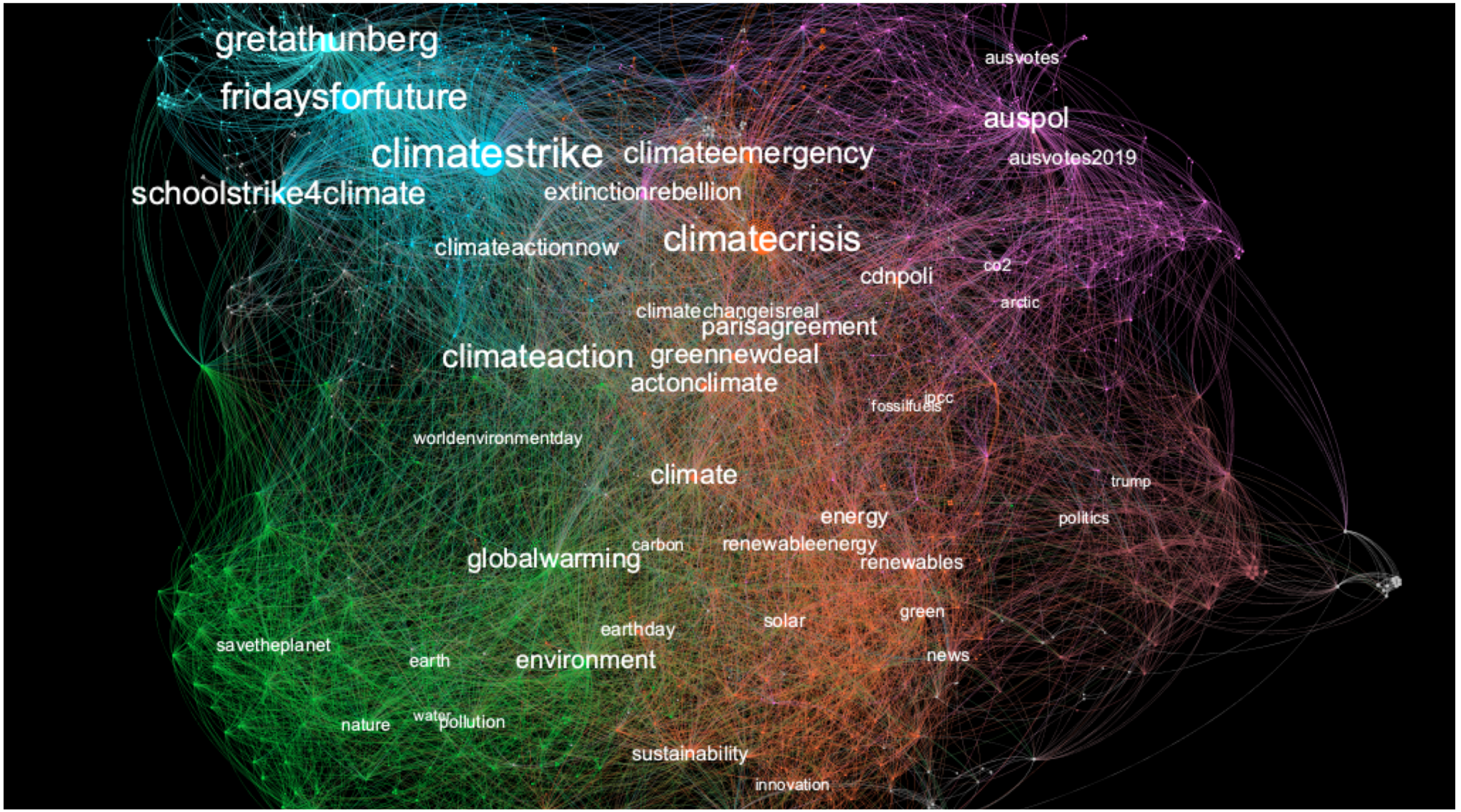
Social network analysis



2019 hashtag network related to #climatechange (by Matteo Migliorini)

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

In this course you'll also meet

Lejla Dzanko

Bruno Gabriel Salvador Casara

Lectures

- Thu 8:30-10:00
- Fri 8:30-10:00

Room 13
Complesso Beato Pellegrino
Via Beato Pellegrino, 32
Padova

Prerequisites

- Useful Knowledge

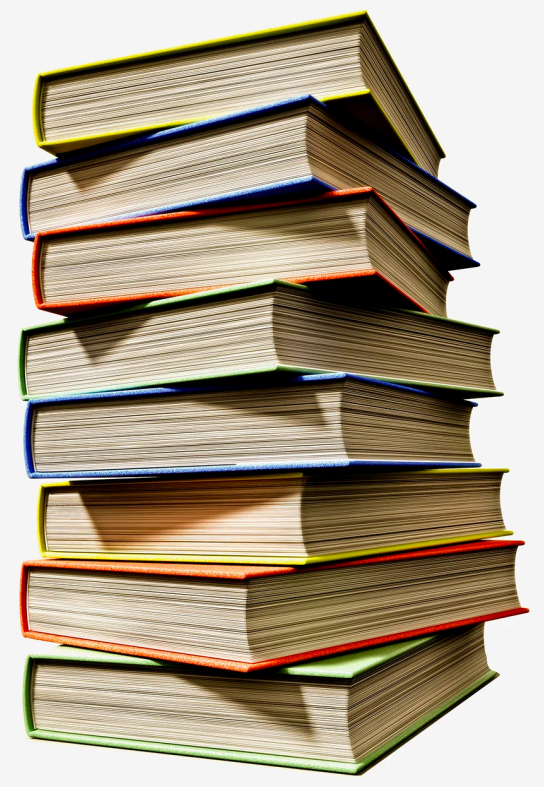
Statistics / Statistical analysis
Socio psychological processes of communication
Techniques for social inquiry

- Further useful competencies

Networking processes in sociology, semantics, etc …
Coding

Textbooks ?

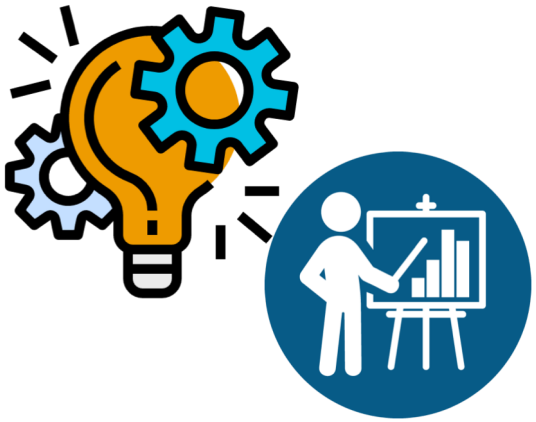
- No textbook! ☺
- Slides/videos & additional material available in Moodle @ssu.elearning.unipd.it



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**

  +2 bonus if completed by 1st session/IP day

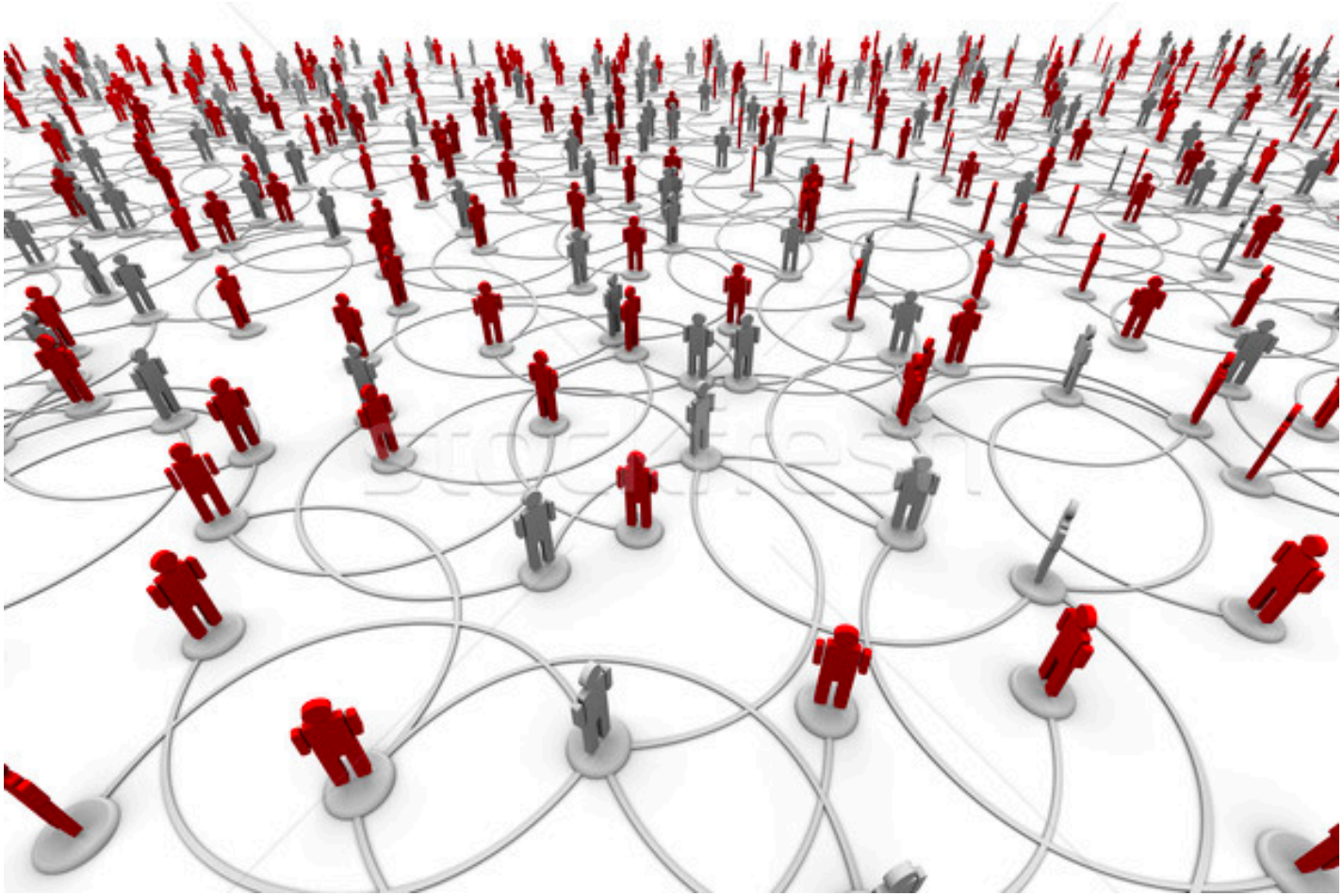
What is SNA?

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.[1] 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,[2][3] memes spread,[4] information circulation,[5] friendship and acquaintance networks, business networks, knowledge networks,[6][7] difficult working relationships,[8] social networks, collaboration graphs, kinship, disease transmission, and sexual relationships.[9][10] 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.[11]

What is a network?



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

What is SNA? (cont'd)

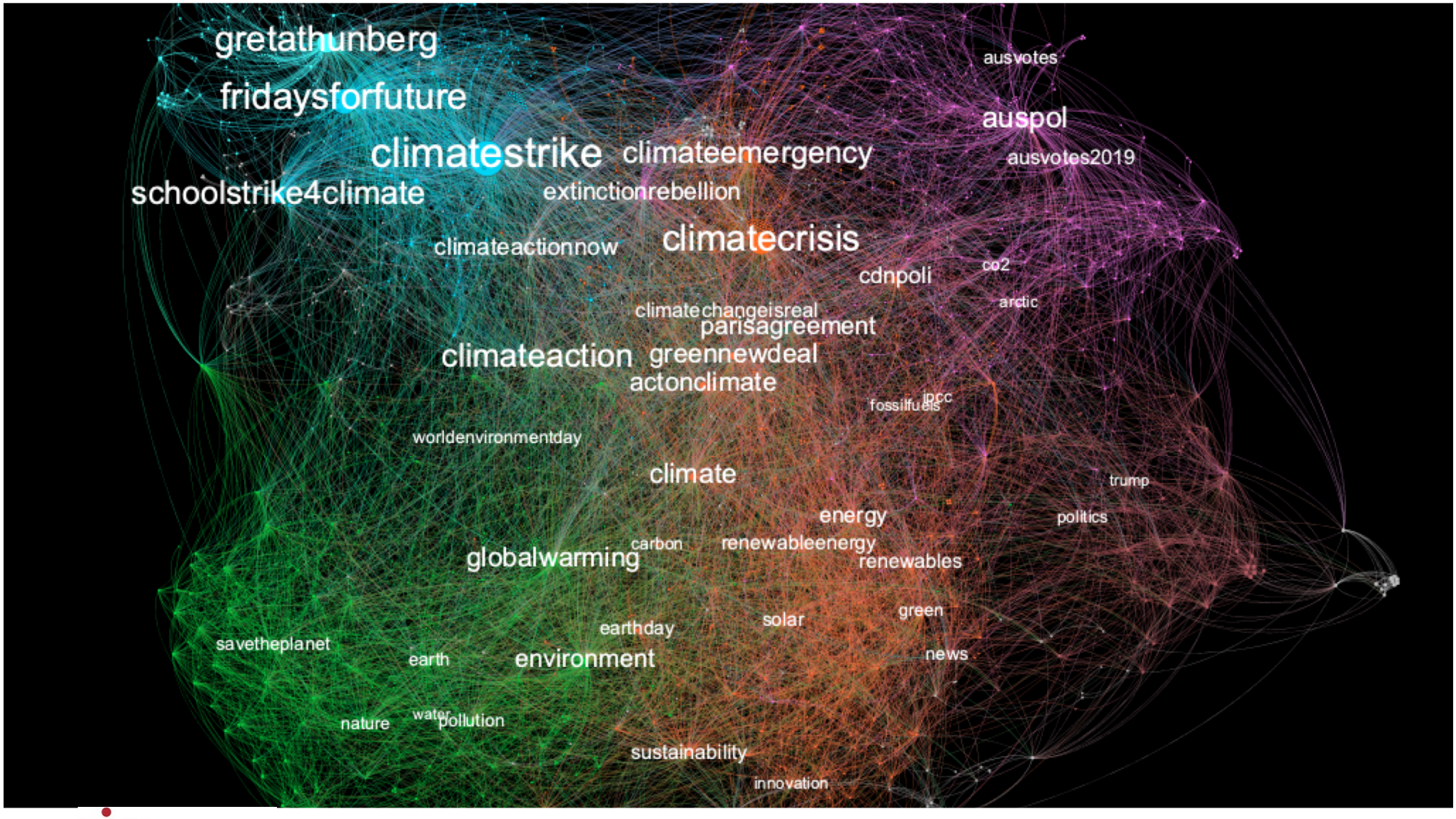
Social network analysis

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,[12] demography, communication studies,[3][13] economics, geography, history, information science, organizational studies,[6][8] political science, public health,[14][7] social psychology, development studies, sociolinguistics, and computer science[15] and is now commonly available as a consumer tool (see the list of SNA software).[16][17][18][19]

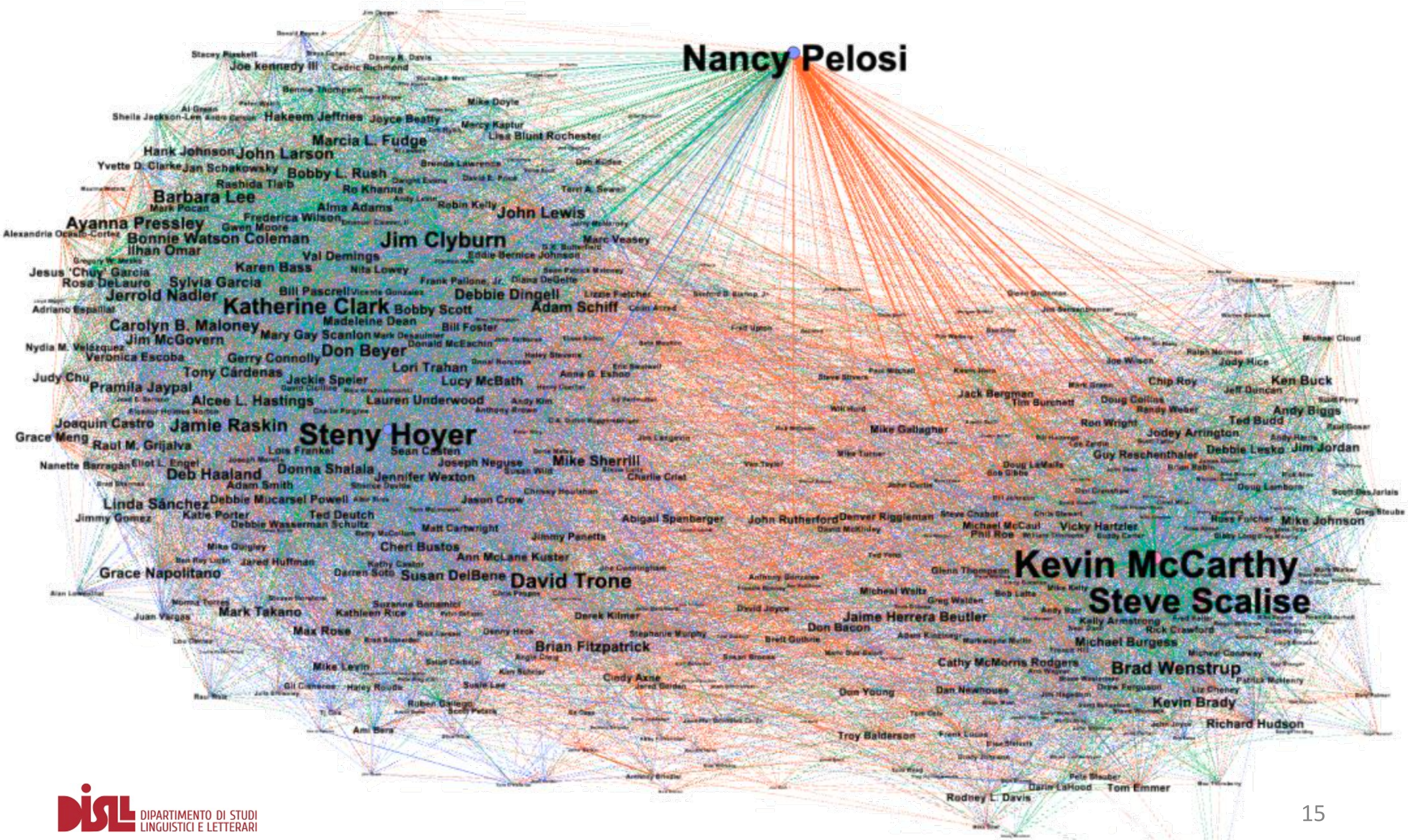
Network examples

2019 hashtag network related to #climatechange (from Twitter)



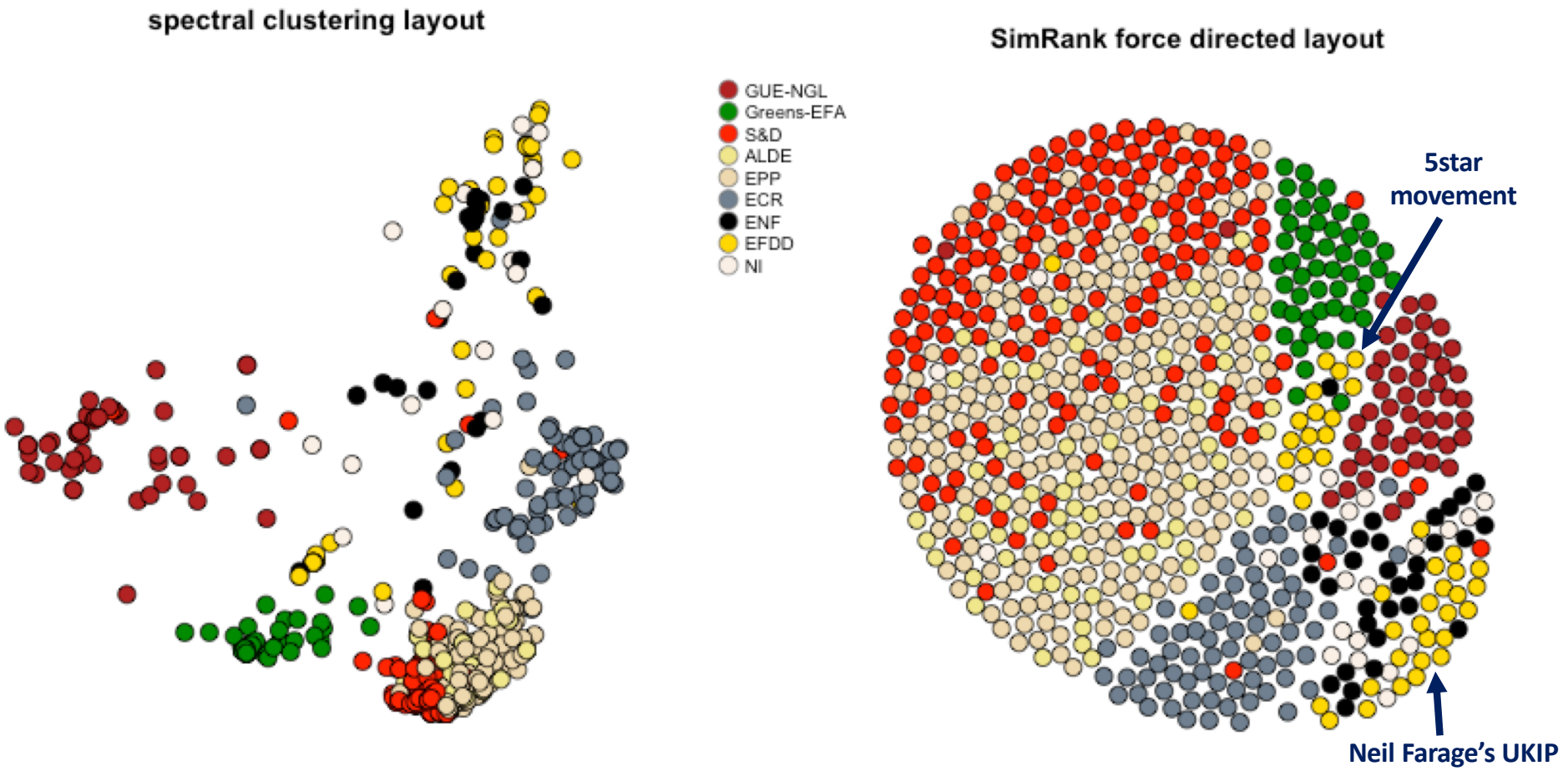
Network examples … cont’d

US Parliament – likes, mentions, retweets



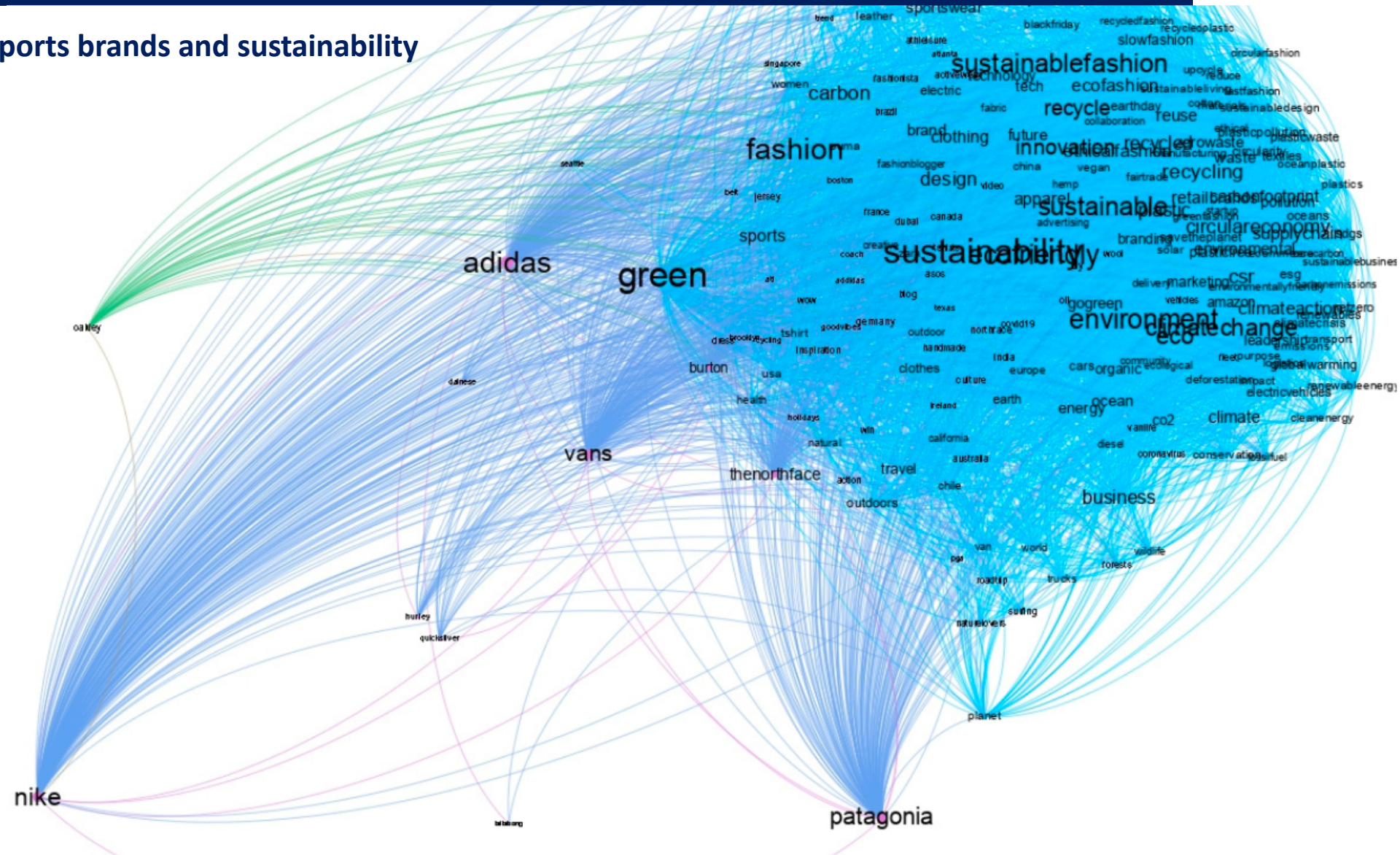
Network examples … cont'd

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



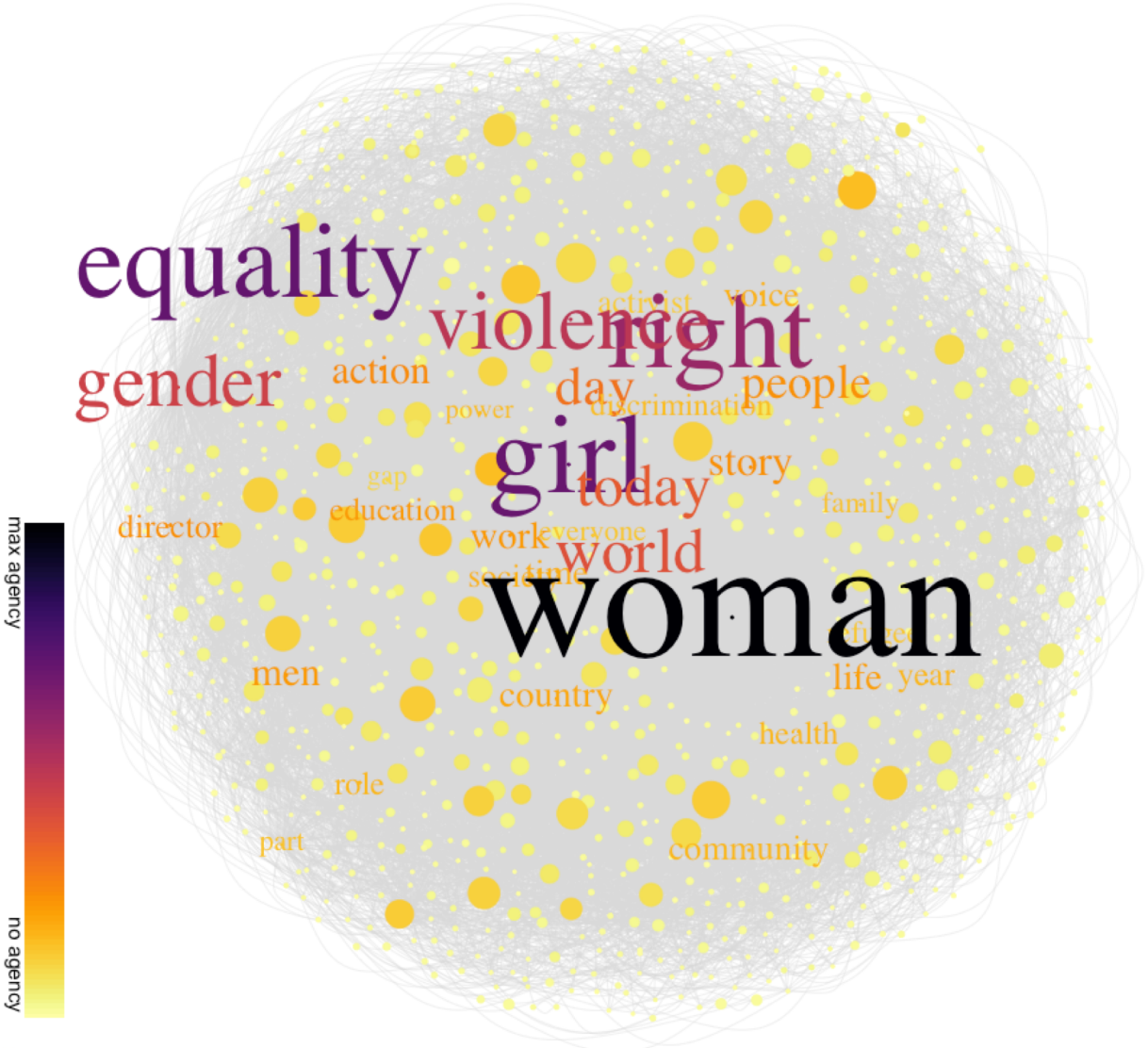
Network examples … cont'd

Sports brands and sustainability



Network examples … cont'd

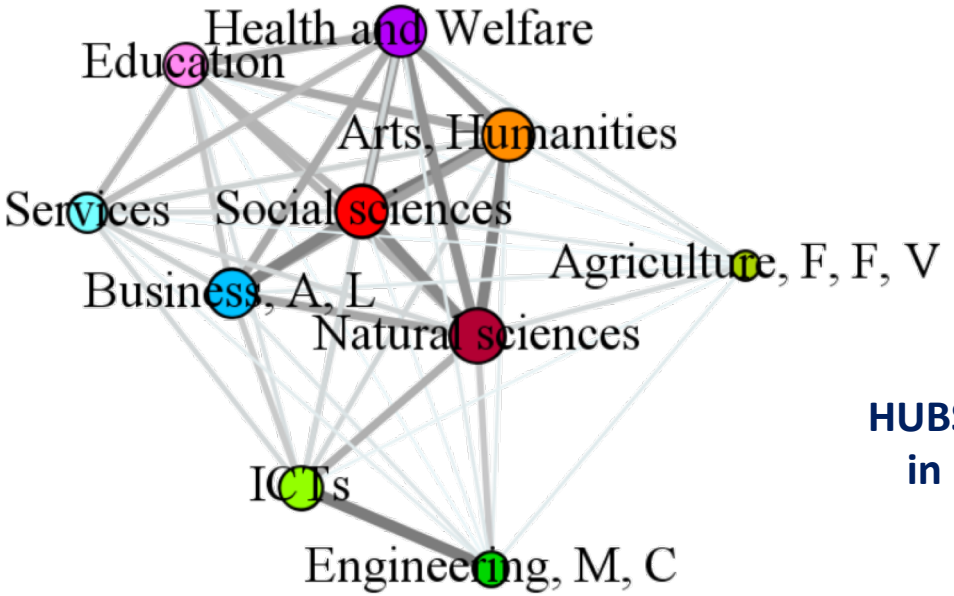
2018 nouns network related to @UN_Women pages on Twitter



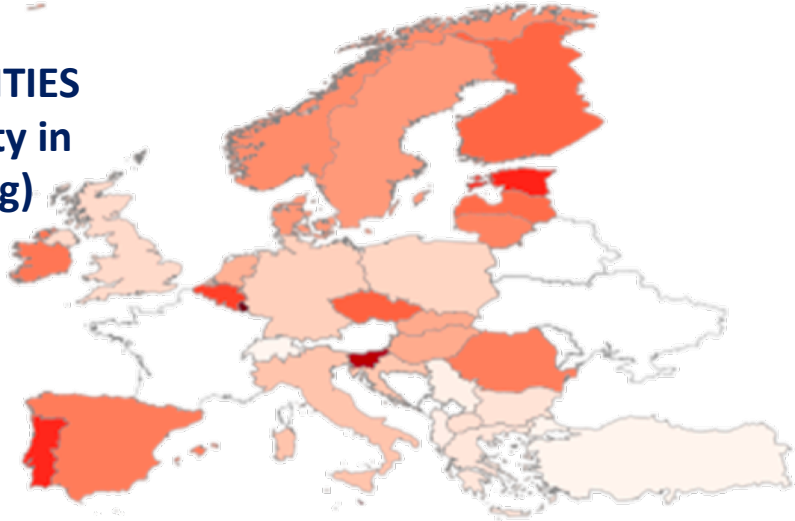
Network examples … cont'd

Erasmus+ exchange, 2016 enrolment

Fields of study



AUTHORITIES (centrality in sending)



HUBS (centrality in receiving)

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And how do we study networks?

With a holistic character

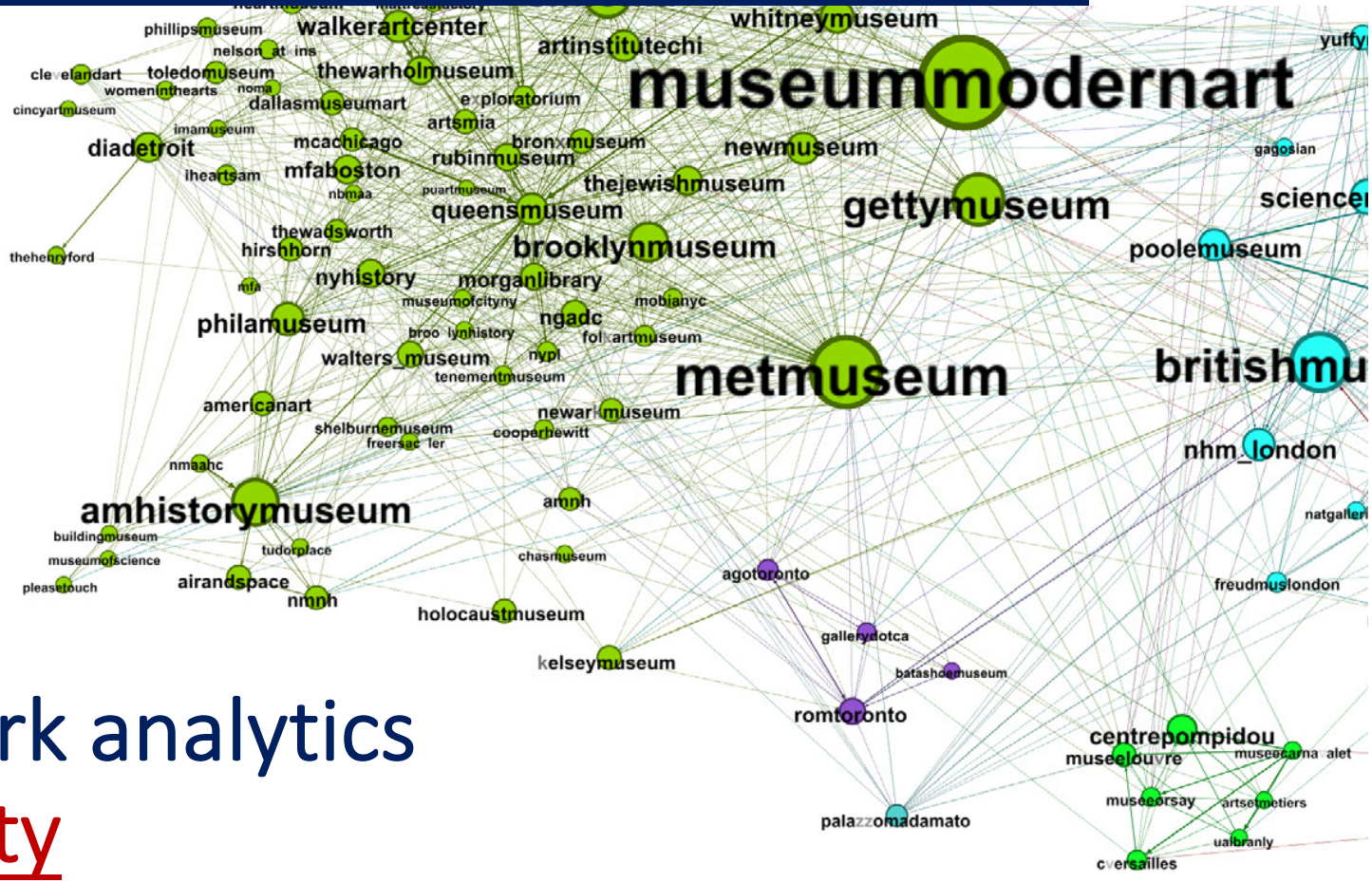
(the whole is greater than the sum of its parts)

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?



many network analytics
e.g., centrality

- degree, PageRank, HITS, betweenness, etc.

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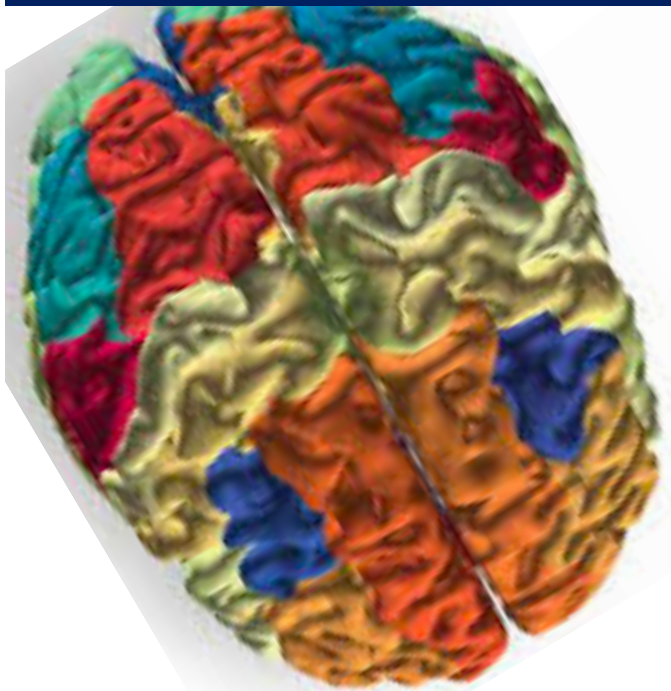
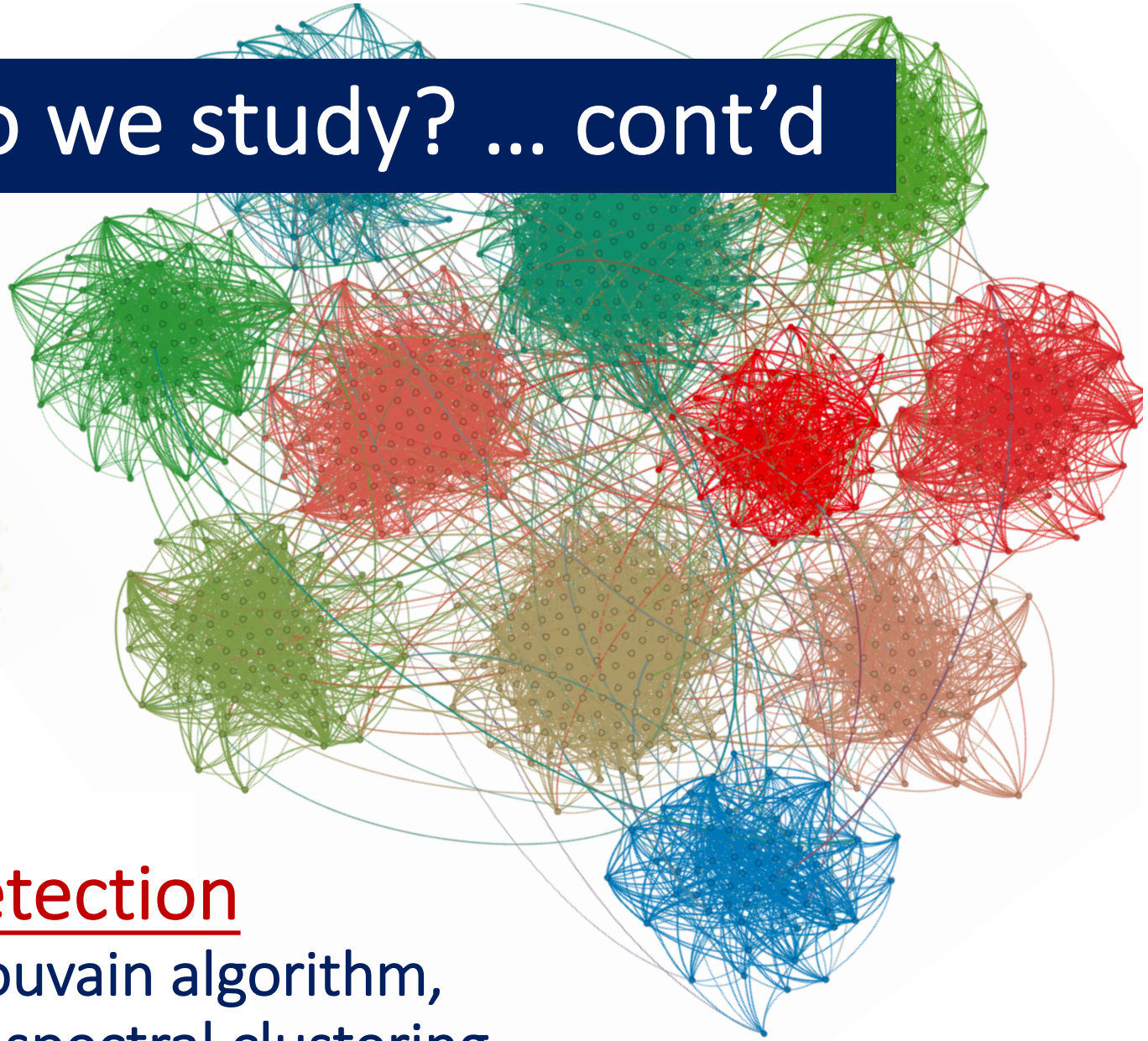
And what do we study? … cont'd

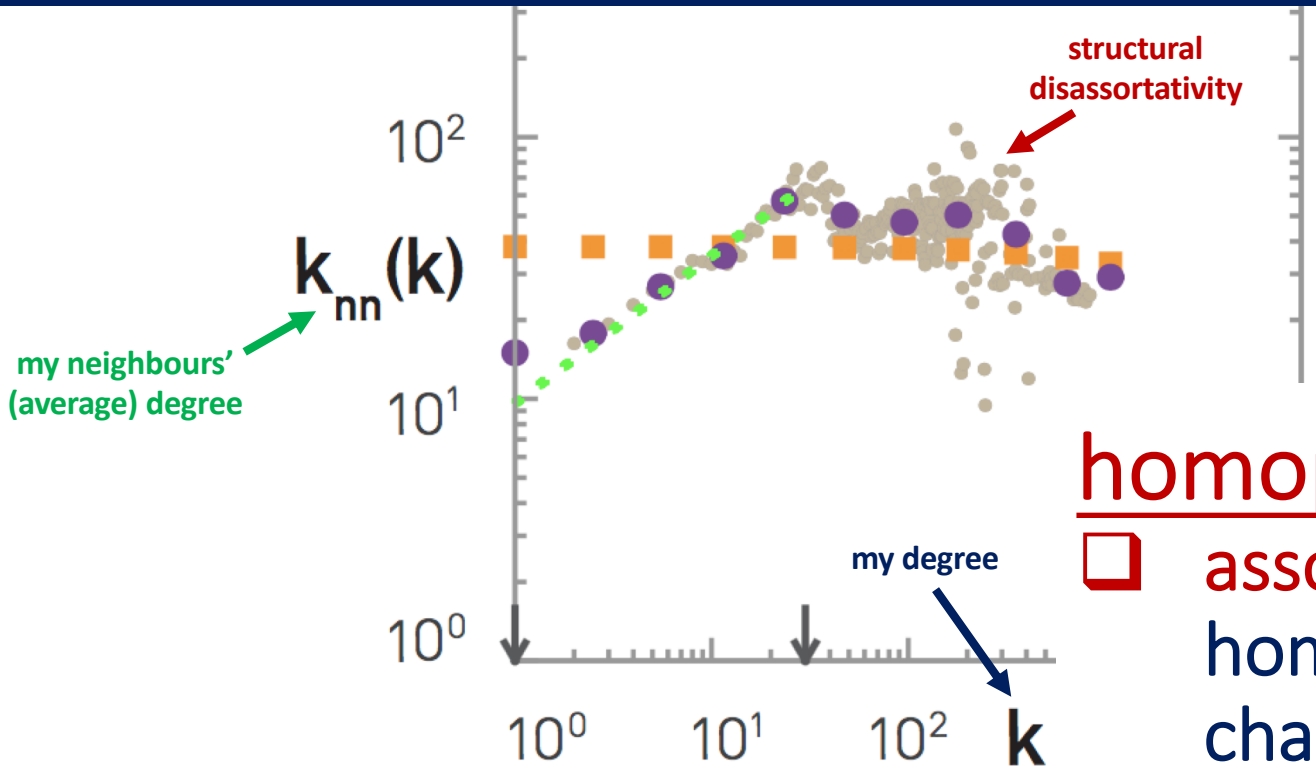




community detection

- 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

SNA students suggest research questions

NS students conceive appropriate algorithmic solutions

in brainstorming sessions
instructors will help/give feedback ☺

Your NS colleagues ☺

What do we use networks for?

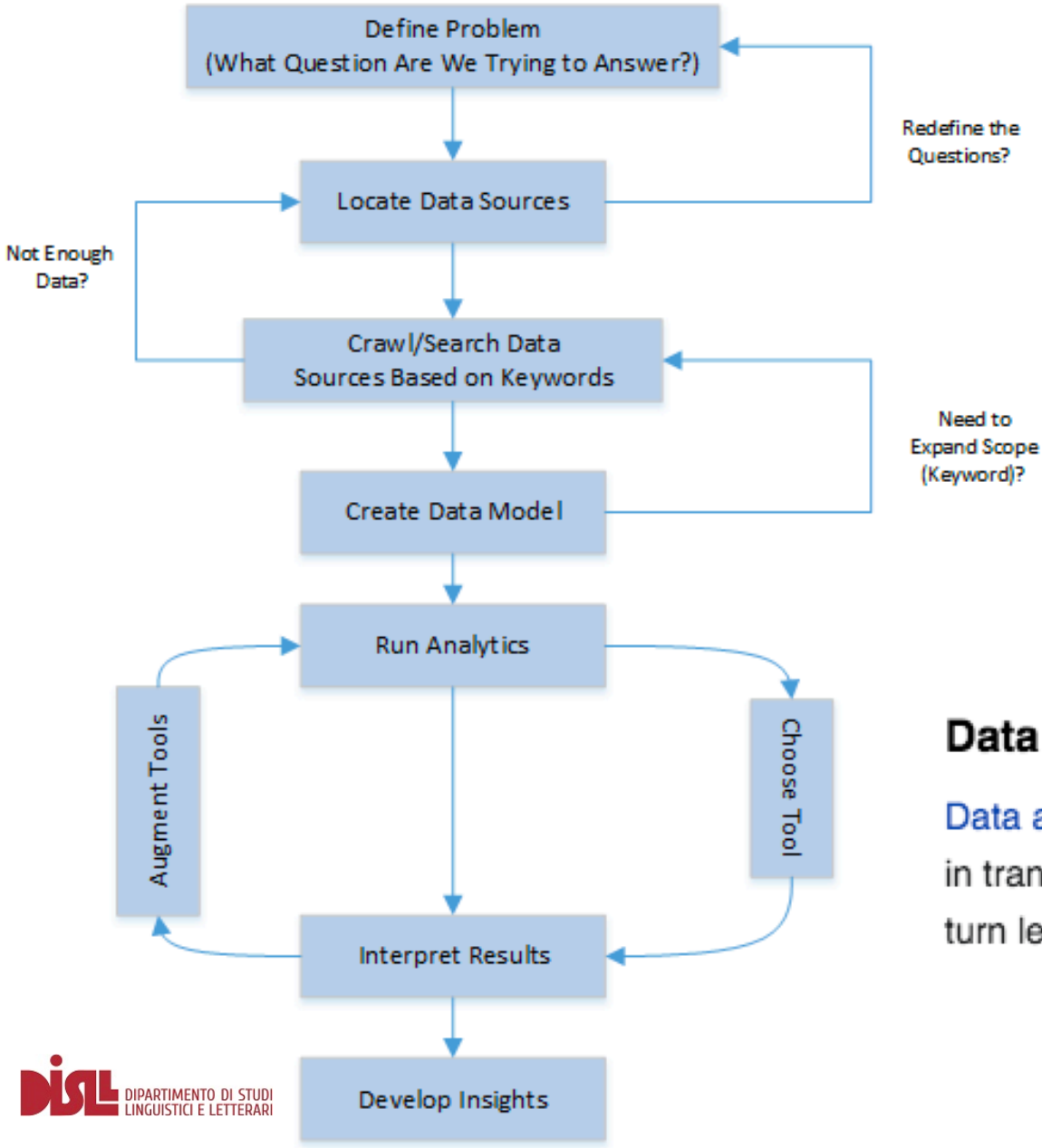
Social media analytics

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."[1]

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

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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."[1]

Interdisciplinary projects 2019

MIME
Master's degree ICT Internet Multimedia Engineering

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Dipartimento di Psicologia dello Sviluppo e della Socializzazione

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 Sotomayor 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

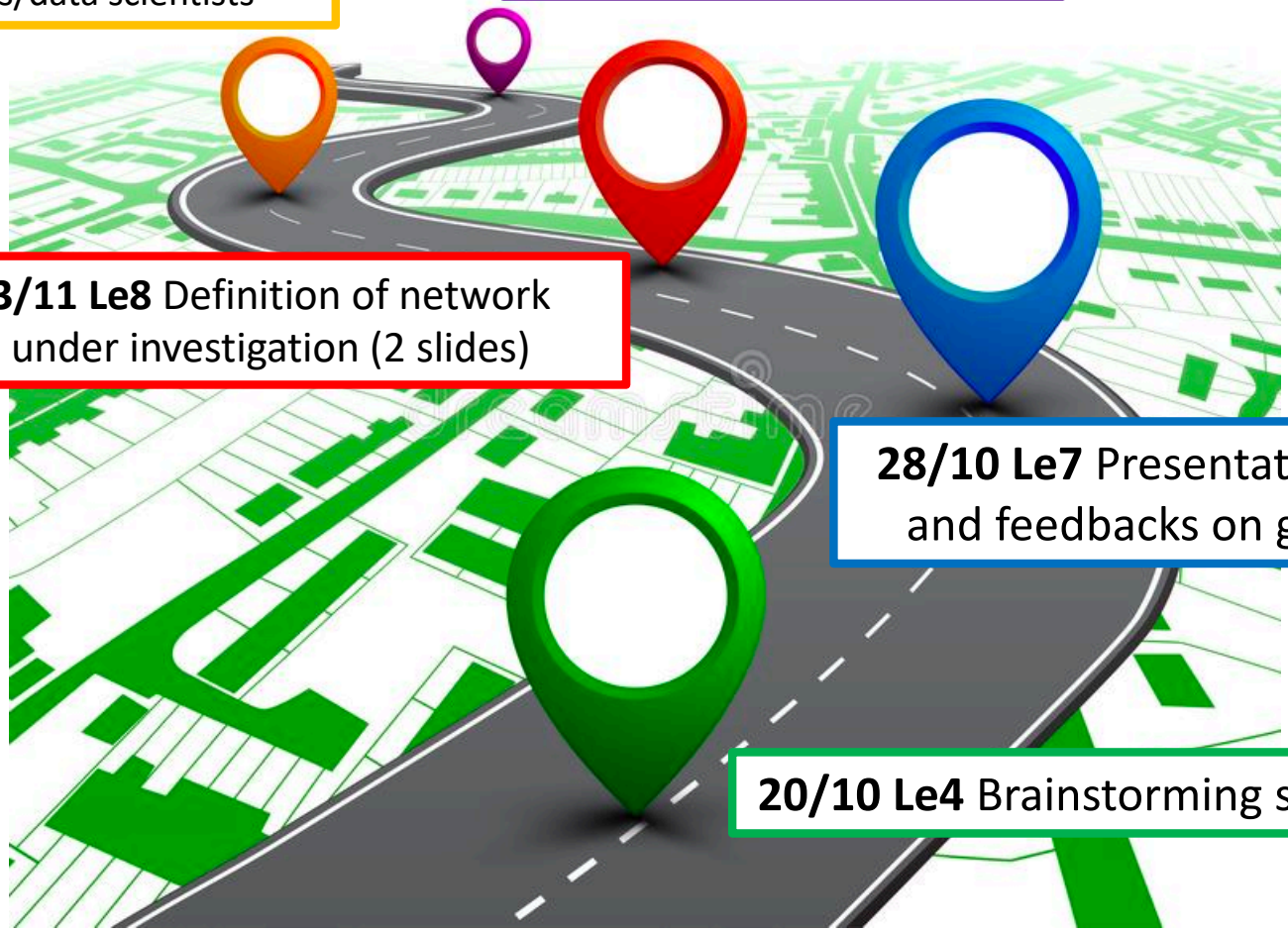
15:30 IP1 **FREEDA NETWORK**
Elena Faccio, Rachele Calamai, Damiano Clementel, Laura Iacovissi

16:00 IP5 **GRETA EFFECT AND CLIMATE CHANGE**
Riccardo Bergamasco, Francesca Civo, Martino De Nardi, Matteo Migliorini, Domenico Solimini, Carlotta Segna

IP roadmap (tentative)

8/11 Le10 Presentation to engineers/data scientists

6/2/2023 IP presentation day



3/11 Le8 Definition of network under investigation (2 slides)

28/10 Le7 Presentation of groups and feedbacks on group topics

20/10 Le4 Brainstorming session

Exam sessions (tentative dates)

1° session Jan 28?, 2022 (Sat) - 10:00am
IP day Feb 6, 2023 (Mon) - 9:00
2° session Feb 18?, 2022 (Sat) - 10:00am

Others tbd

PS: You will be asked to enrol in
www.uniweb.unipd.it