2.PRACTICE
INTRODUCTION TO NETWORK SCIENCE
JOSIP HANAK

1. NODES AND EDGES IN NETWORK

Analyzer

hero-network.csv (undirected)

Summary Statistics

Number of nodes	6421
Number of edges	167112

got-relationships.csv (undire...

Summary Statistics

Number of nodes	84
Number of edges	216

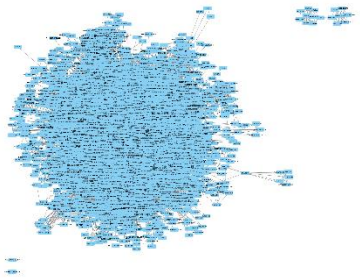
ufc-relations.csv (undirected)

Summary Statistics

Number of nodes	29
Number of edges	67

2.MARVEL NETWORK

[REPORT 1.1.1]



Hero network view

[REPORT 1.1.2]

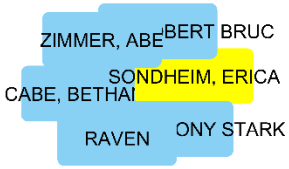
Ten nodes with largest degree

shared name	name	Degree
CAPTAIN AMERICA	CAPTAIN AME...	1905
SPIDER-MAN/PETER PARKER	SPIDER-MAN/...	1737
IRON MAN/TONY STARK	IRON MAN/T...	1521
THING/BEN GRIMM	THING/BEN G...	1416
MR. FANTASTIC/REED RICHARDS	MR. FANTAS...	1377
WOLVERINE/LOGAN	WOLVERINE/L...	1368
HUMAN TORCH/JOHNNY S	HUMAN TORC...	1361
SCARLET WITCH/WANDA	SCARLET WI...	1322
THOR/DR. DONALD BLAK	THOR/DR. DO...	1289
BEAST/HENRY &HANK& P	BEAST/HENR...	1265
VISION	VISION	1238

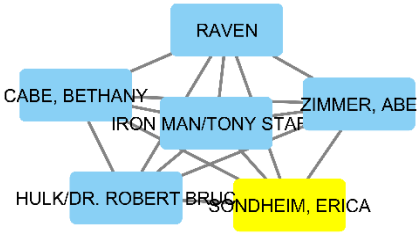
[REPORT 1.2.1]

The Raven subgraph network has 6 vertices and 15 edges.

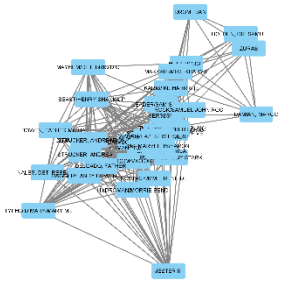
When using the Prefused Force Directed Layout the view of the network wasn't optimal.



So I changed it to Compound Spring Embedded Layout.



[REPORT 1.2.2, 1.2.3]As visible in the graph I can see only one community structure if the Raven subgraph is chosen. So I selected another character and made a subgraph around that character. The chosen character is ROBOT HULK and the subgraph made from his neighbors has 36 vertices and 366 edges.

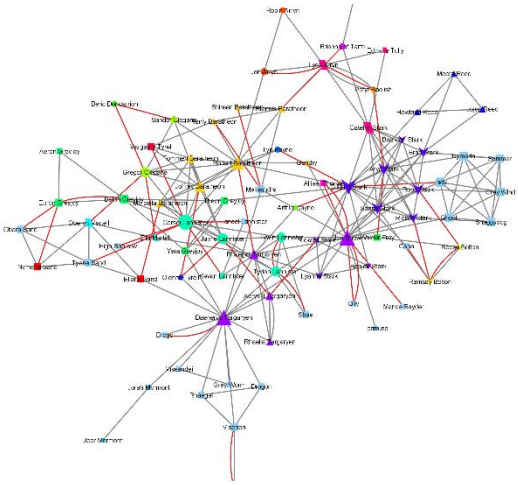


This graph has two community structures (I did not select only one vertice as a community structure).

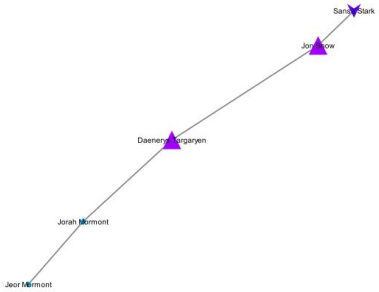
[REPORT 1.2.4]

I think the connectivity of the subgraphs is affected by the level of importance of the character in the MARVEL universe. Characters which are more important have a larger degree and as such a larger subgraph

3.GAME OF THRONES NETWORK



GOT relationship and character network



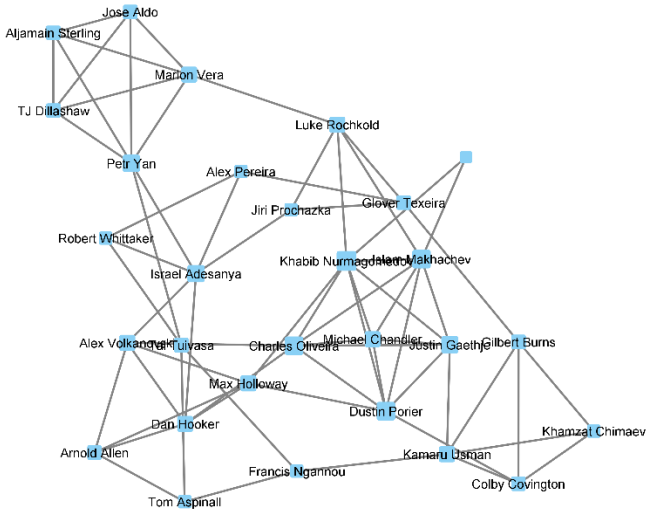
example of a chain (extracted into a subgraph)

Multiple edges are edges that are incident to the same two vertices, or in a directed graph, two or more edges with both the same tail vertex and the same head vertex.

example of a multiple edge

There is a correlation between House Birth node attribute and Relation edge attribute because the House of birth obviously affects to whom the characters are related to and thus form a relation.

4.MY NETWORK



The graph that I created represents the UFC (Ultimate Fighting Championship) athletes at each weight class. I only selected the top three to five fighters excluding female fighters because of the vertice number constraint. Each node has a key , which is a unique ID, and attributes such as the name of the fighter his weight and country of origin. The edges between vertices represent the relation between fighters. Two fighters can either be competing between each other for a higher ranking or the belt, or be teammates. Usually fighters are in the same weight class when competing against each other and the same nationality when they are teammates but it is not necessary (for example champions in neighboring weightclass can compete).

UFC fighter nodes

id	fighter-name	weight	nationality
0	Petr Yan	bantam	Russian
1	Aljamain Sterling	bantam	US

2	TJ Dillashaw	bantam	US
3	Jose Aldo	bantam	Brazilian
4	Marlon Vera	bantam	Ecuadorian
6	Alex Volkanovski	feather	Australian
7	Max Holloway	feather	US
8	Dan Hooker	feather	New Zealand
9	Arnold Allen	feather	UK
10	Charles Oliveira	light	Brazilian
11	Dustin Porier	light	US
12	Justin Gaethje	light	US
13	Islam Makhachev	light	Russian
14	Khabib Nurmagomedov	light	Russian
15	Michael Chandler	light	US
16	Kamaru Usman	welter	US
17	Colby Covington	welter	US
18	Khamzat Chimaev	welter	Russian
19	Gilbert Burns	welter	Brazilian
20	Israel Adesanya	middle	New Zealand
21	Robert Whittaker	middle	Australian
22	Alex Pereira	middle	Brazilian
23	Jiri Prochazka	lightheavy	Czechk
24	Glover Texeira	lightheavy	Brazilian
25	Luke Rochkold	lightheavy	US
26	Francis Ngannou	heavy	Nigerian
27	Tai Tuivasa	heavy	Australian
28	Tom Aspinall	heavy	UK

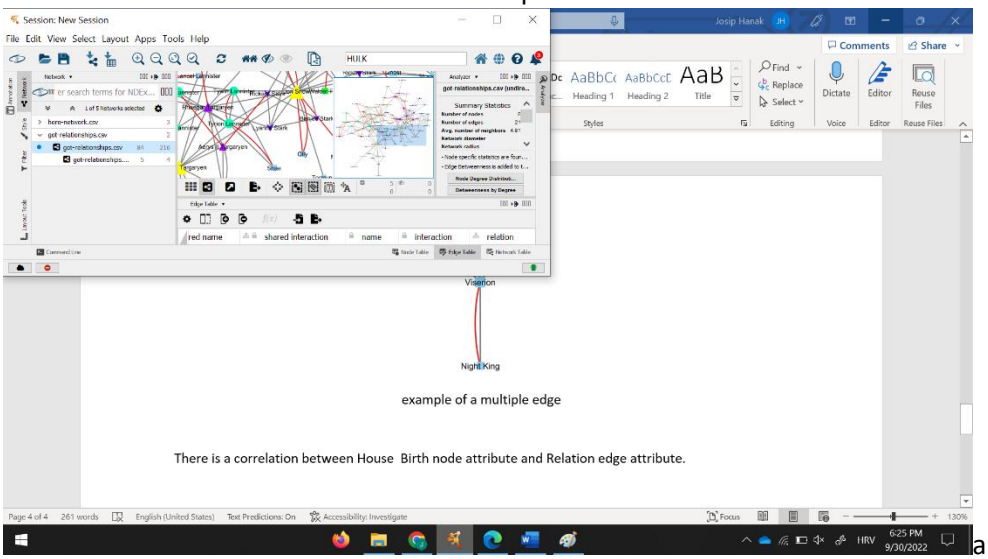
Relations between the fighters

src	dest	relation
0	1	competition
0	2	competition
0	3	competition
0	4	competition
0	20	teammate
0	27	teammate
1	2	competition
1	3	competition
1	4	competition

2	3	competition
2	4	competition
3	4	competition
4	25	teammate
6	7	competition
6	8	teammate
6	9	competition
6	20	teammate
6	10	competition
7	8	competition
7	9	competition
7	11	competition
7	14	competition
8	9	competition
8	20	teammate
9	28	teammate
10	11	competition
10	12	competition
10	13	competition
10	14	competition
10	15	competition
10	8	competition
11	12	competition
11	13	competition
11	14	competition
11	15	competition
11	17	competition
12	13	competition
12	14	competition
12	15	competition
12	16	teammate
13	14	teammate
13	25	teammate
13	15	competition
14	25	teammate
14	15	competition
16	17	competition
16	18	competition
16	19	competition
16	26	teammate
17	18	competition
17	19	competition
18	19	competition
19	24	teammate

20	21	competition
20	22	competition
20	23	competition
21	22	competition
21	27	teammate
22	24	teammate
23	24	competition
23	25	competition
24	25	competition
26	27	competition
26	28	competition
27	28	competition

Screenshot of current actions at the end of practice



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I hereby declare that all of the text, tables, and figures in this report were produced by myself.