



# Lecturers

## Tomaso Erseghe

tomaso.erseghe@unipd.it  
room 217, DEI/A  
office hours: contact me by email



## Caterina Suitner



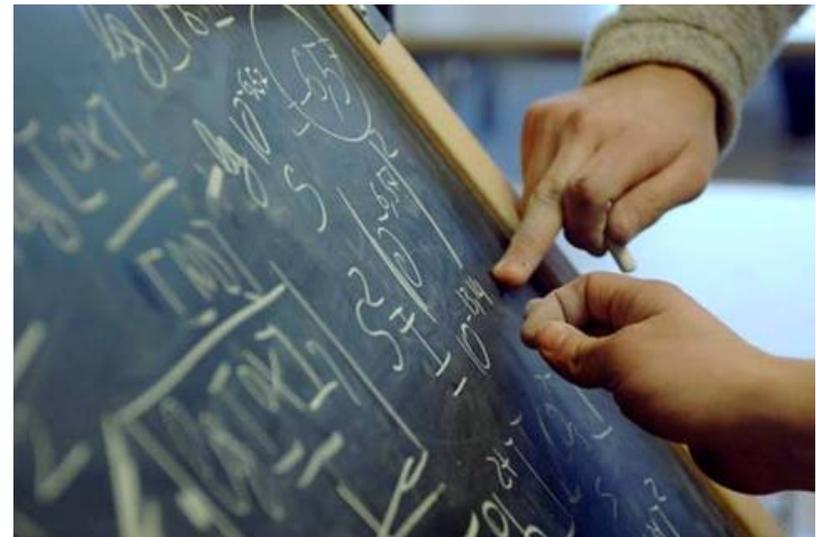
caterina.suitner@unipd.it  
room 20-21, Via Venezia 8  
office hours: see [my page](#)

<https://didattica.unipd.it/off/docente/55C3F2D5E9400D02D6F95ED6B1978BAC>

# Lectures

- Thu 10:30-12:00
- Fri 10:30-12:00

Room 13 (?tbd?)  
Complesso Beato Pellegrino  
Via Beato Pellegrino, 32  
Padova



# Prerequisites

## Basic requirements (that you probably already satisfy)

Statistics / Statistical analysis

Socio psychological processes of communication

Techniques for social inquiry



## Other useful knowledge

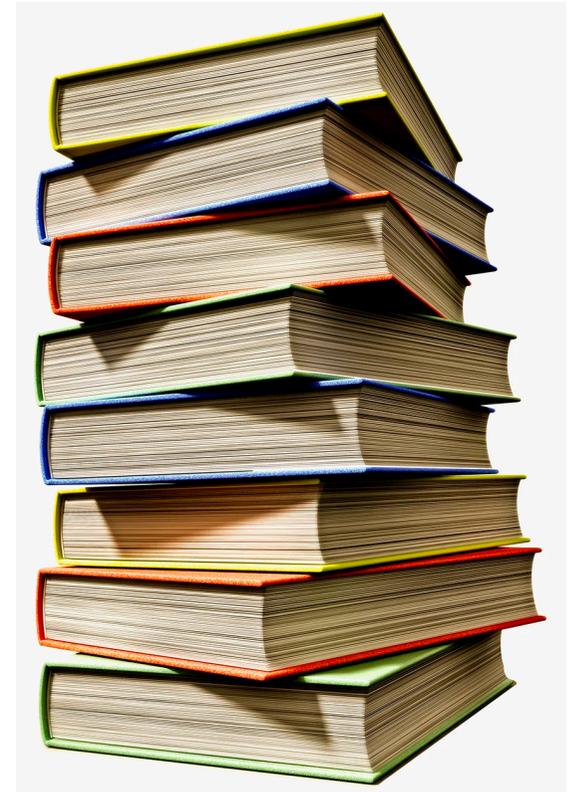
Networking processes in sociology,  
semantics, economics, etc ...

Programming language



# Textbooks ?

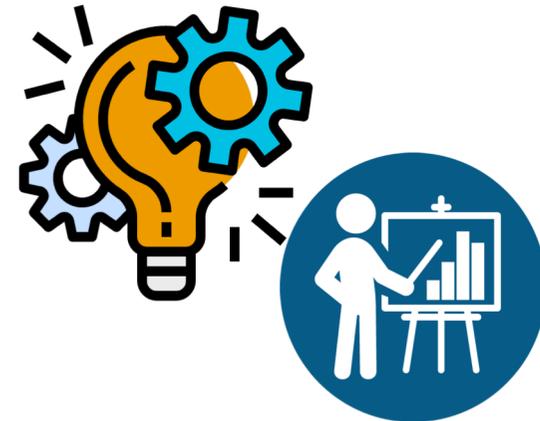
- ❑ No textbook! 😊
- ❑ Slides/videos & additional material available in Moodle @[elearning.unipd.it/scienzeumane](https://elearning.unipd.it/scienzeumane)



<https://elearning.unipd.it/scienzeumane/course/view.php?id=9257>

# Exam style

- ❑ **Written test**  
for verifying the students' understanding of the course
- ❑ **Group Project**  
Short essay  
10 min presentation (slides)  
5 min for questions
- ❑ **Final grade: 40% test, 60% project**  
+1 **bonus** if completed by **end of Jan**



# What is SNA?

## Social network analysis

From Wikipedia, the free encyclopedia



**Social network analysis (SNA)** is the process of investigating social structures through the use of networks and graph theory.<sup>[1]</sup> It characterizes networked structures in terms of *nodes* (individual actors, people, or things within the network) and the *ties*, *edges*, or *links* (relationships or interactions) that connect them. Examples of social structures commonly visualized through social network analysis include social media networks,<sup>[2][3]</sup> memes spread,<sup>[4]</sup> information circulation,<sup>[5]</sup> friendship and acquaintance networks, business networks, knowledge networks,<sup>[6][7]</sup> difficult working relationships,<sup>[8]</sup> social networks, collaboration graphs, kinship, disease transmission, and sexual relationships.<sup>[9][10]</sup> These networks are often visualized through sociograms in which nodes are represented as points and ties are represented as lines. These visualizations provide a means of qualitatively assessing networks by varying the visual representation of their nodes and edges to reflect attributes of interest.<sup>[11]</sup>

# What is SNA? (cont'd)

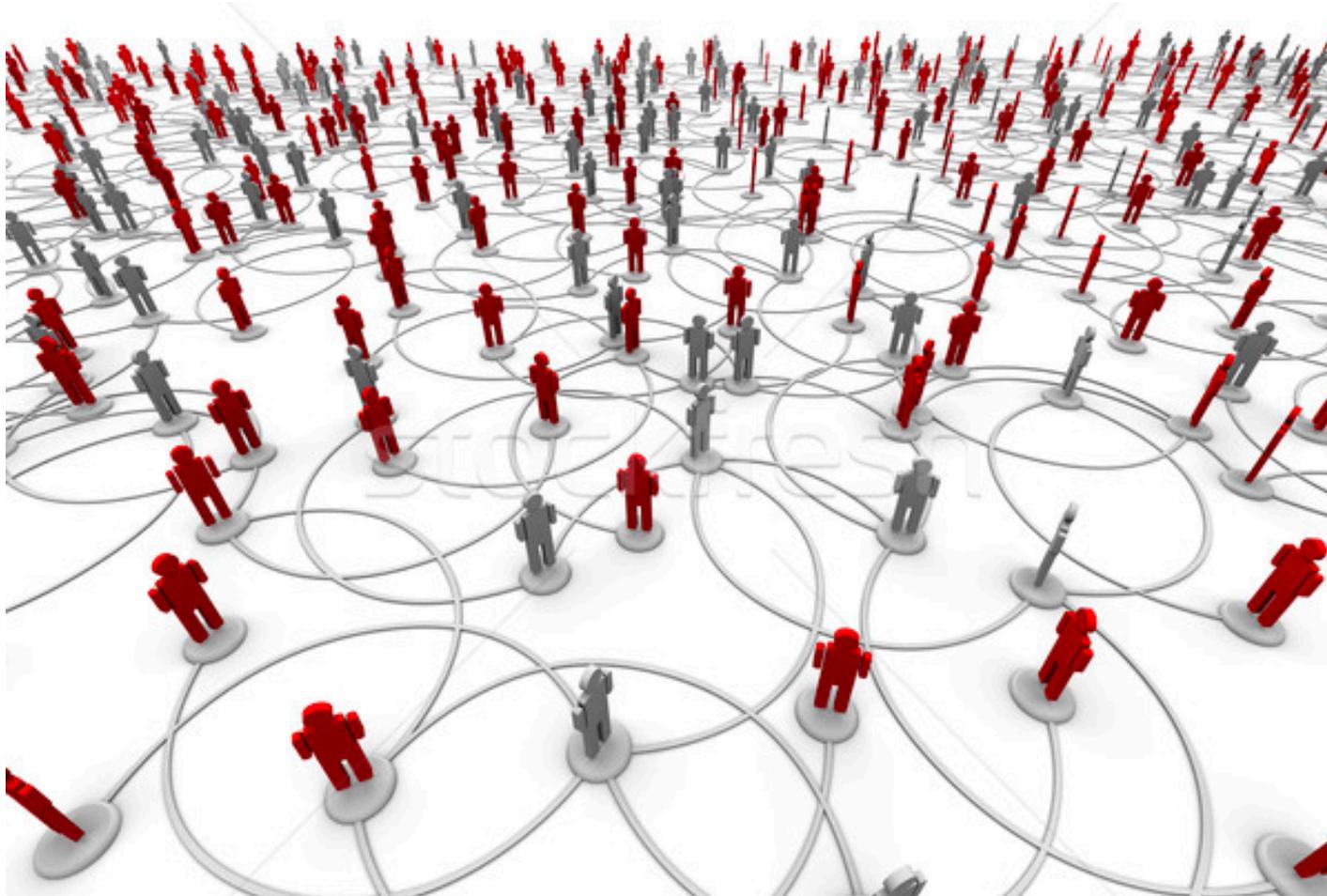
## Social network analysis

From Wikipedia, the free encyclopedia



Social network analysis has emerged as a key technique in modern [sociology](#). It has also gained a significant following in [anthropology](#), [biology](#),<sup>[12]</sup> [demography](#), [communication studies](#),<sup>[3][13]</sup> [economics](#), [geography](#), [history](#), [information science](#), [organizational studies](#),<sup>[6][8]</sup> [political science](#), [public health](#),<sup>[14][7]</sup> [social psychology](#), [development studies](#), [sociolinguistics](#), and [computer science](#)<sup>[15]</sup> and is now commonly available as a consumer tool (see the [list of SNA software](#)).<sup>[16][17][18][19]</sup>

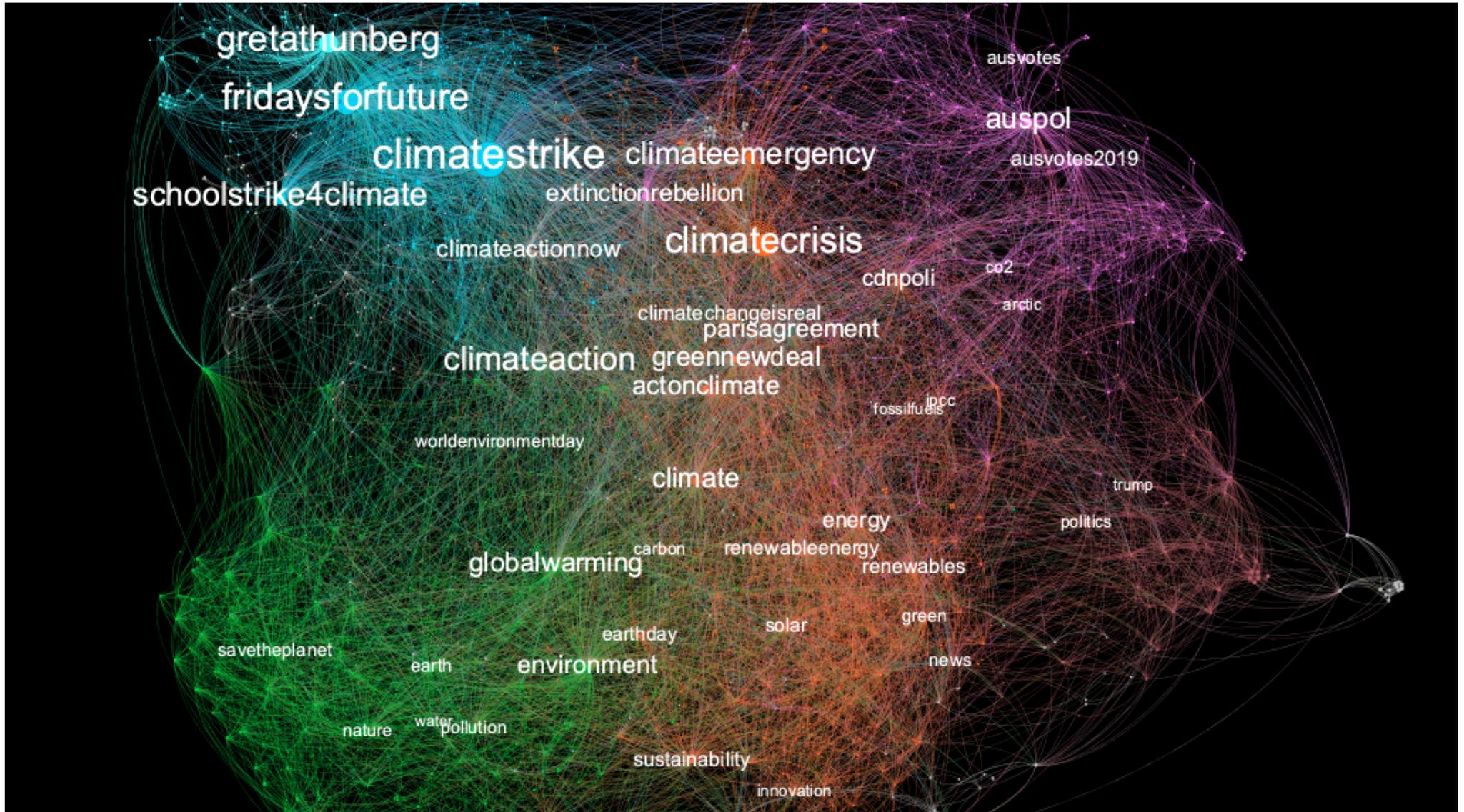
# What is a network?



- Network = anything that interconnects  
e.g., people sharing friendship in a social network platform

# Network examples

2019 hashtag network related to #climatechange (from Twitter)

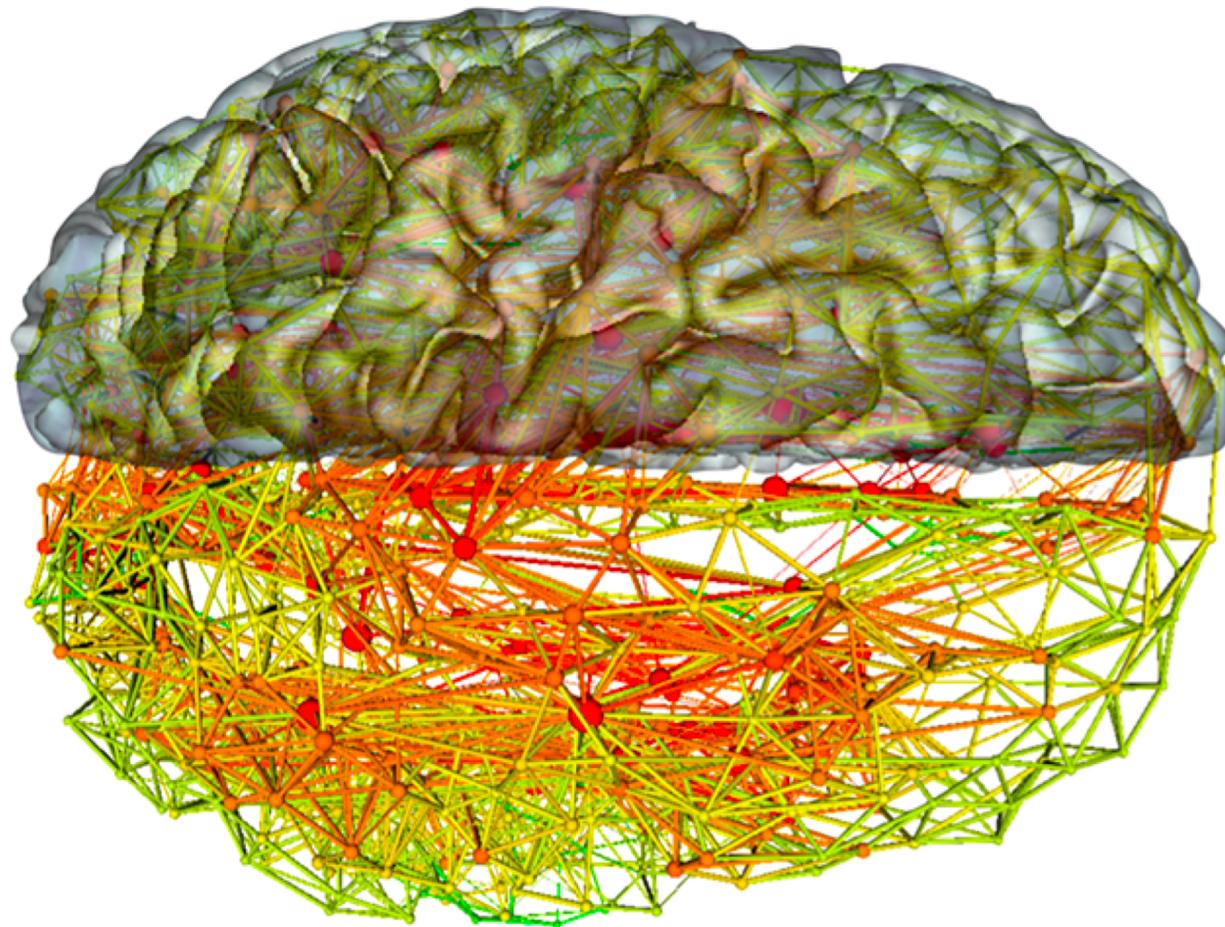






# Network examples ... cont'd

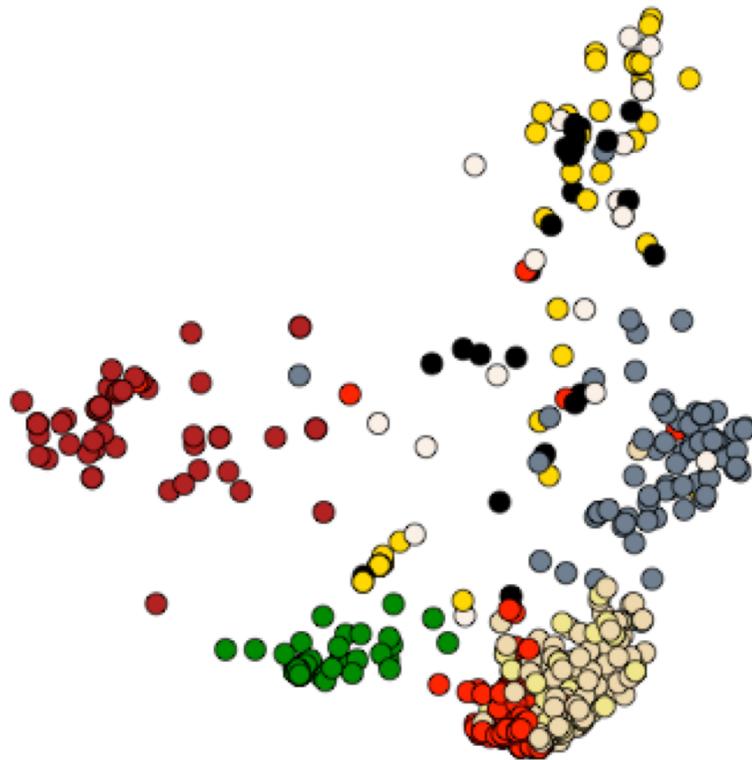
The brain network (functional connectivity network)



# Network examples ... cont'd

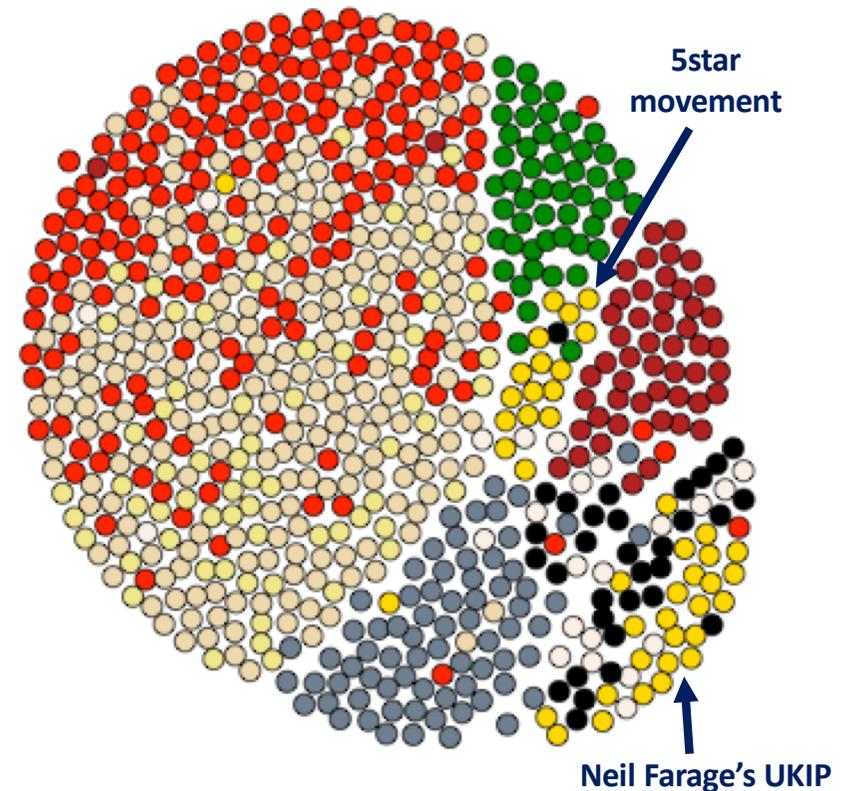
April-May 2016 political network (votes at the EU parliament)

spectral clustering layout



SimRank force directed layout

- GUE-NGL
- Greens-EFA
- S&D
- ALDE
- EPP
- ECR
- ENF
- EFDD
- NI



# And how do we study networks?

With a **holistic** character

(the whole is greater than the sum of its parts)

The approach is

**Empirical** (driven by concrete data),

**Precise** (requires a proper formalism),

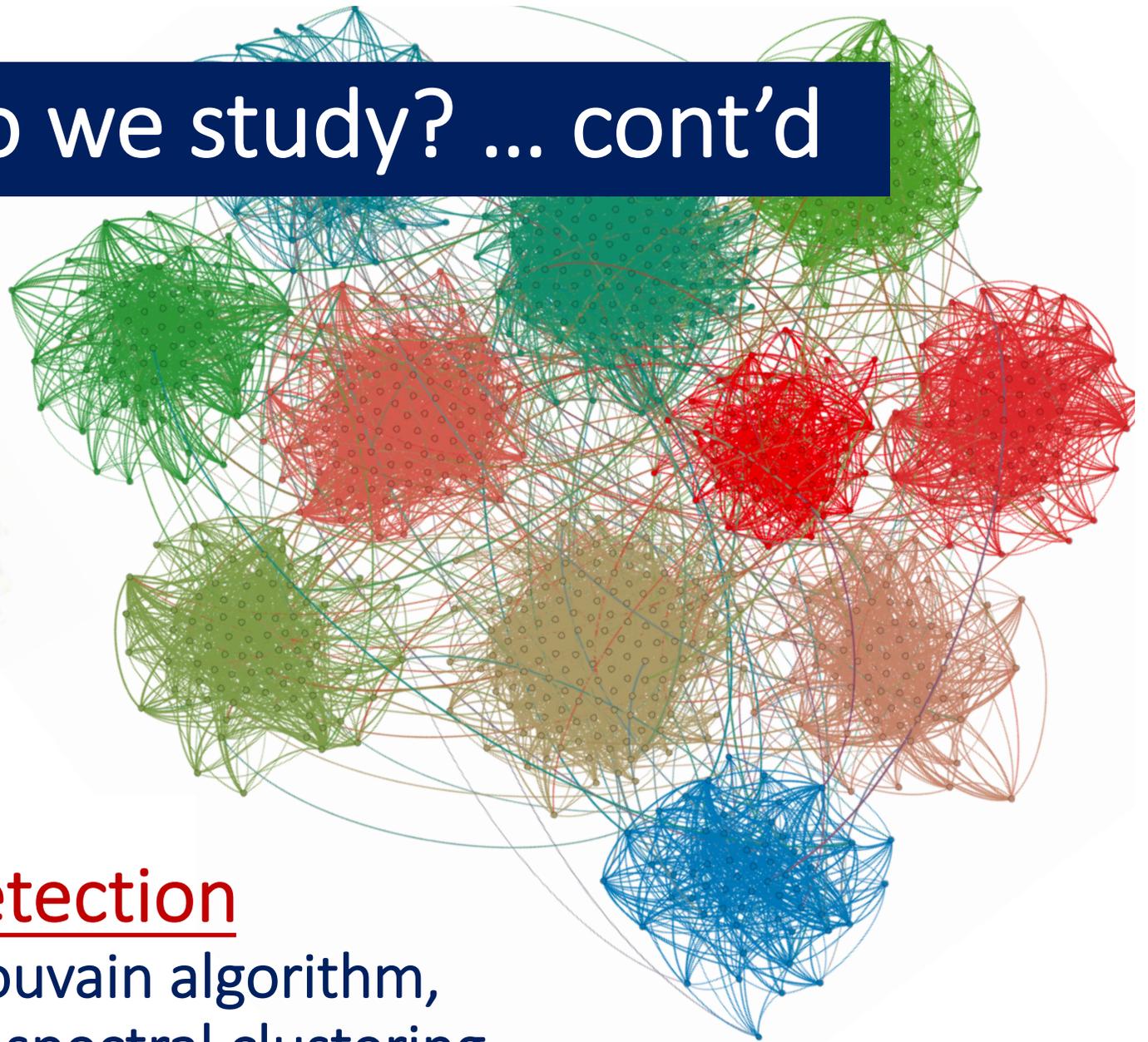
**Interdisciplinary** (can be applied to several fields),

**Challenging** (in data size and in objectives), and

...and fun 😊



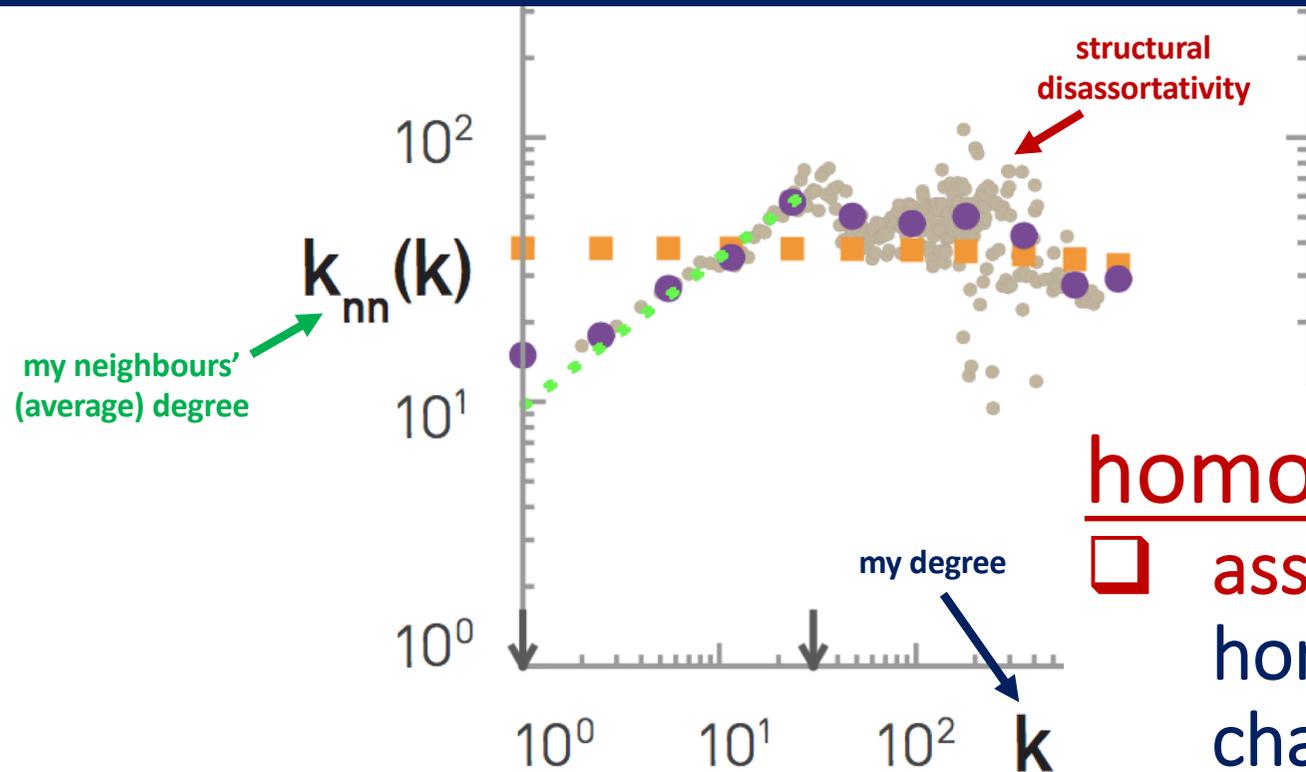
# And what do we study? ... cont'd



## community detection

- modularity, Louvain algorithm, conductance, spectral clustering, overlapping communities

# And what do we study? ... cont'd



## homophily

- assortativity (degree homophily), echo chambers, polarization

## robustness

- how robust is a network to node removal?

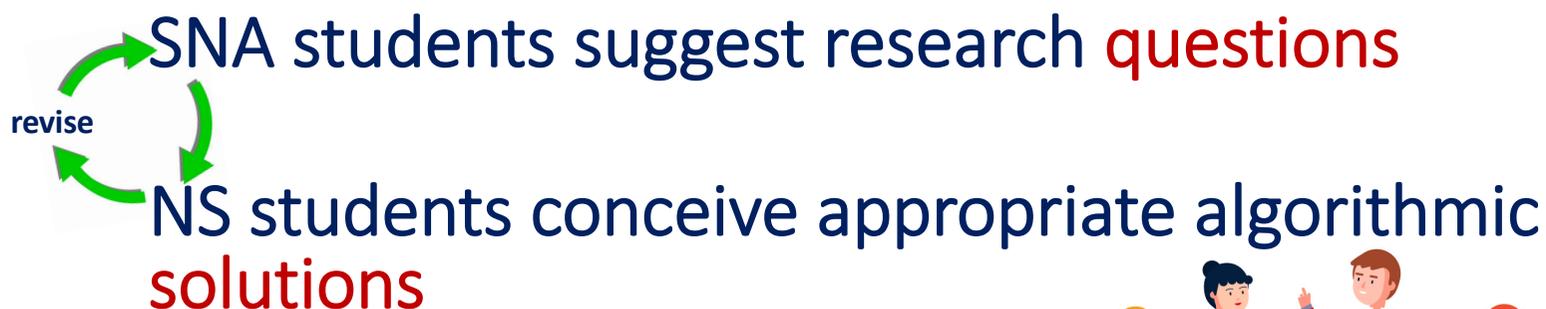
## link prediction

- which is the next link to activate?

# What about interdisciplinary projects ?

## □ Rationale

in collaboration with the twin course of  
Network Science @ ICT for Internet &  
Multimedia / Data Science



in **brainstorming sessions**  
instructors will help/give feedback 😊



# What do we use networks for?

## Social media analytics

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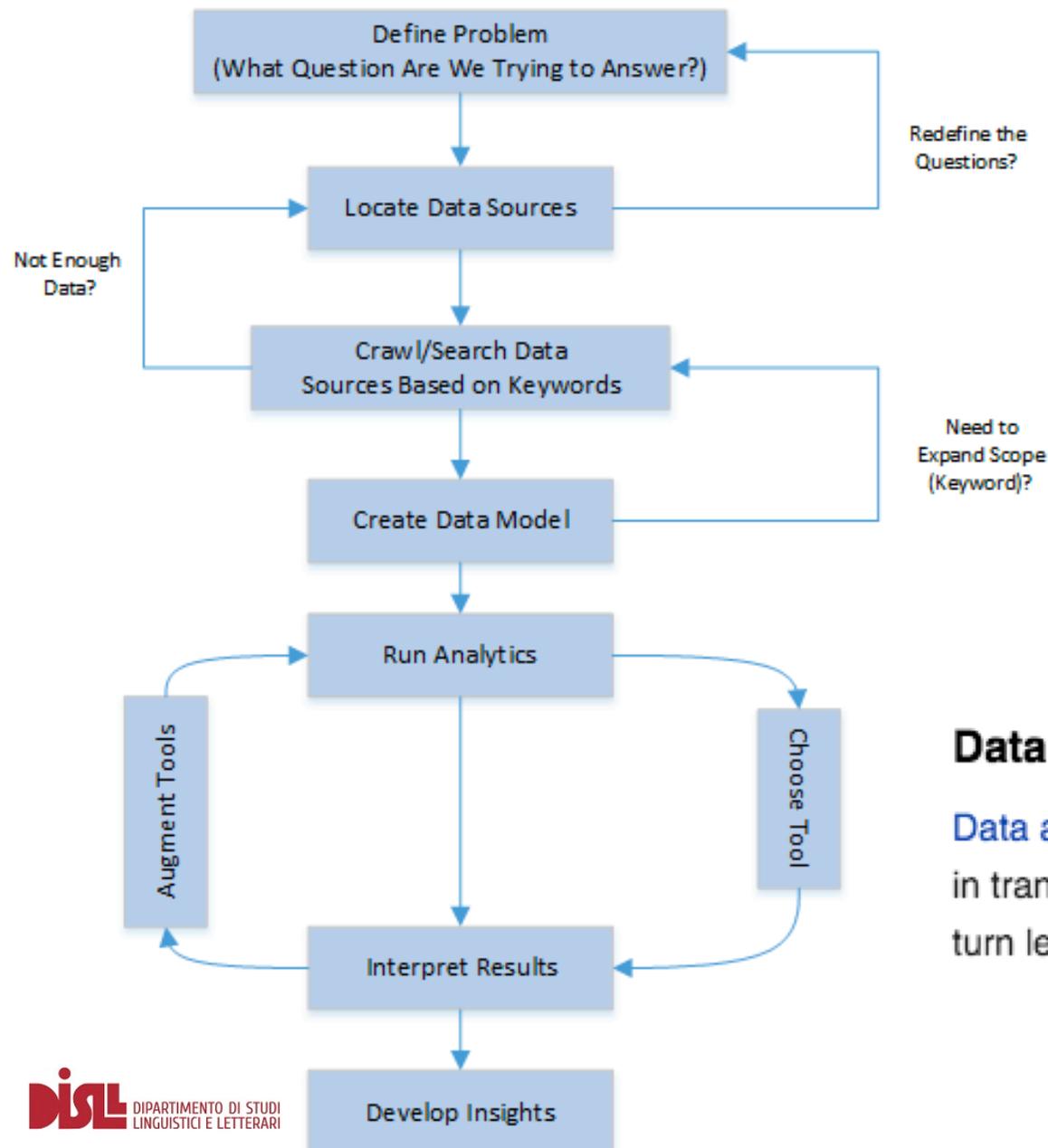
From Wikipedia, the free encyclopedia

*This article is about the quantitative analysis of social media. For theoretical foundations, see [social network analysis](#).*

**Social media analytics** is the process of gathering and analyzing data from [social networks](#) such as [Facebook](#), [Instagram](#), [LinkedIn](#) and [Twitter](#). It is commonly used by marketers to track online conversations about products and companies. One author defined it as "the art and science of extracting valuable hidden insights from vast amounts of semi-structured and unstructured social media data to enable informed and insightful decision making."<sup>[1]</sup>



# What do we use networks for?



## Data analysis

Data analysis is the set of activities that assist in transforming raw data into insight, which in turn leads to a new base of knowledge

# What is network science?

## Network science

From Wikipedia, the free encyclopedia

*For other uses, see [Network \(disambiguation\)](#).*

**Network science** is 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 represented by *nodes* (or *vertices*) and the connections between the elements or actors as *links* (or *edges*). The field draws on theories and methods including **graph theory** from mathematics, **statistical mechanics** from physics, **data mining** and **information visualization** from computer science, **inferential modeling** from statistics, and **social structure** from sociology. The **United States National Research Council** defines network science as "the study of network representations of physical, biological, and social phenomena leading to **predictive models** of these phenomena."<sup>[1]</sup>



# Interdisciplinary projects 2019

**MIME.**  
Master's degree ICT Internet Multimedia Engineering

**DI**  
DIPARTIMENTO  
DI INGEGNERIA  
DELL'INFORMAZIONE

**DISL** DIPARTIMENTO DI STUDI  
LINGUISTICI E LETTERARI

Dipartimento di  
Psicologia dello Sviluppo  
e della Socializzazione

## INTERDISCIPLINARY PROJECTS PRESENTATION

Network Science &  
Social Networks Analysis

**AULA MAGNA LEPSCHY**

DEI - VIA GRADENIGO 6 - PADOVA

Friday 31st Jan - 9:00



# Interdisciplinary projects 2019

**10:00 IP6 INSULTS AND HATE** networks from words in tweets

Salvatore Romano, Carlo Facchin, Enrico Lanza, Abanoub Gaber Aziz Saeed, Alberto Zancanaro

**10:40 IP2 ITALIAN POLITICIANS AND IMMIGRATION**

Giovanni Boato, Martina Eleno, Riccardo Pinton, Sarra Ben Mayassa, Salihi Memen, Francesco Savio, Mario Serafin

**11:20 IP7 NOODLES AND SPAGHETTI**

networks from recipes, food colours

Diana Ching-Fang Tai, Elena Camuffo, Giovanni Colotti, Laura Crosara, Federico Fiorenzoli, Daniele Lorenzi, Matteo Moro, Aniello Xie

**14:20 IP8 VENETO DIALECT**

network of social connections

Ainhoa Solomayor Aranburu, Ane Arzallus Alonso, Stella Mariz Barafon, Bianca Rangel Campinho, Fabio Cecchinato, Stefano Alberton

**15:00 IP3 PRO-LIFE AND PRO-CHOICE**

networks from words in tweets

Lara Schwarz, Leila Dzanko, Giulia Rizzoli, Sanja Miljanovic, Sara Shena

**15:30 IP1 FREEDA NETWORK**

Elena Faccio, Rachele Calamai, Damiano Clementel, Laura Iacovissi

**16:00 IP5 GRETA EFFECT AND CLIMATE CHANGE**

Riccardo Bergamasco, Francesca Civo, Martino De Nardi, Matteo Migliorini, Domenico Solimini, Carlotta Segna

# Is IPs dirty work?

well, it needs  
collaborating but ...

... the reward is  
worth the effort



# Calendar (tentative)

## OCTOBER

S	M	T	W	T	F	S
		intro	1	2	3	
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

22/10: Task 1  
Research topic

29/10: Task 2  
Net definition

4/11: Task 3  
Presentation to NS  
14:30-16:00 @DEI

## DECEMBER

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

17/12: Discussion

19/11: Discussion

## NOVEMBER

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Project presentation: date to be  
decided (roughly end of January)

# Exam sessions (starting dates)

- 1) Jan 29, 2021 (fri) - 10:00am
- 2) Feb 19, 2021 (fri) - 10:00am
- 3) Jul 2, 2021 (fri) - 10:00am
- 4) Sep 10, 2021 (fri) - 10:00am

Written + oral exam same day!

... and will add a date for IPs presentation

PS: You will be asked to enrol in

[www.uniweb.unipd.it](http://www.uniweb.unipd.it)

# Questions ?

