Network Analysis
AN INTRODUCTION FOR HUMANISTS
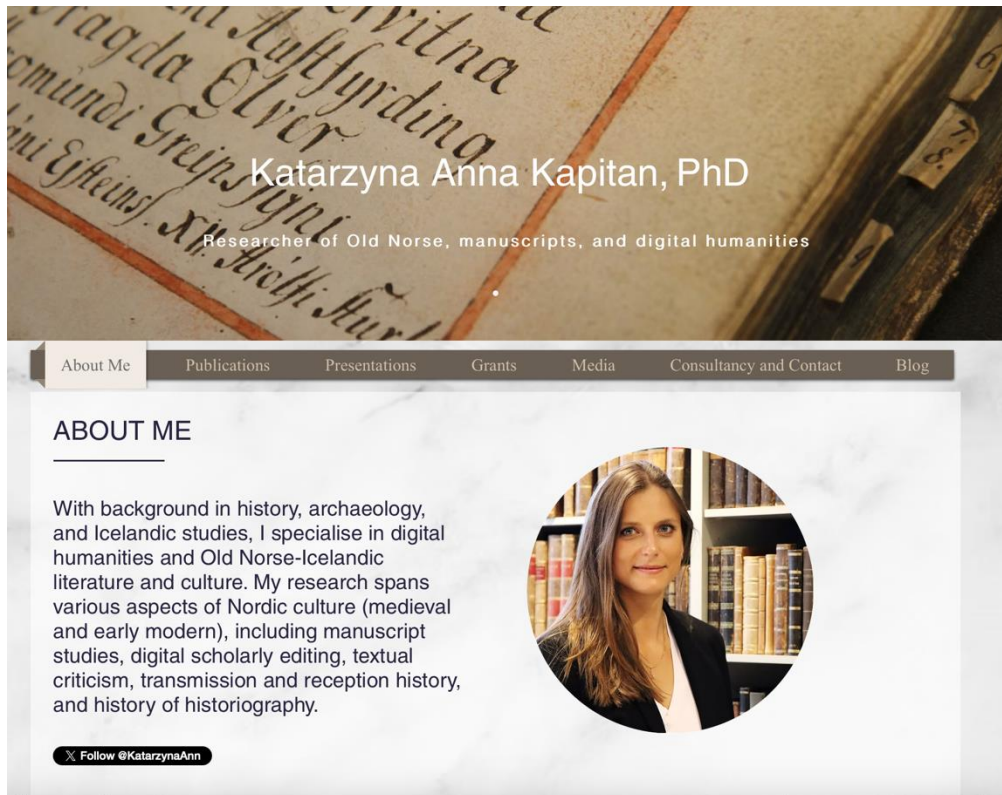
Dr Katarzyna Anna Kapitan
28 January 2025

Format: 8 x 3 h (Lecture, Seminar, Lab)

Time: Thursdays, 13:00-16:00

Place: 65 Rue de Richelieu, 75002 Paris

Teacher: Dr Katarzyna Anna Kapitan

Katarzyna Anna Kapitan, PhD
Researcher of Old Norse, manuscripts, and digital humanities

About Me | Publications | Presentations | Grants | Media | Consultancy and Contact | Blog

ABOUT ME

With background in history, archaeology, and Icelandic studies, I specialise in digital humanities and Old Norse-Icelandic literature and culture. My research spans various aspects of Nordic culture (medieval and early modern), including manuscript studies, digital scholarly editing, textual criticism, transmission and reception history, and history of historiography.

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Introductions: Present Your Neighbour

▶ Name

▶ Current study programme & Previous studies

▶ Research Interests

▶ Why did they choose this course?

▶ What are their expectations for this course?

Course Repo @ GitHub

- **Link: https://github.com/KAKDH/HN_NA_26/**
- Clone the Repo
- Sync at least once a week before the class

- **How to clone and sync?
  See:** https://docs.github.com/en/get-started/using-git/getting-changes-from-a-remote-repository

Schedule

See syllabus:
https://github.com/KAKDH/HN_NA_26/blob/main/Docs/Kapitan_NA_Syllabus.pdf

Date	Lectures & Labs
28 January	Network Thinking
4 February	Fundamentals
11 February	Connectivity
18 February	Centrality
11 March	Influence
18 March	Communities
25 March	Modelling
1 April	Dynamics

Assessment

- Final Exam – 40% [Lectures]
- Group Project – 30% [Labs]
- Individual Participation & Presentation – 30% [Seminar]

- *Note: In order to pass the class you need to pass all three grading components.*

- **See syllabus:** https://github.com/KAKDH/HN_NA_26/blob/main/Docs/Kapitan_NA_Syllabus.pdf

Introduction to Network Thinking

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Connected: The Power of Six Degrees

YouTube: https://www.youtube.com/watch?v=2rzxAyY7D7k
IMDb: https://www.imdb.com/title/tt1310375

Group Work (20 min prep + 10 min discussion) Connected, The Power of Six Degrees

▶ Prepare a mid-map of the documentary

▶ Include Keywords, Terms, and Concepts

  ▶ Mark with "!" the ones you've heard before and can explain

  ▶ Mark with "x" the ones you've heard before but cannot really explain

  ▶ Mark with "?" the ones you've never heard before and cannot explain

▶ Formulate a definition of a "network" according to the documentary & your own understanding

▶ Formulate a definition of "network science" according to the documentary & your own understanding

▶ In your opinion, what was the main take-home message of the documentary?

Network

- a complicated system of roads, lines, tubes, etc. that cross each other and are connected to each other

- a group or system of people or things that are connected to each

- a group of people who meet, exchange information, etc. for professional or social

- a number of computers and other devices that are connected together so that equipment and data can be shared

Source: Oxford Academic English Dictionary (https://www.oxfordlearnersdictionaries.com)

Network Science

▶ An academic field which studies complex networks such as telecommunication networks, computer networks, biological networks, cognitive and semantic networks, and social networks, considering distinct **elements** or actors […] and the **connections** between the elements or actors…

Source: Wikipedia

Network Science

▶ 'A key discovery of network science is that the architecture of networks emerging in various domains of science, nature, and technology are similar to each other, a consequence of being governed by the **same organizing principles.** Consequently, we can use a common set of mathematical tools to explore these systems'
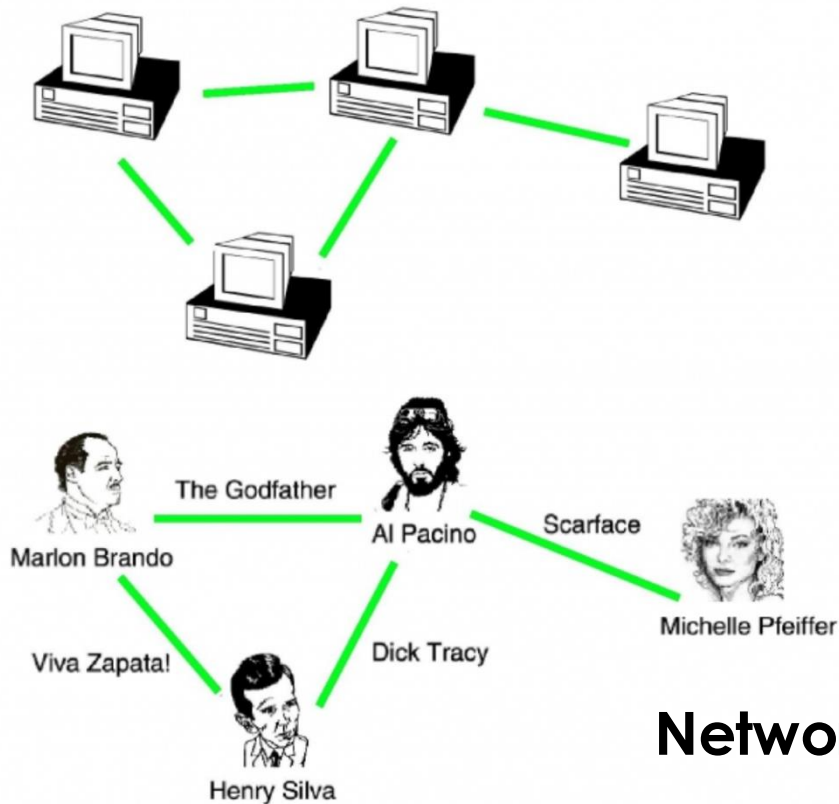
Source: Barabási, Network Science (https://networksciencebook.com)
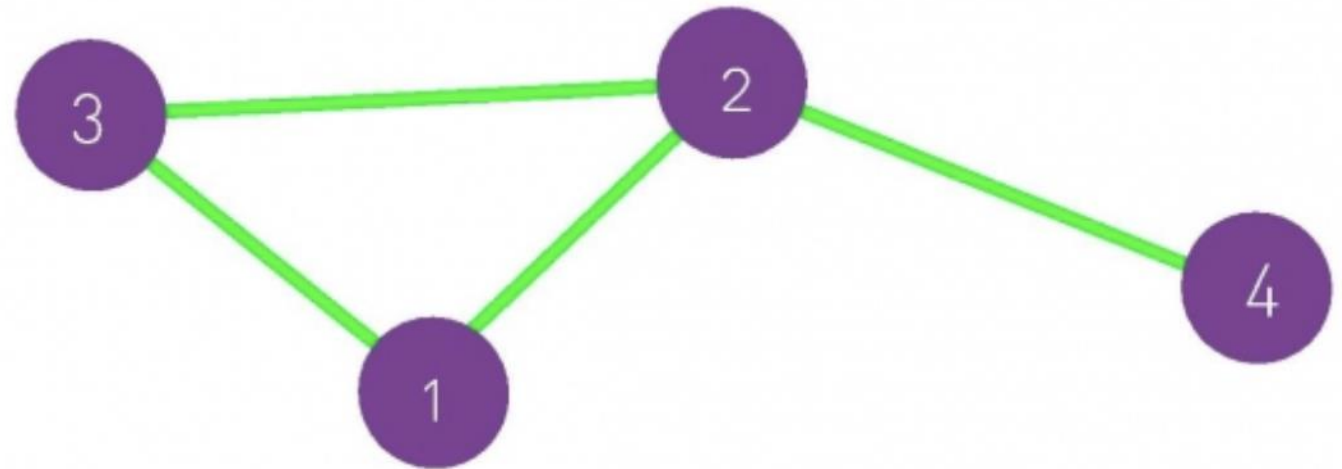
The Characteristics of Network Science

▶ Interdisciplinary

▶ Empirical and Data Driven

▶ Quantitative and Mathematical

▶ Computational
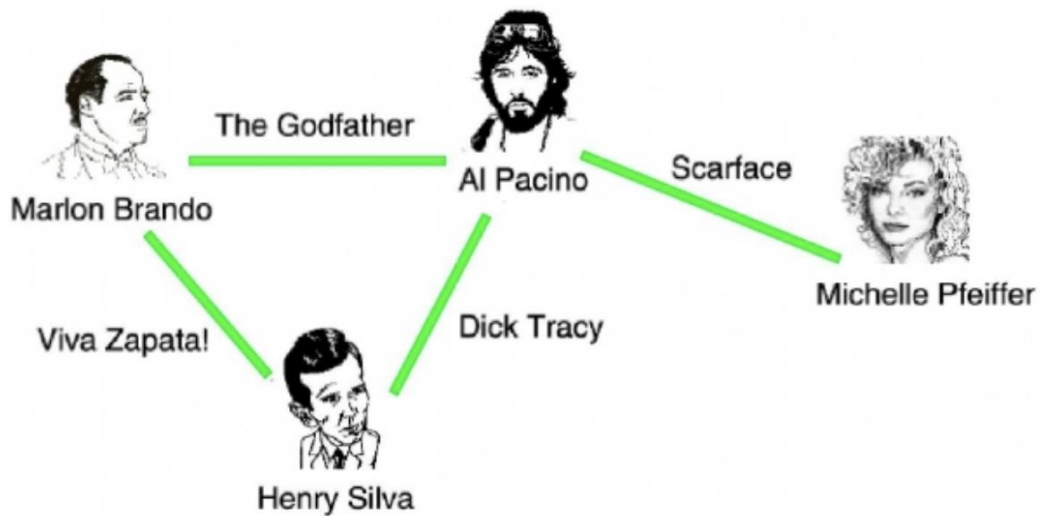
Source: Barabási, Network Science (https://networksciencebook.com)

Networks & Graphs

Network, node, link

Graph, vertex, edge

Source: Barabási, Network Science (https://networksciencebook.com)

Networks & Graphs

N, represents the number of components in the system (number of nodes).

L, represents the total number of interactions between the nodes (number of links).

N = 4
L = 4

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Seminar

Applications of Network Analysis in the Humanities

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	Date	Seminars
1	28 January	*Introduction*
2	4 February	Networks & Literature
3	11 February	Networks & History
4	18 February	Networks & Manuscripts
5	11 March	Networks & Linguistics
6	18 March	Networks & Media
7	25 March	Networks & Scholarship
8	1 April	*Project Presentations*

Seminar Readings

▶ Each week there is **one required reading** and one or two additional readings.

▶ Each week everyone prepares for a class discussion by **reading at least the required reading** before the class.

▶ There are three roles to be filled in each week:

    ▶ **EXPERT** – conducts a detailed article analysis of one of the readings and prepares a presentation of its contents

    ▶ **OPONENT** – reads all the readings and prepares questions to the expert and discussion points for the group.

    ▶ **MODERATOR** – moderates the discussion, summarises the main points at the end of the session

Article Analysis – Task for the EXPERT

▶ Choose one article from the seminar reading list.

▶ Read the entire article once without looking at the schema.

▶ Try to fill in the schema based on your first reading.

▶ Read the article again with the schema, analyse its contents, identify relevant passages.

▶ Fill in the schema by writing short answers to all 15 questions.

▶ Prepare a presentation on the article (min 10 and max 15 minutes) and present it in class.

▶ *Note: I recommend using a slideshow to illustrate your presentation. You can time your presentation with slides in programs such as Keynote and PowerPoint.*

Article Analysis – Schema – EXPERT

What is the purpose of the study?

▶ Write down the exact statement in which the authors describe their aim. Use quotation marks around the exact wording and indicate the page number.

▶ Describe the purpose of the study in your own words.

▶ What gap in scholarship were the authors trying to fill with their study?

What are the major findings of the study?

▶ Note down the major findings of the study. Use quotation marks around the exact wording and indicate the page number.

▶ Describe the findings in your own words.

How did the authors conduct their research?

▶ Briefly summarize and explain, in your own words, the methodology and the main steps the authors took to conduct their study. How is the data modelled and analysed.

▶ Describe the limitations of this approach as discussed by the authors.

▶ Is the data and/or code used in the study accessible? If not, is there explanation why?

How reliable are the results?

▶ Do the authors suggest any problems with the study that could lead to unreliable results?

▶ Do you see any problems with the results? Explain why or why not.

Based on your analysis, are the claims made in this article accurate?

▶ Do the conclusions drawn by the authors make sense to you? Are the conclusions too broad or too narrow based on what was actually done in the study?

▶ Based on the accuracy of the methodology and the reliability of the results as described above, do you think the conclusions can be trusted? Why?

What is the importance/relevance of this scientific work?

▶ Summarise, in your own words, the significant contributions of the work presented in this journal article, as reported by the authors.

How would you summarise this article?

▶ Write a one-sentence summary for each section of the article. They should form a cohesive paragraph.

Which topics for discussion arise from this article?

▶ Write three open-ended questions (not yes/no questions) and/or discussion points that you want to explore in class with your colleagues.

Lab

Hands-on session with NetworkX

Final Project (Group Work)

- The goal of our lab sessions is to allow you to test your NA skills with a small real-life example, which will inform your final project, for which

    - You will formulate your research question

    - You will collect and model your data

    - You will analyse the structure and properties of your network

    - You will prepare visualisations of your network

    - You will write a short essay describing your project

    - You will present what you've done in class **[Session 8]**

- **Do you have an idea for a small project?**

- **If not, I do!**

Software

▶ We will be using Python and the NetworkX module.
You can follow one or both of two approaches:

  ▶ Use free services to run Jupyter notebooks in the cloud, e.g., Google Colab (colab.research.google.com), Binder (mybinder.org), Kaggle Kernels (www.kaggle.com/kernels), Datalore (datalore.io), etc.

  ▶ Run Python locally on your laptop with Jupyter notebooks. We recommend installing the Anaconda Python 3 distribution (www.anaconda.com/distribution). This option requires that you are comfortable with managing software packages.

Software

▶ Be advised that each cloud-based notebook service has pros and cons and we cannot test them all in class. You may have to try more than one solution, read documentation, and/or seek support from the providers to install packages.

▶ Local Python installations can present issues, especially on Windows machines. Packages are system dependent. Instructors may be unable to provide support.

▶ **By following this class, you agree to work independently to find solutions that work on your machine.**

Lab 1: Exercises (https://github.com/KAKDH/HN_NA_26/)

► Follow all steps in the **examples at the beginning of the notebooks** and make sure you understand what is happening.

► Feel free to annotate your copy of the notebook further.

► Move to **Exercise 1** and reproduce this Actor network in NetworkX