VK network analysis

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Basic network description and statistics
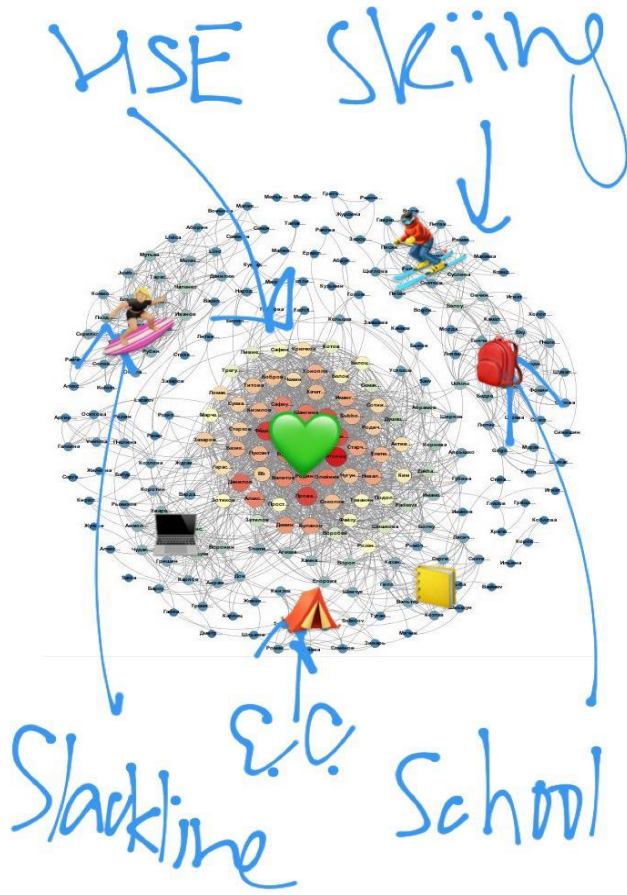
VK friend's network is represented.

Each node (friend) has the following attributes:

- Sex
- City
- Hometown

THE GRAPH STATISTICS:

- Number of friends: 256
- Number of links: 2245
- Number of connected components is 12
- Number of nodes in the biggest connected component is 241
- An average shortest path is 3.69
- An average clustering is 0.61
- Diameter of a graph is 10
- Density of a graph is 0.078

From the first sight, there are some community that I can detect:

- HSE baccalaureate mates (the biggest one)
- Slackline (this is a sport community)
- School mates
- Skiing sport school
- Children's camp
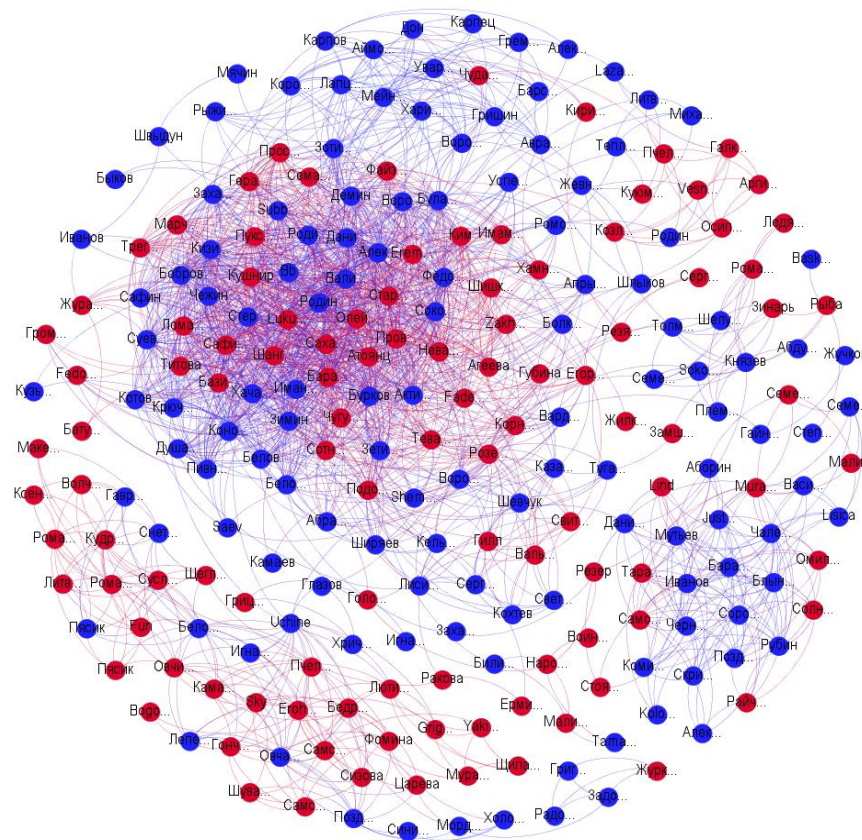
Central Nodes Detection

Top-10 nodes obtained by			
Degree	**Closeness**	**Betweenness**	**PageRank**
Атоянц	Баранецкая	Uchine	Фёдоров
Фёдоров	Бурков	Кельцев	Атоянц
Проваторова	Атоянц	Данилюк	Баранецкая
Баранецкая	Хачатрян	Хачатрян	Проваторова
Lukutina	Фёдоров	Розенвальд	Данилов
Сахарова	Проваторова	Фёдоров	Белоусов
Данилов	Lukutina	Баранецкая	Lukutina
Зимин	Сахарова	Крючков	Сахарова
Шангина	Александров	Воропаев	Демин
Олейник	Шангина	Бурков	Александров

Assortativity mixing coefficient according to

- sex is 0.1067
- city is 0.02
- hometown is 0.00193

Similarity

Cosine similarity metric is used.

Friend	The most similar friend	Cosine value
Baskaev	Степанов	1
Степанов	Baskaev	1
Лапцуев	Мейнстер	0.917463422
Мейнстер	Лапцуев	0.917463422
Аргирова	Родин	0.912870929
Родин	Аргирова	0.912870929
Lukutina	Шангина	0.894059341
Шангина	Lukutina	0.894059341
Мутьев	Чернявский	0.890263815
Чернявский	Мутьев	0.890263815
Кудрявцева	Романова	0.88949918
Романова	Кудрявцева	0.88949918
Атоянц	Lukutina	0.883883476
Тарасова	Мутьев	0.882352941
Иванов	Чернявский	0.872081599

Comparison to random graphs

Statistics	Friend's network	Erdos-Renyi model	Watts Strogatz model	Barabasi Albert model
Number of nodes	241	241	241	241
Number of edges	2240	2221	2169	2221
Avg. node degree	0.077	0.077	0.077	0.077
Avg. cl.coef.	0.609	0.075	0.573	0.223
Avg. sh. path	3.685	2.15	2.685	1.872
Diameter	10	3	4	3
Density	0.078	0.077	0.075	0.146

Maximal clique

The number of max. cliques: 4031
The size of the max clique: 20

HSE community:

• Атоянц	• Хачатрян	• Ломакина	• Пивненко
• Lukutina	• Бобров	• Крючков	• Старчикова
• Шангина	• Титова	• Кизилов	• Стерхов
• Сахарова	• Зимин	• Конопля	• Захаров
• Сафиуллина	• Суевалов	• Данилов	• Имангулов

1. Fast Greedy algorithm (8 groups)

2. Random walk algorithm (19 groups)

3. Edge betweenness algorithm (27 groups)

- modularity for Fast Greed is 0.426565290179

- modularity for Random Walk is 0.409225924745

- modularity for Edge Betweenness is 0.401120455995

Thank you