific personal information.

Similarity



without ordering



with ordering

Community detection

Cliques

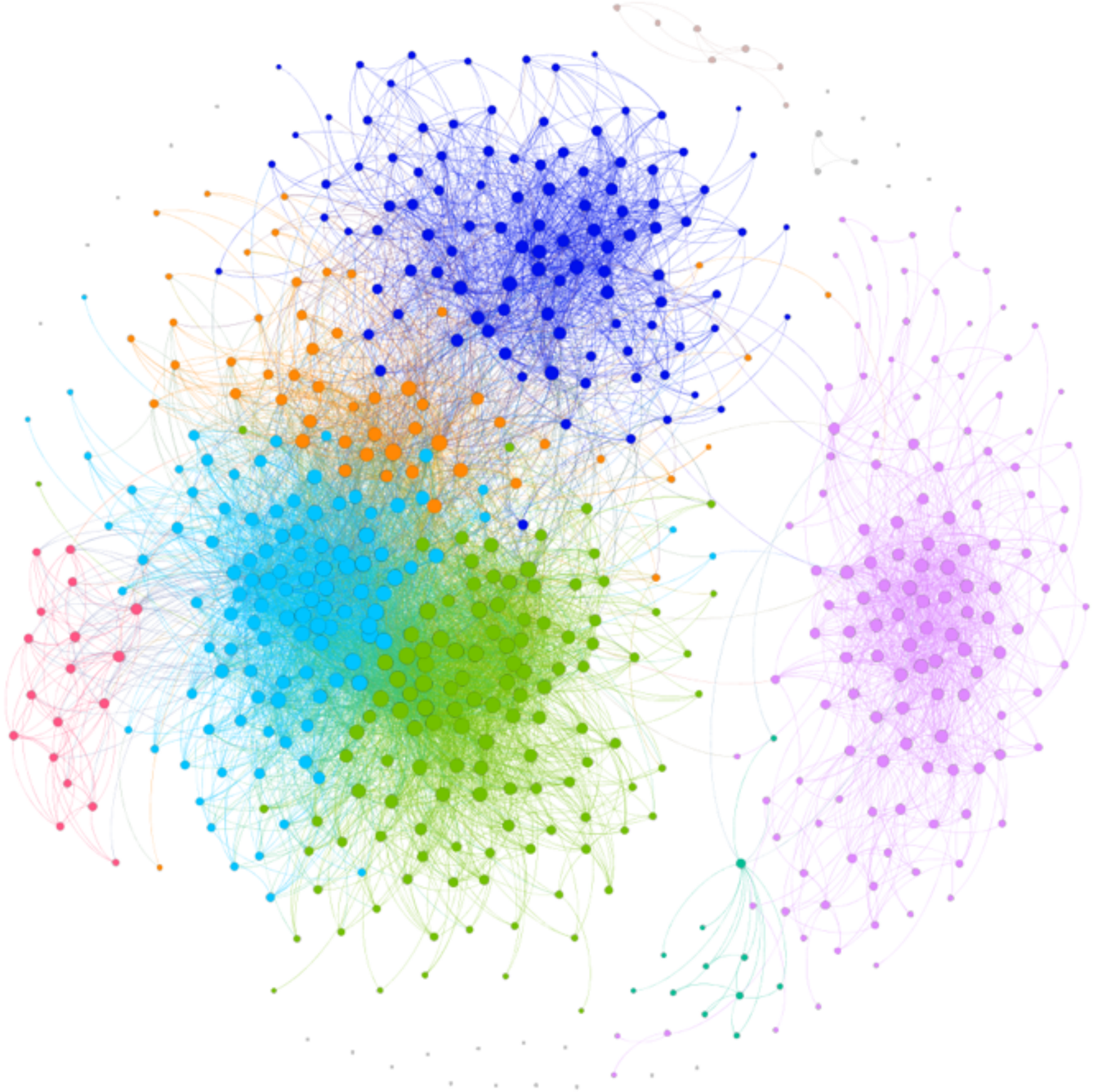
Number of maximal cliques = 17 080
Size of maximum clique = 29
Number of maximum cliques = 16

Communities

Community detection done by modularity.

Legend

- faculty
- home city
- home city friends from summer camp
- MIPT
- HSE student organisation (ШТ)
- participants HSE camp (“Мы Вместе”)
- participants of other summer camp
- other HSE friends (dormitory in general)



Communities

Community detection done by MCA (p = 2, alpha = 2).

Communities is quite similar with previous picture.