

The Complex Networks of Tolkien, Homer, and Other Great Storytellers

Gabriel Triggs
Mentor: Dr. Lazaros Gallos

Complex Networks

Network: set of nodes and connecting edges

Scale-free networks' degree distributions follow power laws

Network analysis has changed our perception of the workings of myriad social, natural, and technological systems

The Project

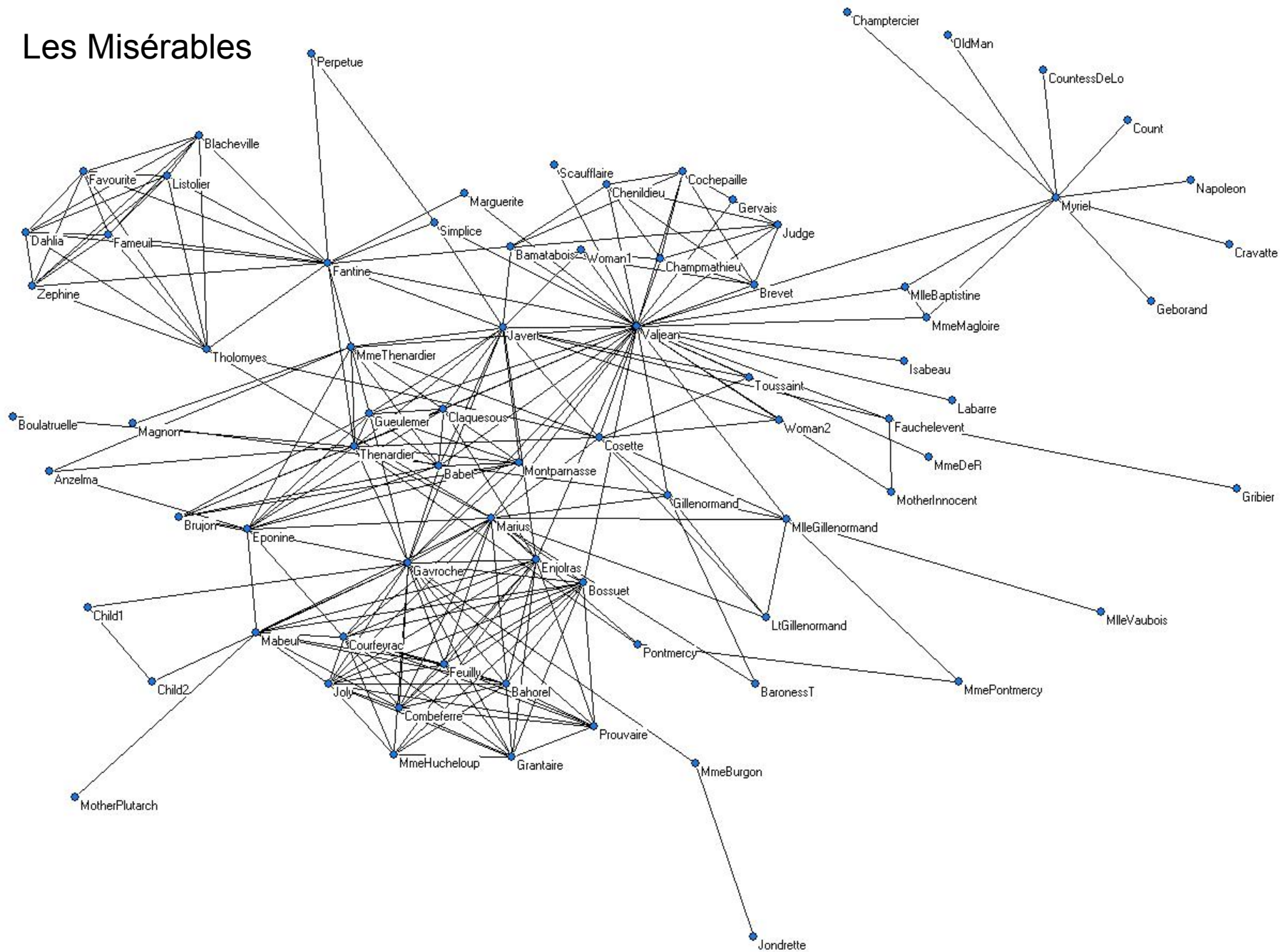
Two components:

- Data mining
- Network analysis

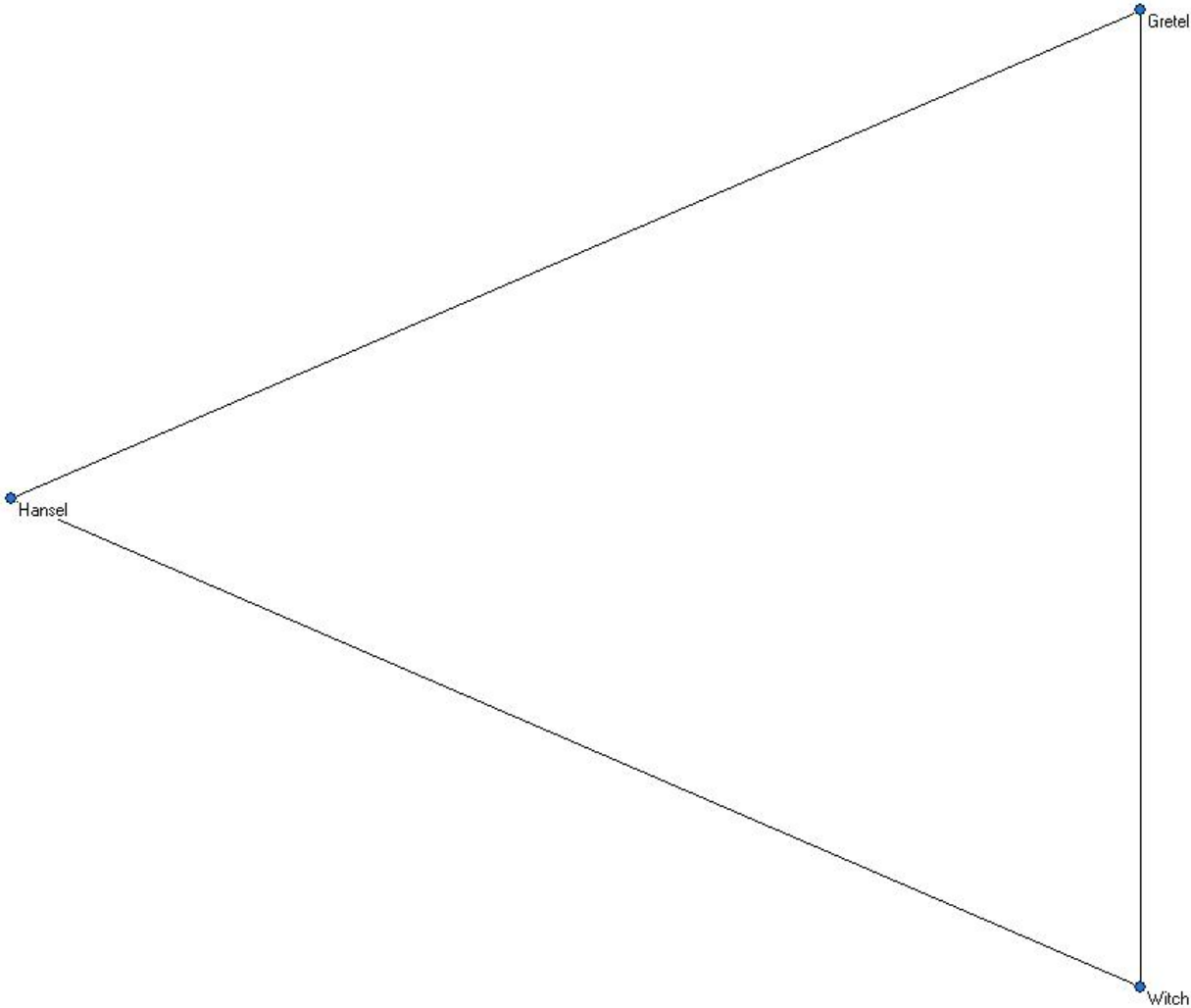
Motivation:

- Natural world vs. contrived ones
- Details of texts without contexts

Les Misérables



Hänsel und Gretel



Methods

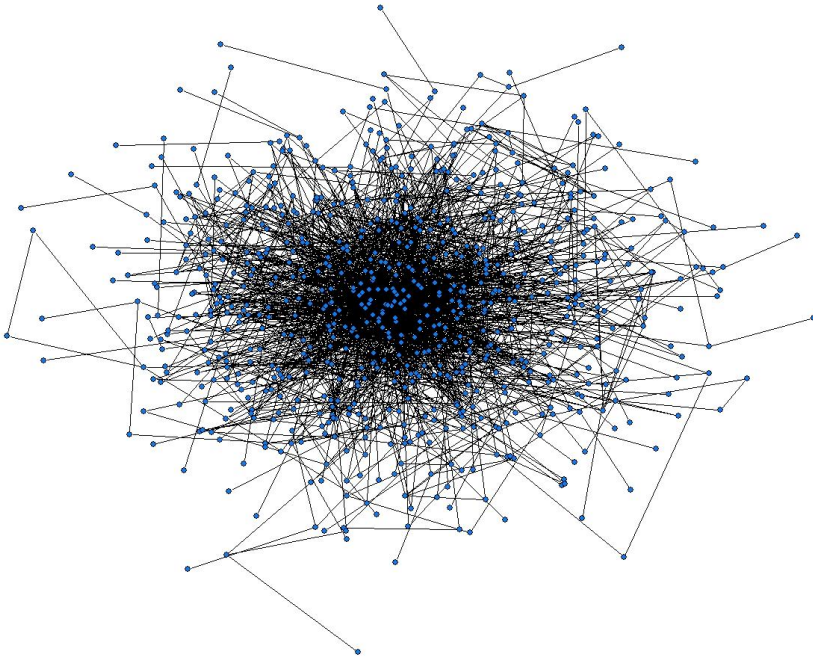
Data Mining

'You had better come and live here, Frodo my lad,' said Bilbo one day; 'and then we can celebrate our birthday-parties comfortably together.' At that time Frodo was still in his tweens, as the hobbits called the irresponsible twenties between childhood and coming of age at thirty-three.

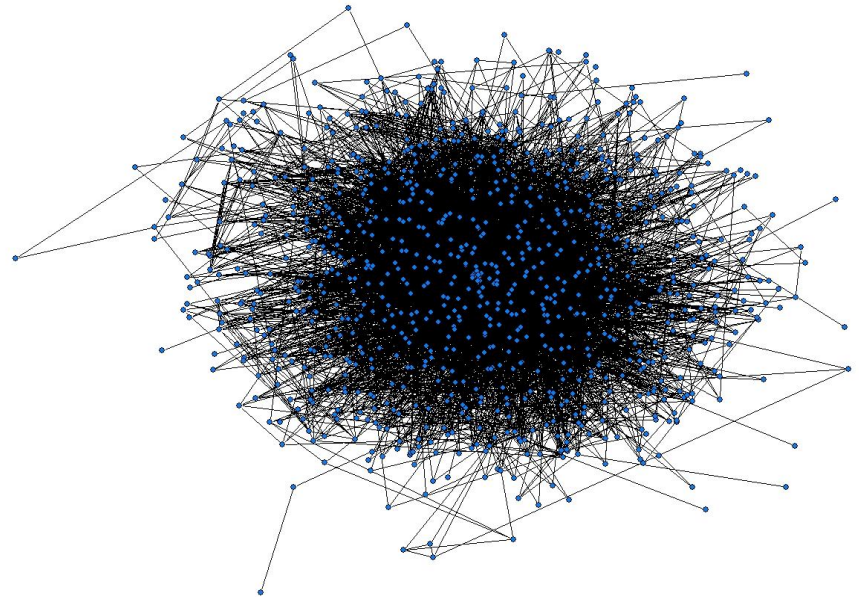
'You had better come and live here, Frodo my lad,' said Bilbo one day; 'and then we can celebrate our birthday-parties comfortably together.' At that time Frodo was still in his tweens, as the hobbits called the irresponsible twenties between childhood and coming of age at thirty-three.

Proximity Thresholds

The Fellowship of the Ring



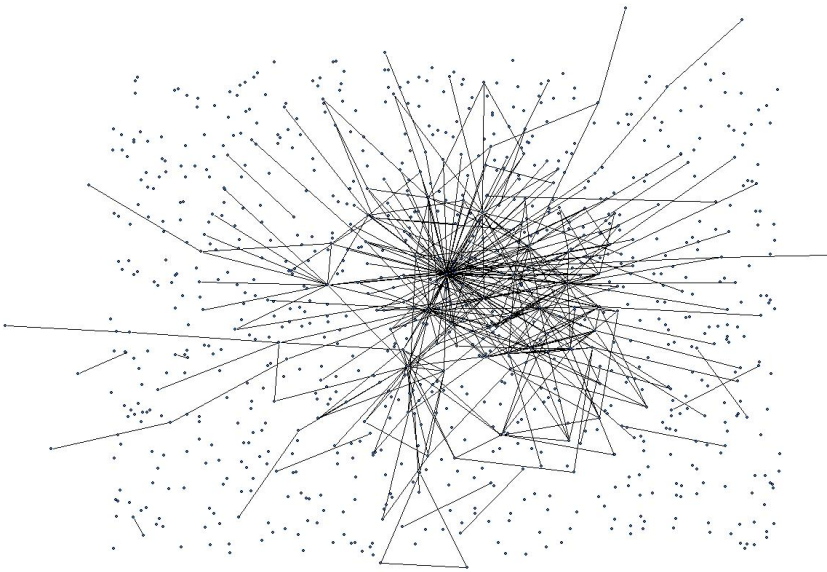
Threshold 5



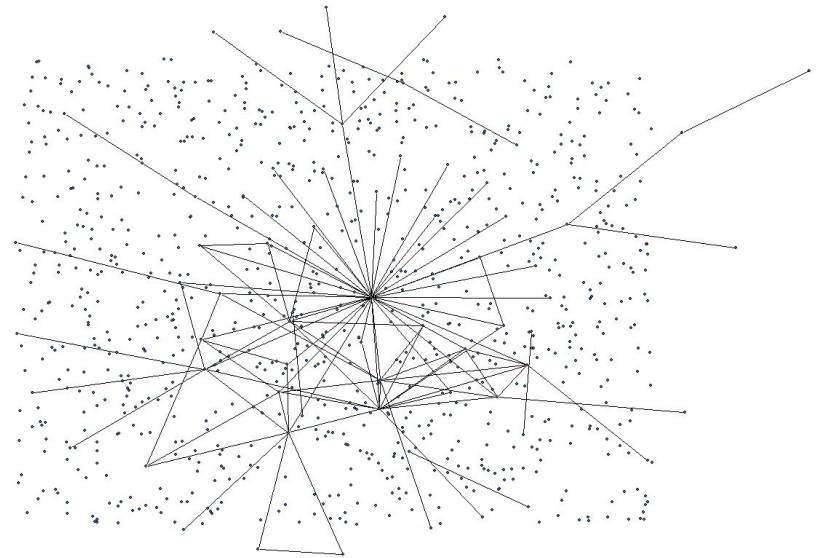
Threshold 20

Weight Thresholds

The Fellowship of the Ring

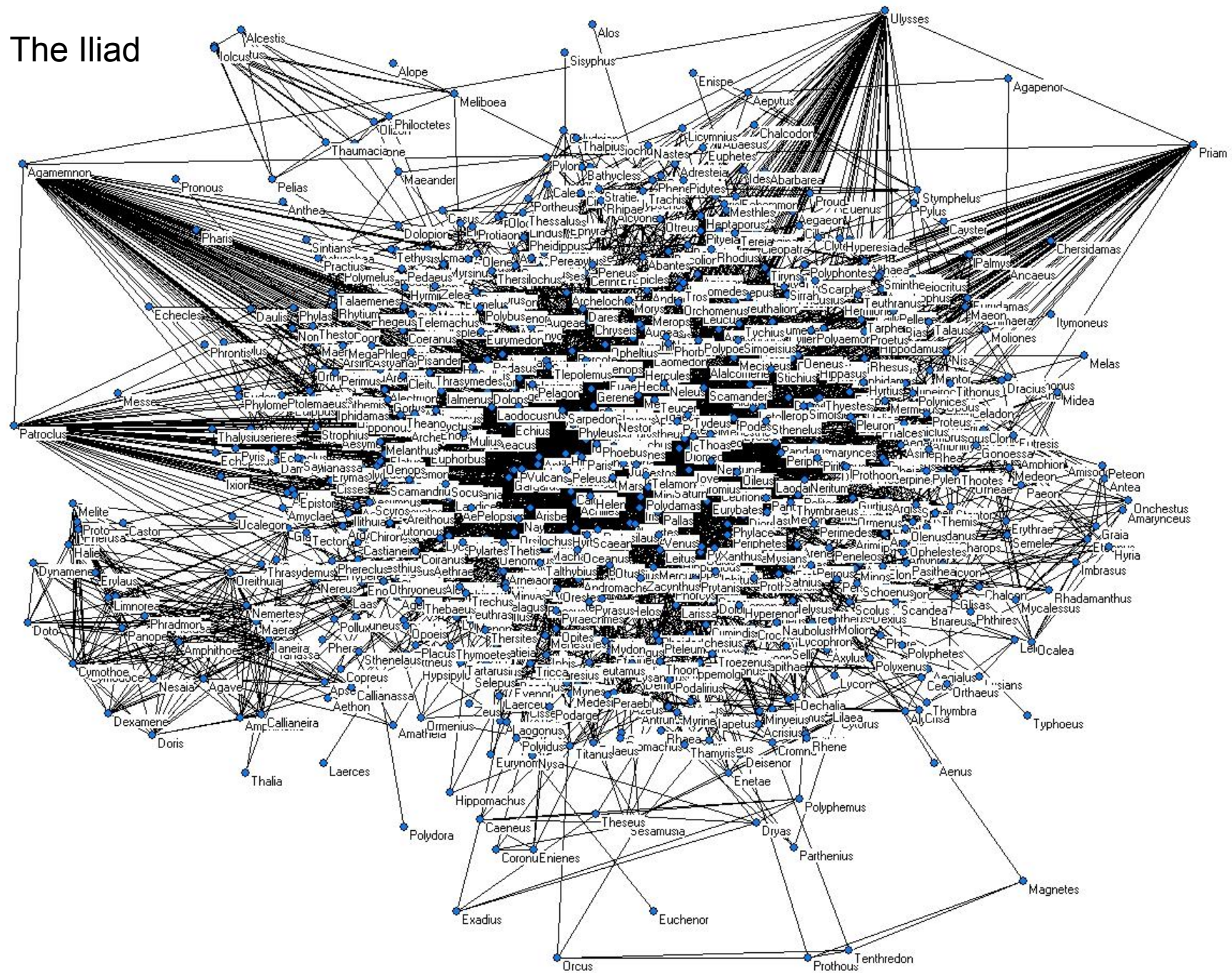


Weight = 5

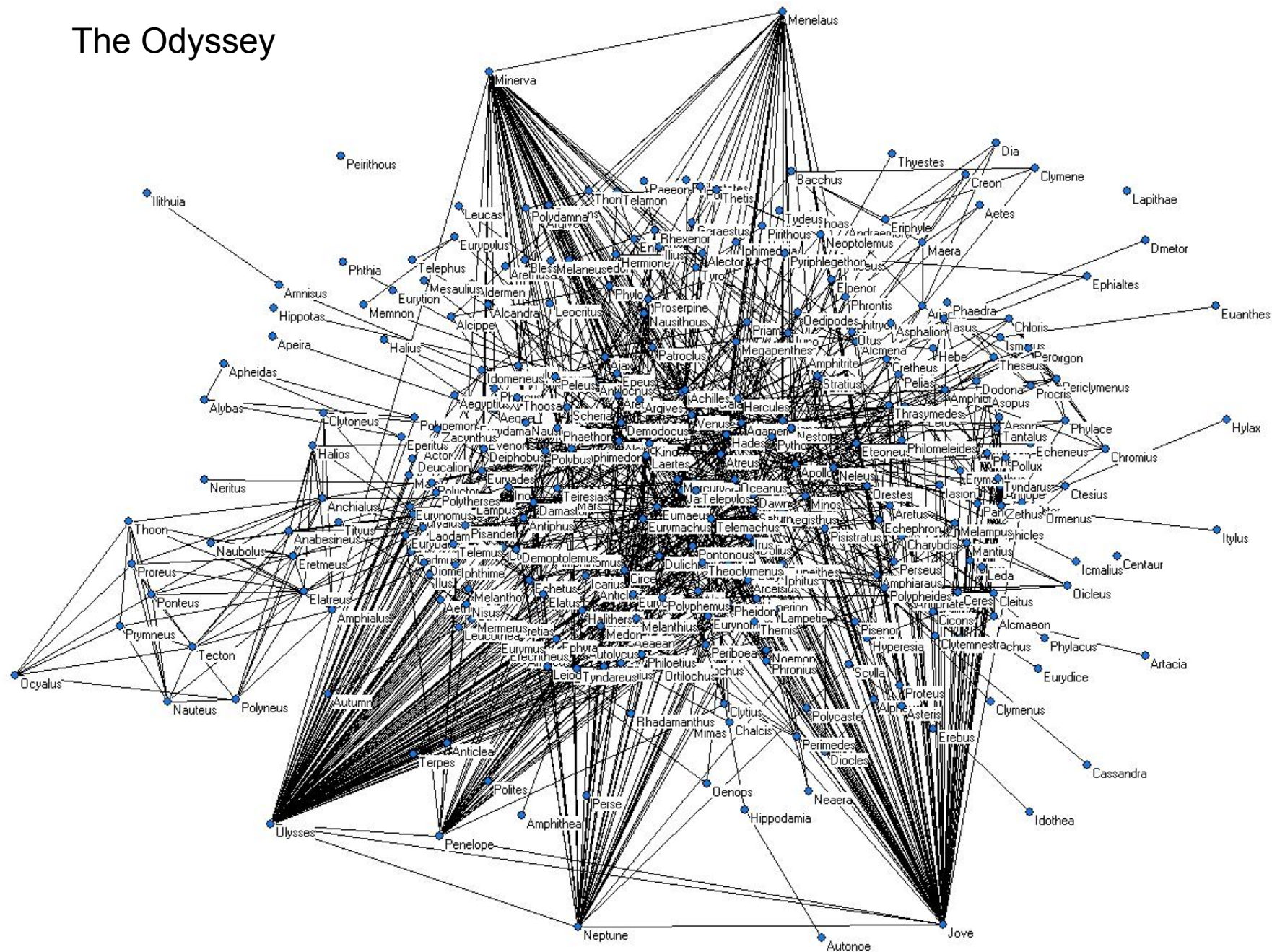


Weight = 10

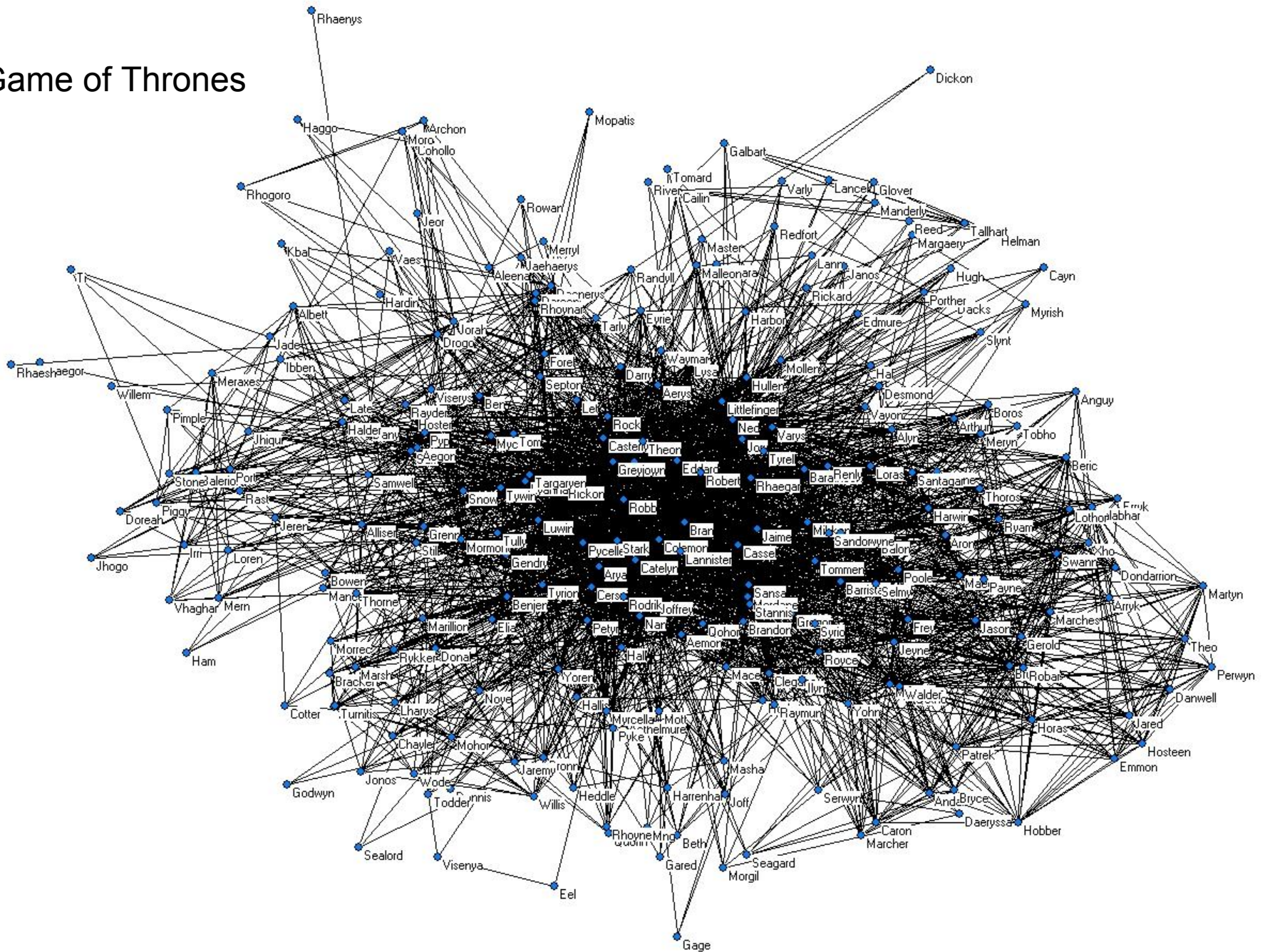
The Iliad

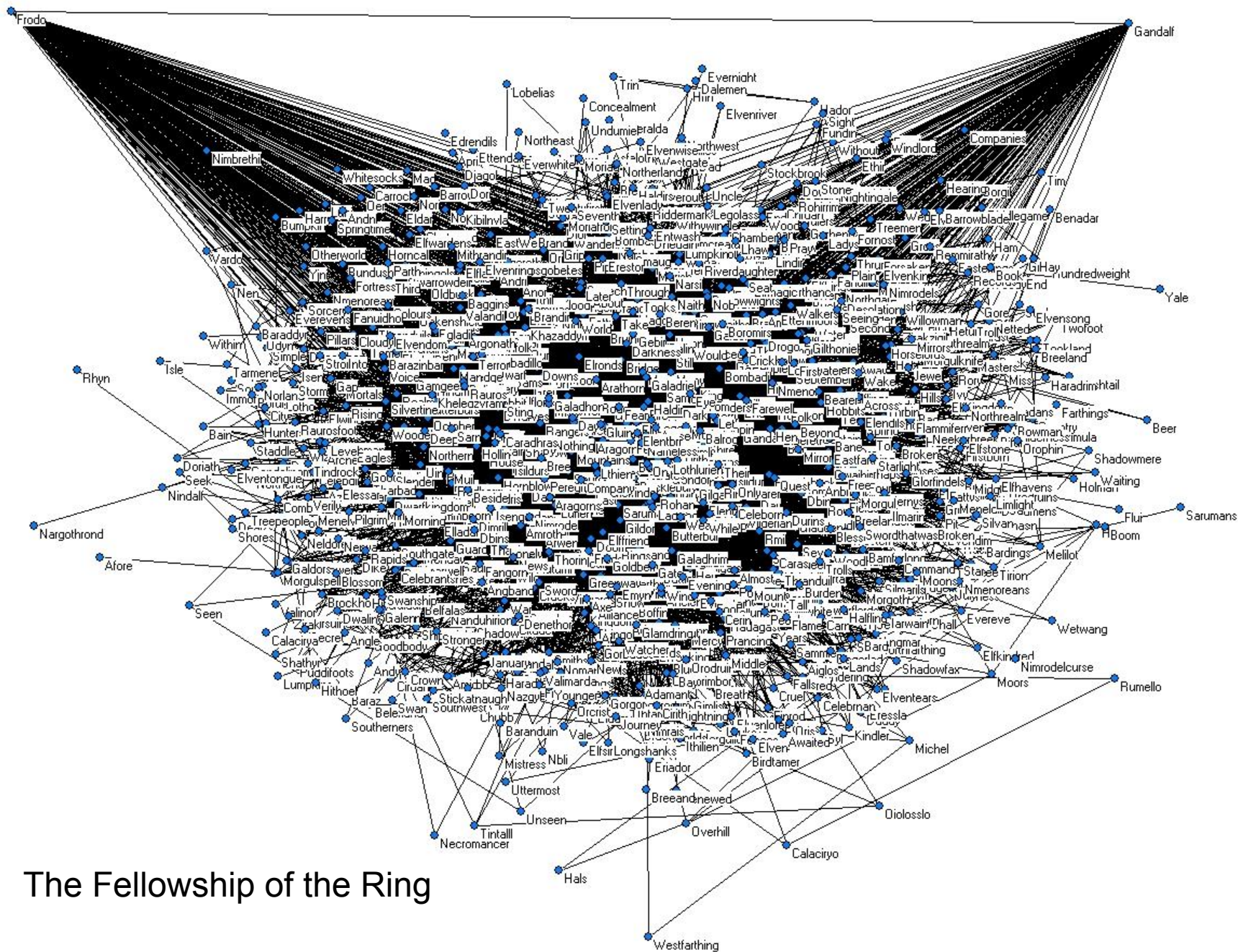


The Odyssey

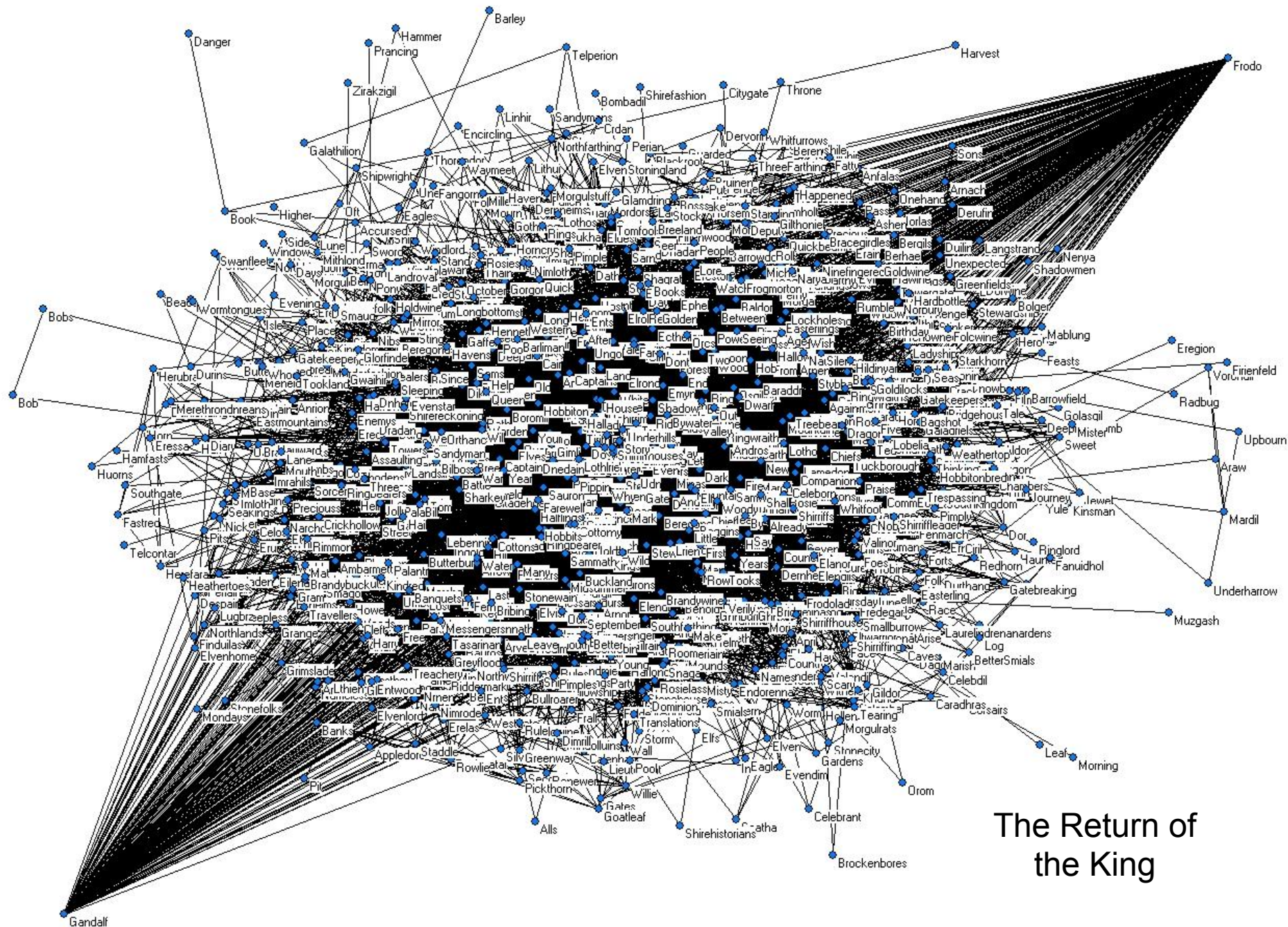


Game of Thrones





The Fellowship of the Ring



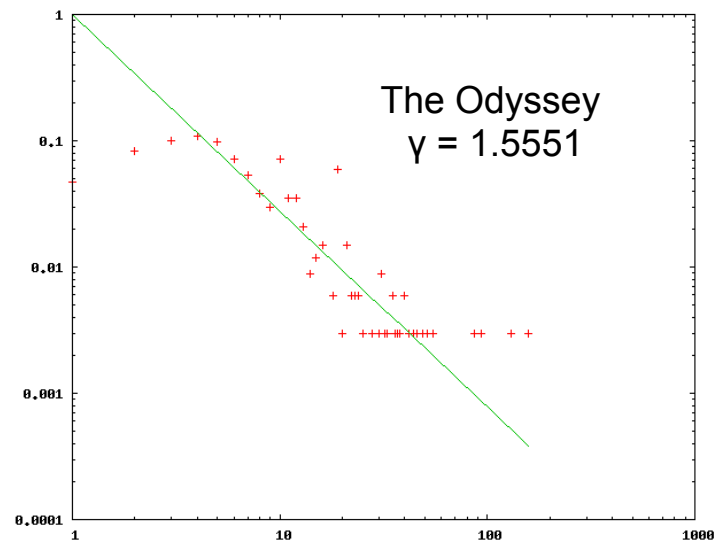
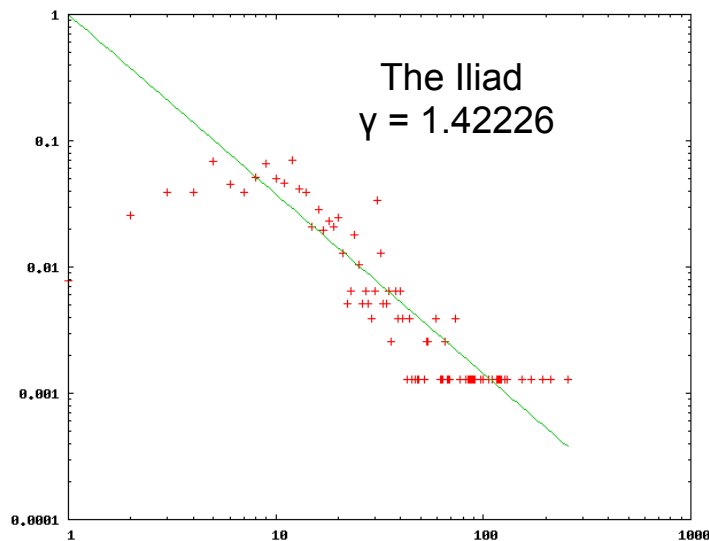
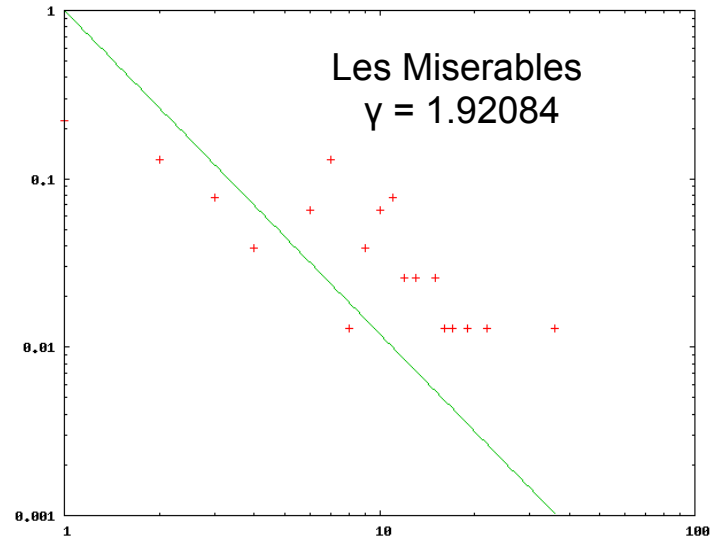
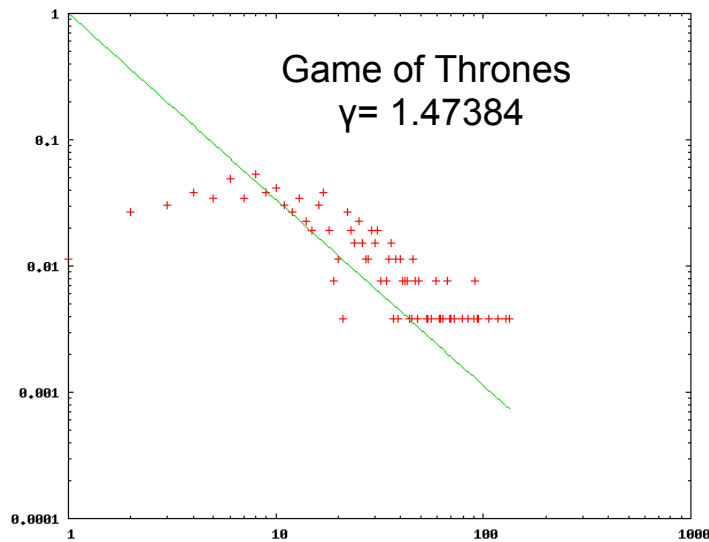
The Return of the King

Methods

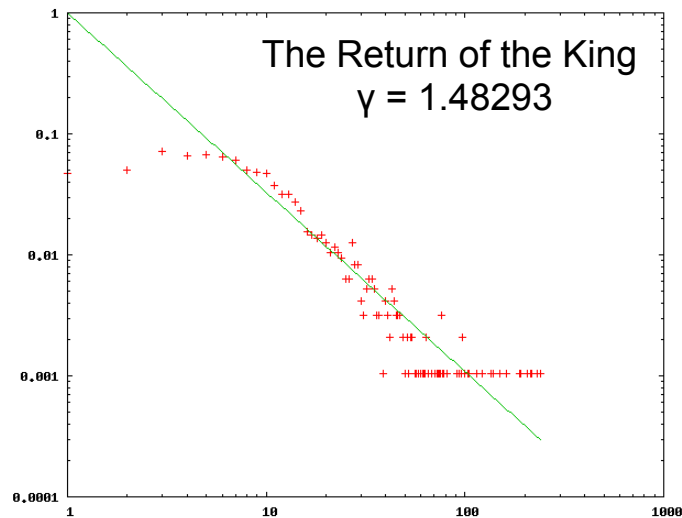
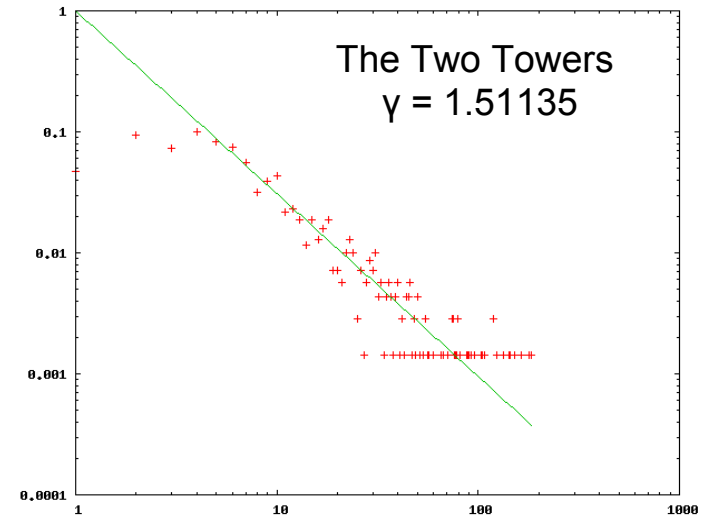
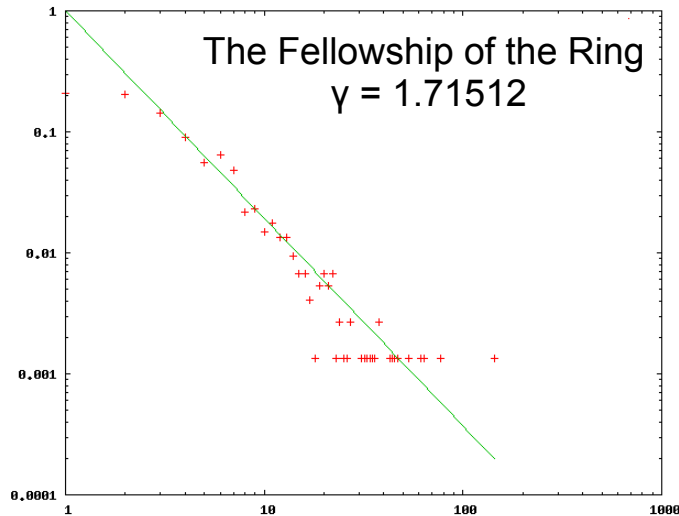
Network Analysis

- Degree distribution - histogram of nodes' degrees
- Modularity index - measure of modularization of nodes
- Kolmogorov-Smirnov test - tests similarity of two networks

Degree Distribution



Degree Distribution



Modularity Index

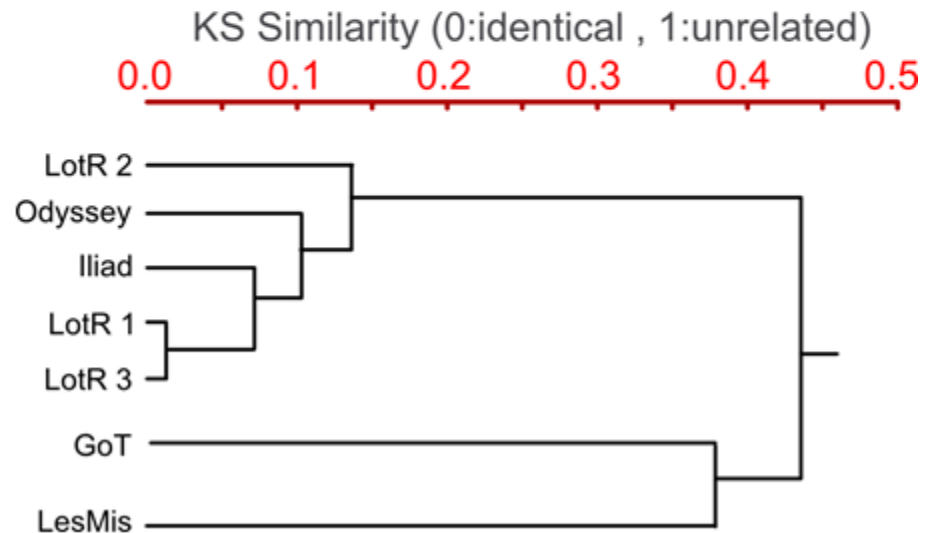
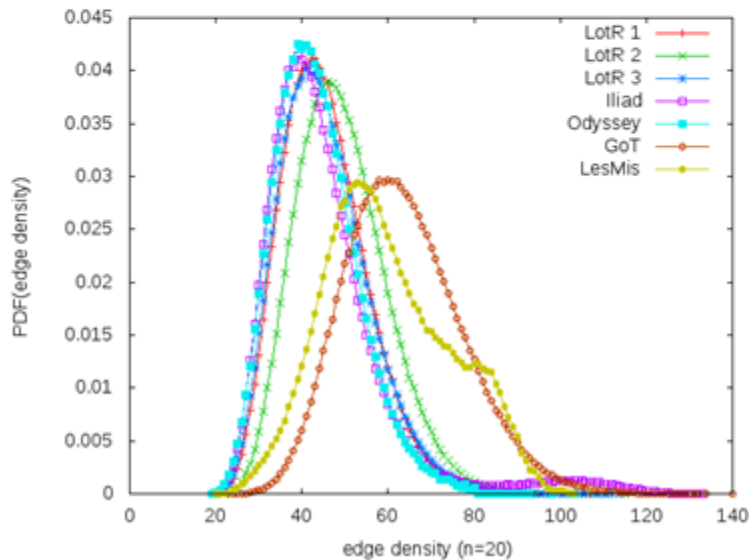
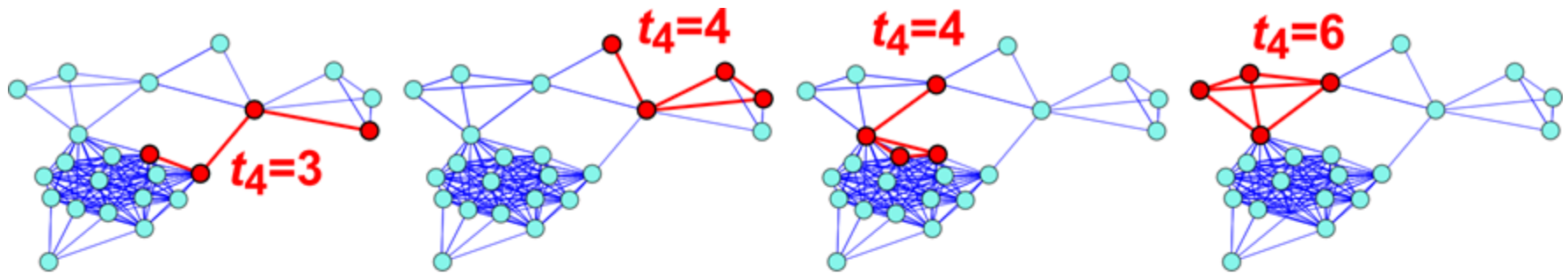
Karate Club	.419
Jazz Collaborations	.442
Metabolic Network	.435
E-mail Contacts	.572
Key Signing	.855
Physicist Co-authors	.723

Game of Thrones	0.315
Les Misérables	0.500
The Iliad	0.417
The Odyssey	0.475
The Fellowship of the Ring	0.333
The Two Towers	0.302
The Return of the King	0.345

Clustering Coefficient

Game of Thrones	.558
Les Miserables	.573
The Iliad	.537
The Odyssey	.538
The Fellowship of the Ring	.608
The Two Towers	.591
The Return of the King	.582

Kolmogorov-Smirnov Test



Conclusion

Motivation:

- Comparisons of contrived social networks to real-world ones
- Insight into important aspects of text without reading

Future work:

- Comparisons amongst books, rather than only within
- Use as a predictive tool for categorization and identification