Observing the evolution of the climate change debate across different public spheres

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Introduction

European Commission | Horizon 2020 European Union funding for Research & Innovation

ODYCCEUS

Opinion Dynamics and Cultural Conflict in European Spaces

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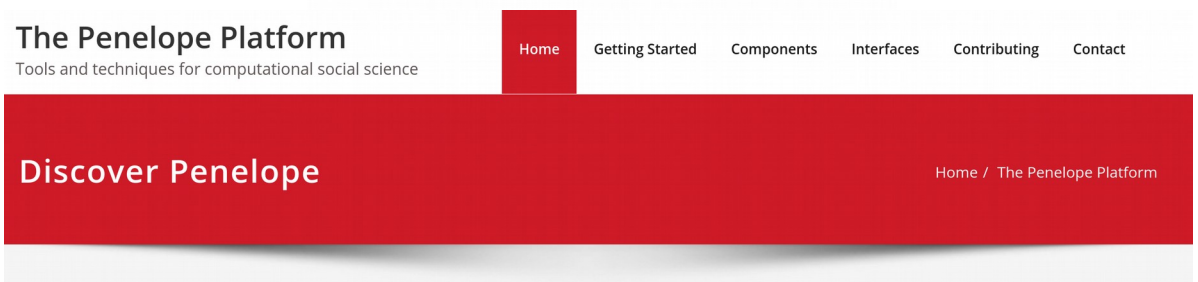

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Topics: geopolitics, refugees crisis, **climate change debate**

Media spheres

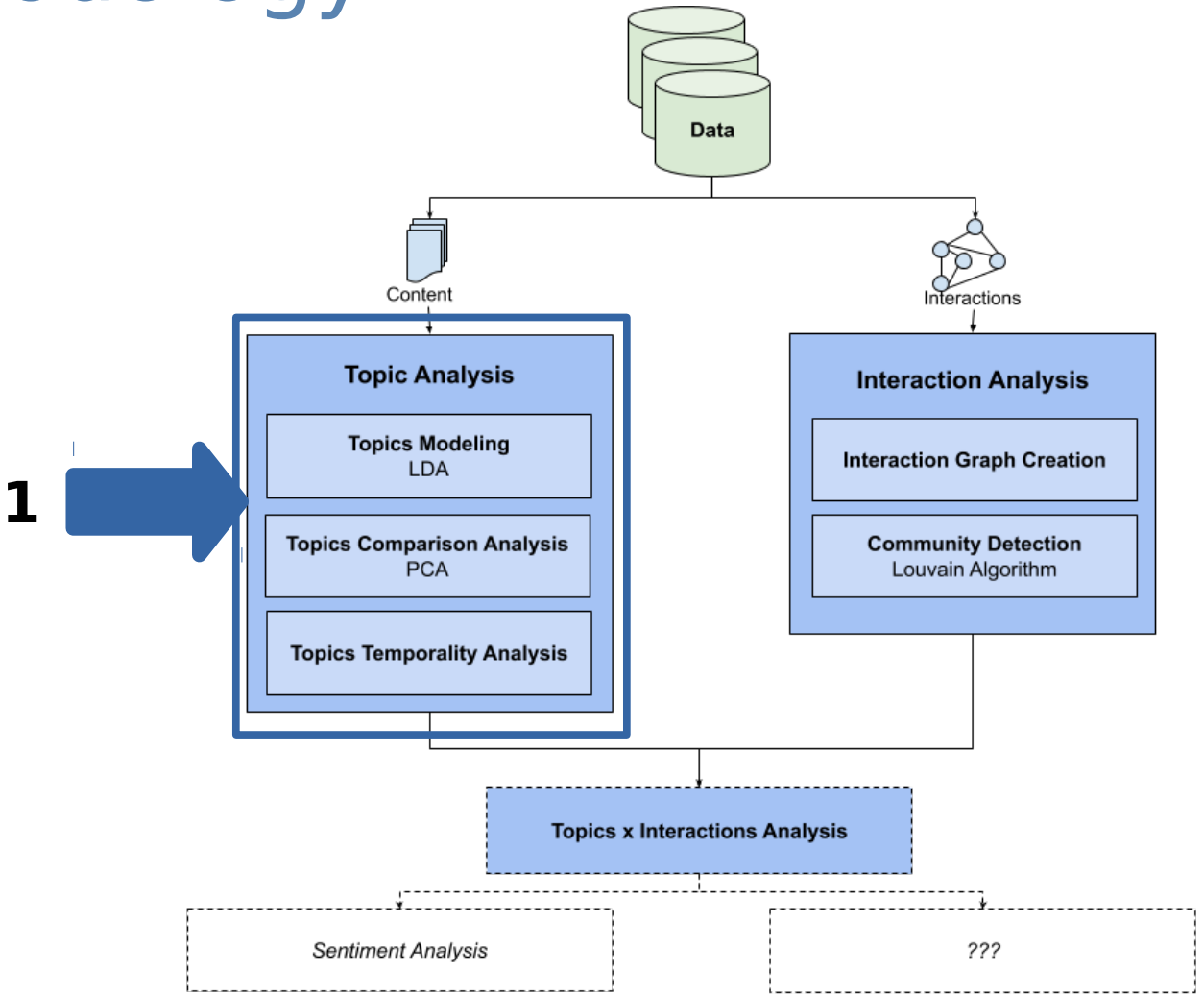
Dataset	Media sphere	Time span	Volume
Twitter	Social media	01/2016 – 04/2019	26.7M
Guardian	Mass media	01/2016 – 04/2019	79K
UK Parliament Speeches	Political	01/2016 – 12/2019	2.6K

All filtered by the use of “climate change”

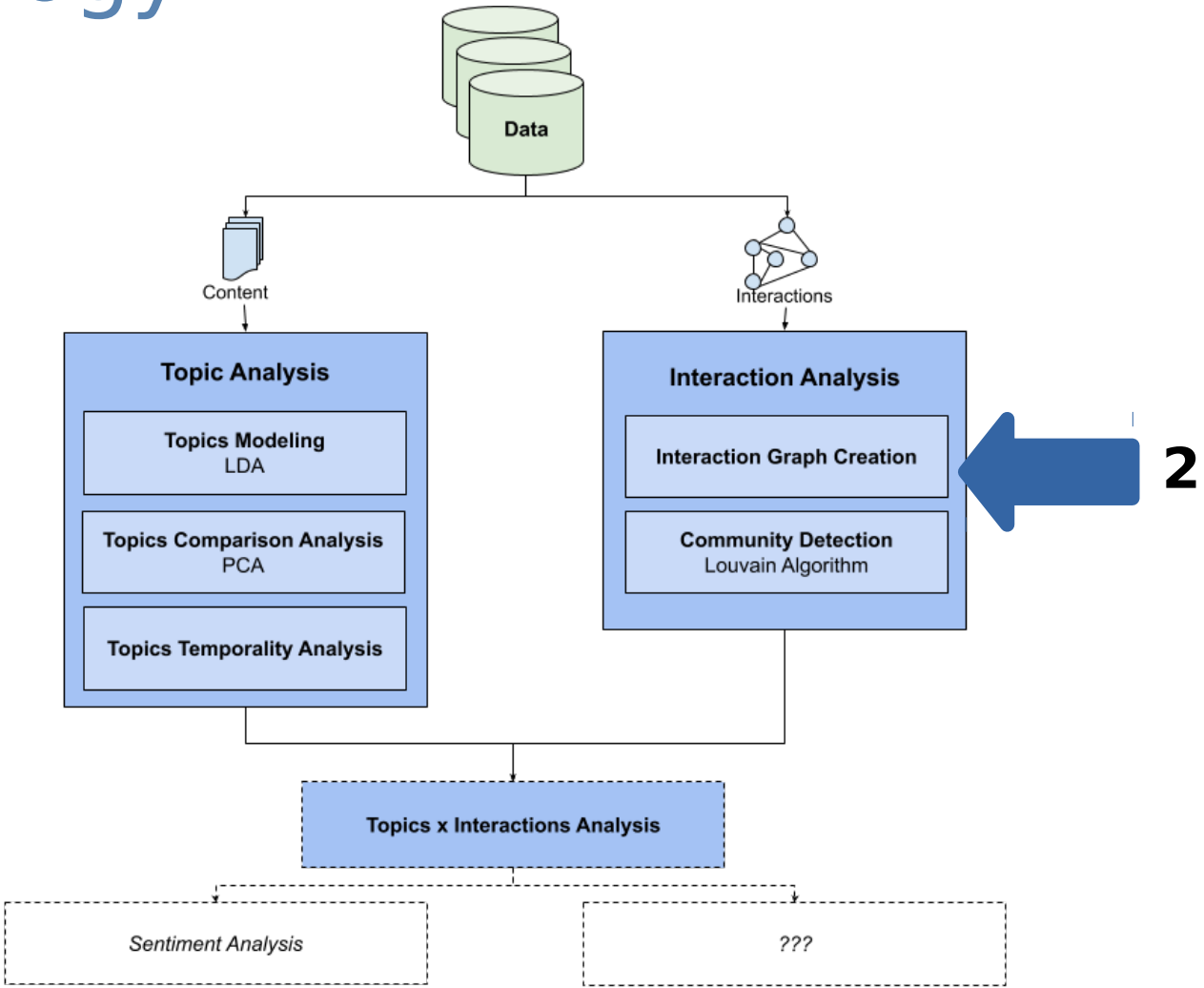
Research Questions

- **How is climate change discussed in different media spheres?**
  - What particular topics are discussed by each of them?
  - How does the used vocabulary differ in each of the spheres?
  - How are climate-related events treated by them?
  - What kind of interaction patterns do we observe in such discussions?

Methodology



Methodology



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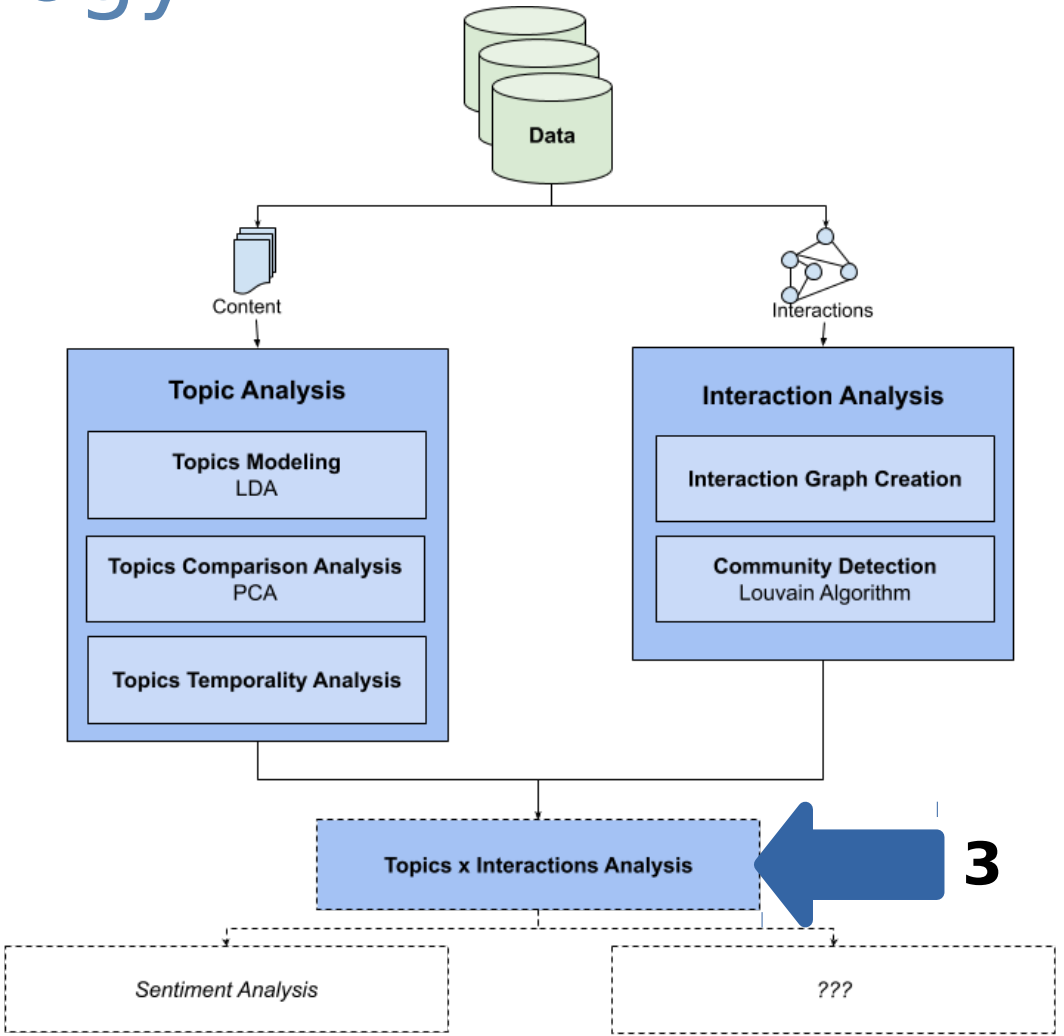
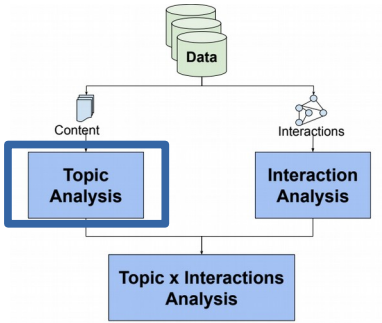


Topic Modeling

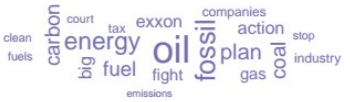


- **Latent Dirichlet Allocation (LDA)**

D.M. Blei, A.Y. Ng, M.I. Jordan, "Latent Dirichlet Allocation" Journal of Machine Learning Research 3 (2003)

Dataset	Document
Twitter	Tweet
Guardian	Article
UK Parliament Speeches	Speech

Topic Modeling



Topic 3

Topic 4

Topic 5

Topic 6

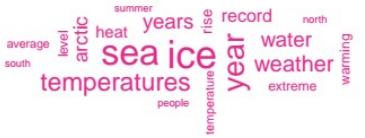
Topic 7

Topic 8

Topic 9

guardian–articles–alpha–0.1–ngram–1

Topic 1



Topic 2

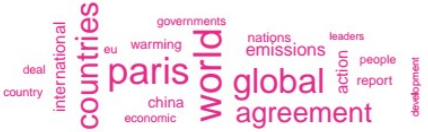
Topic 3

Topic 4

Topic 5

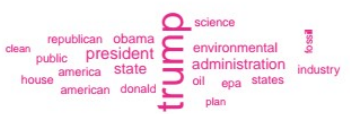
Topic 6

Topic 7



Topic 8

Topic 9



Topic 10

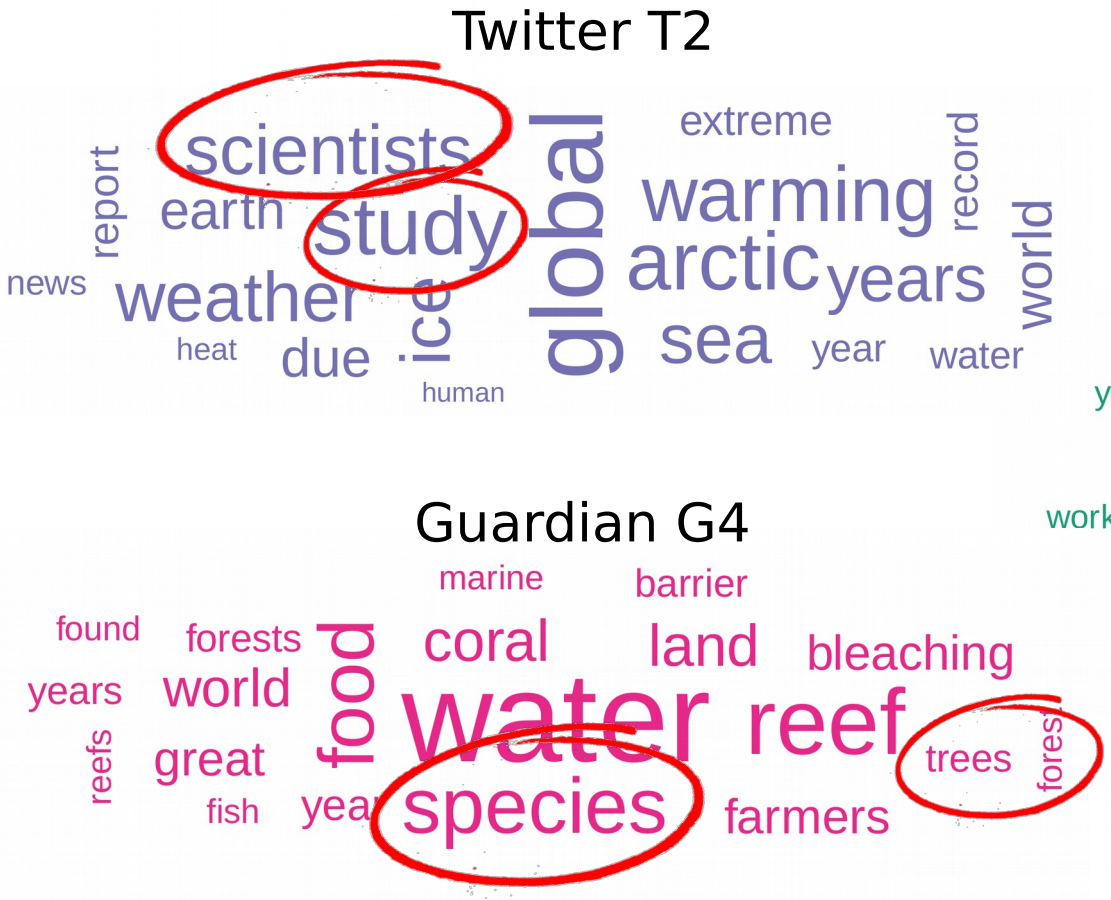
Topic Modeling

Twitter T2

Guardian G4

Parliament P2

Topic Modeling



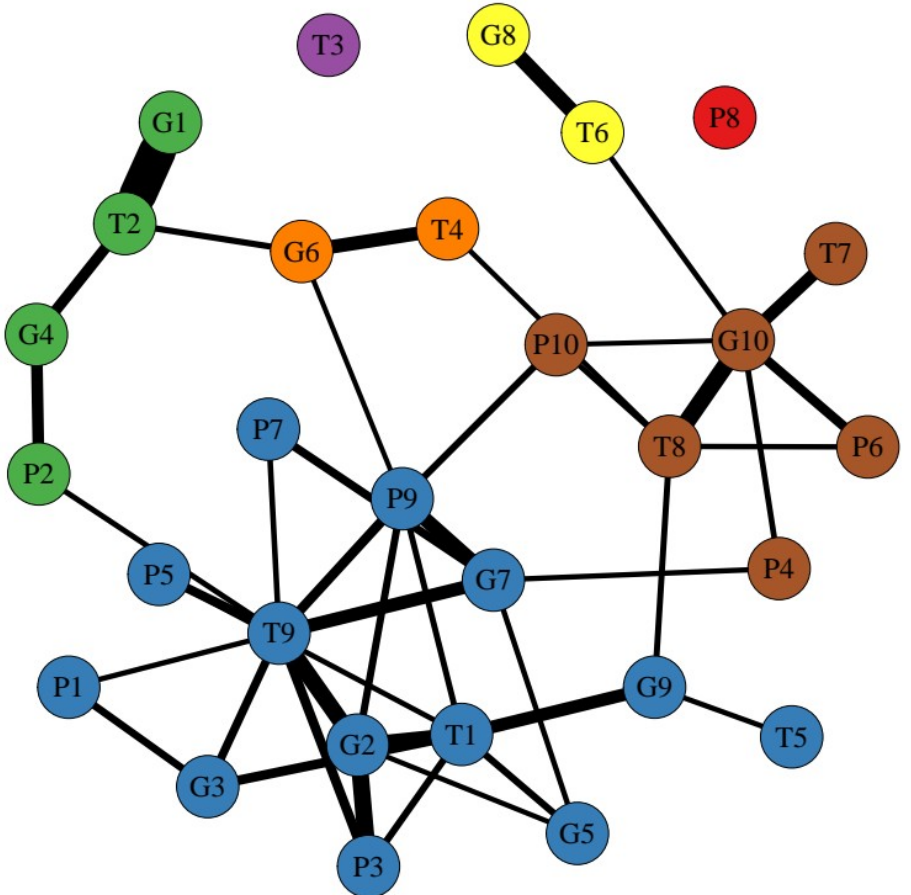
Topics Alignment

- Comparison of lexical topics' distributions
- Kullback-Leibler divergence

$$D_{KL}(t_1 \| t_2) = \sum_w P(w|t_1) \log\left(\frac{P(w|t_1)}{P(w|t_2)}\right)$$

where

$P(w|t)$ probability of word w given topic t



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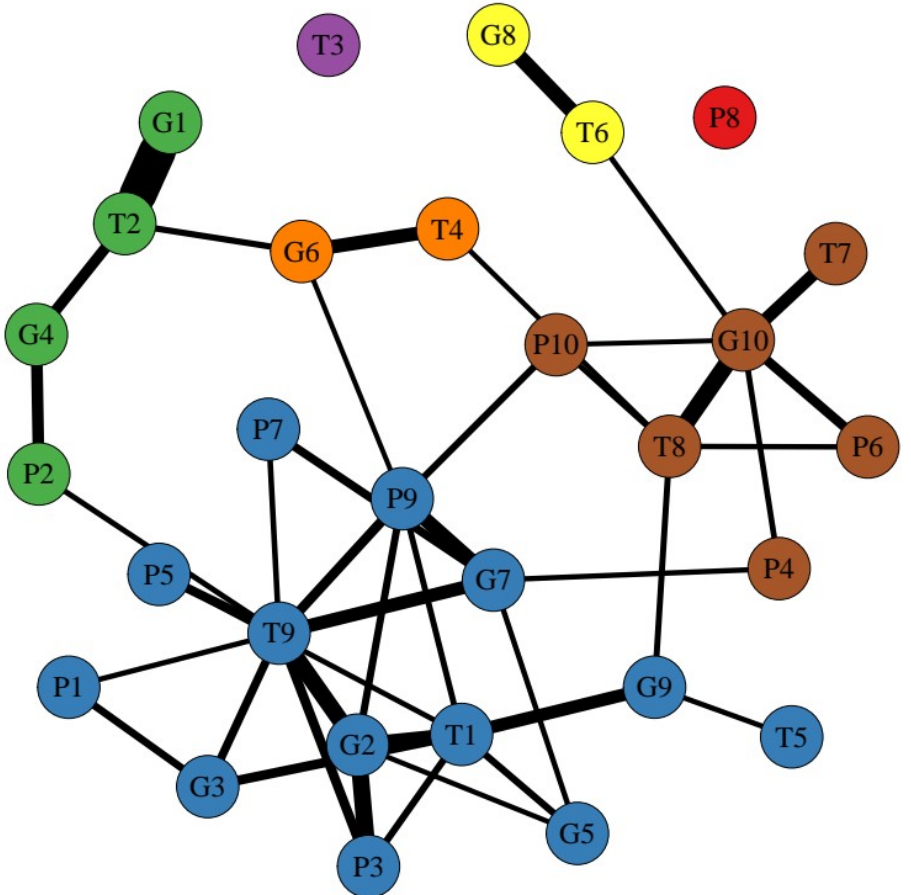
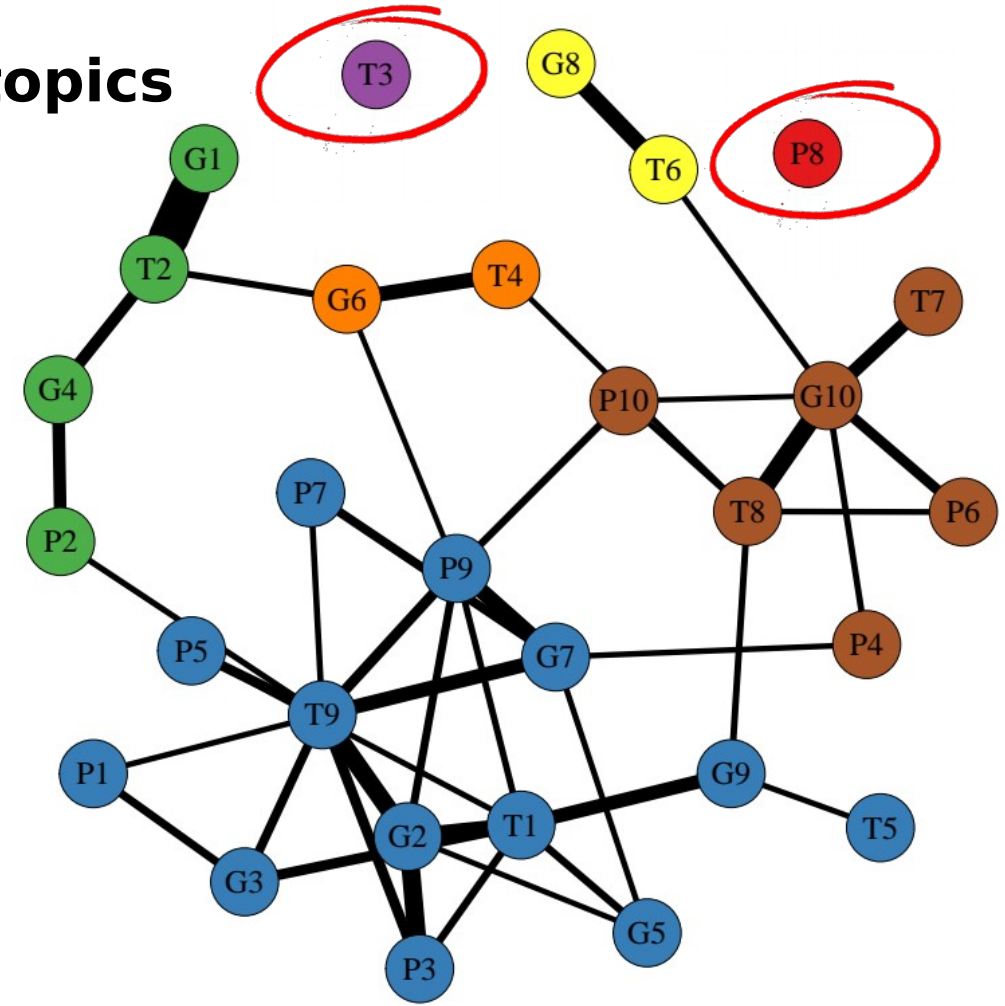


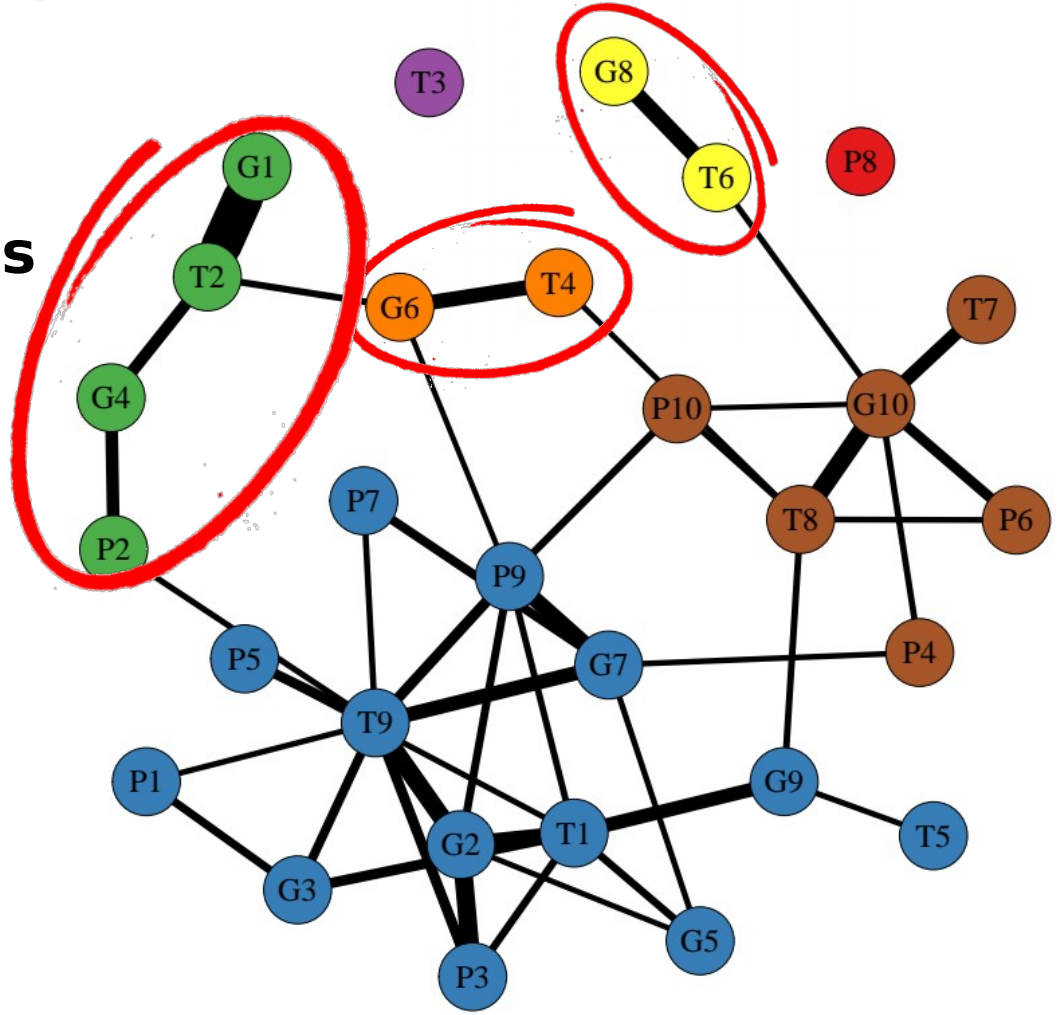
Topics Alignment

Isolated topics

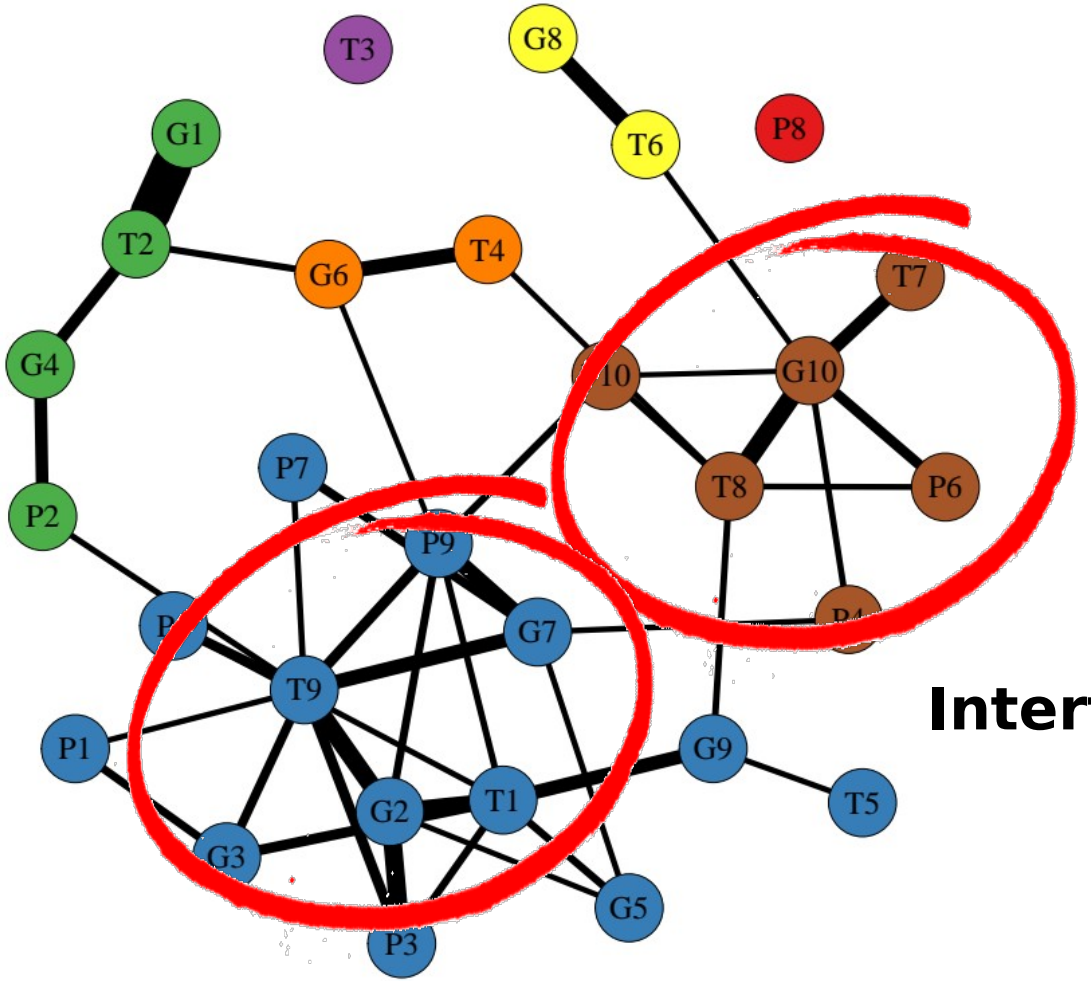


Topics Alignment

Aligned topics



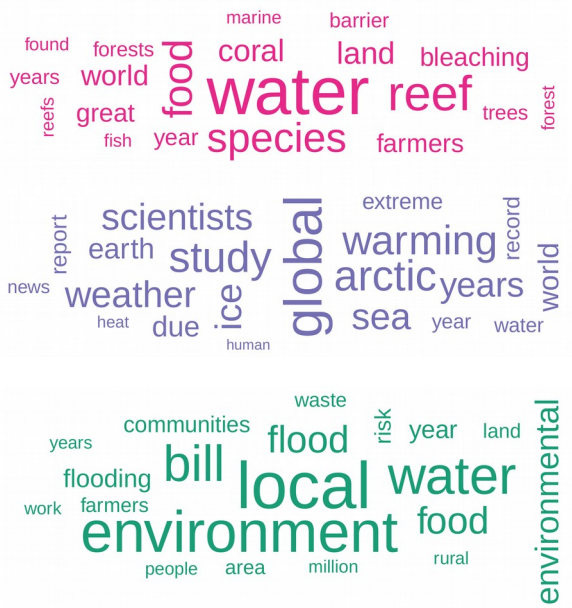
Topics Alignment

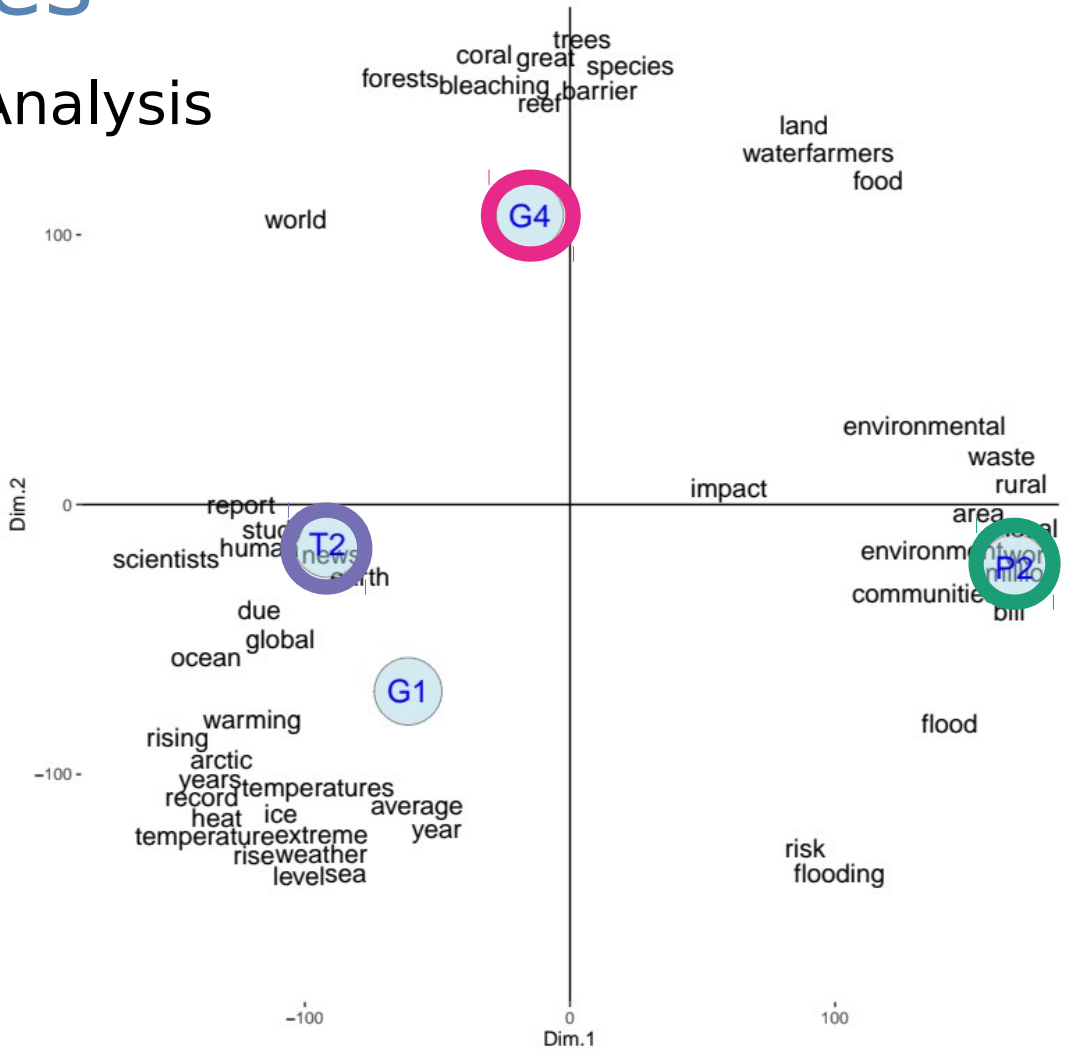


Intertwined topics

Topic specificities

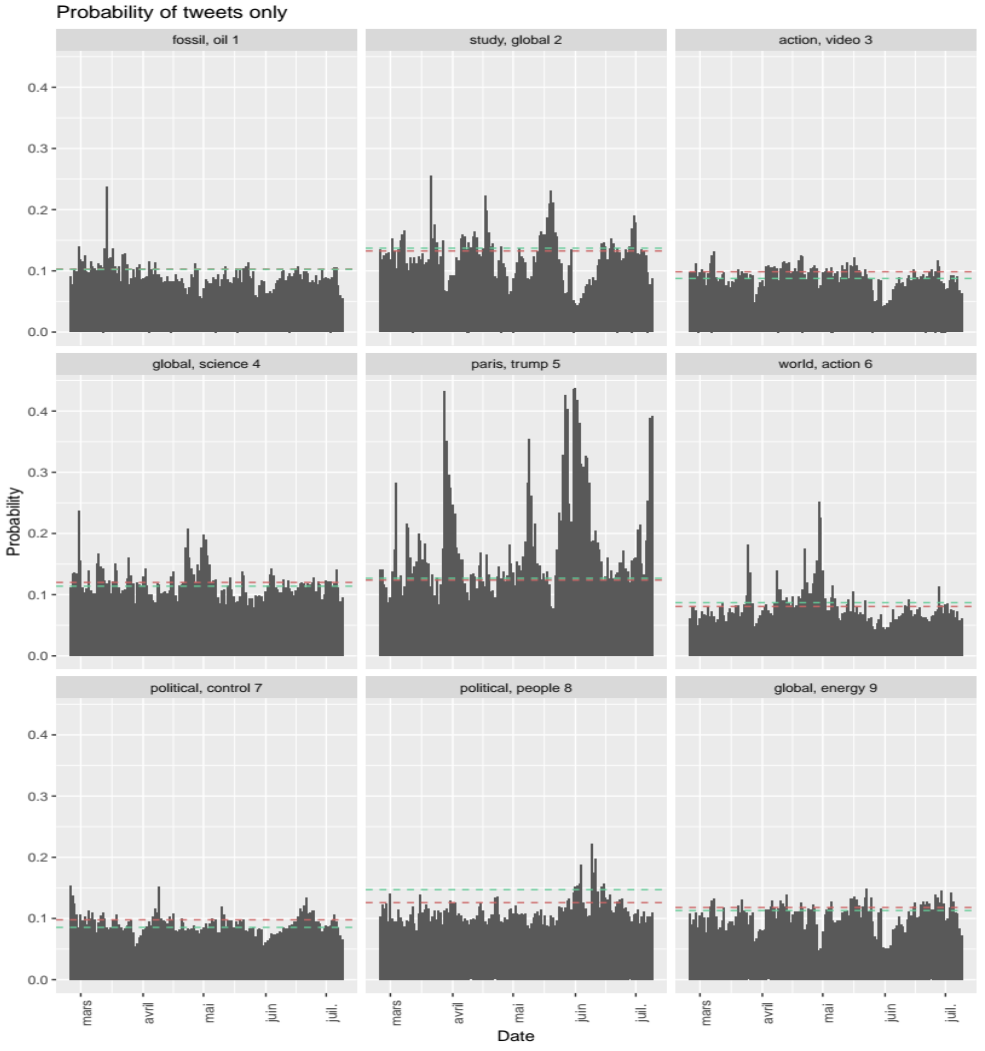
- Principal Component Analysis (PCA)
- Variables = words
- Observations = topics



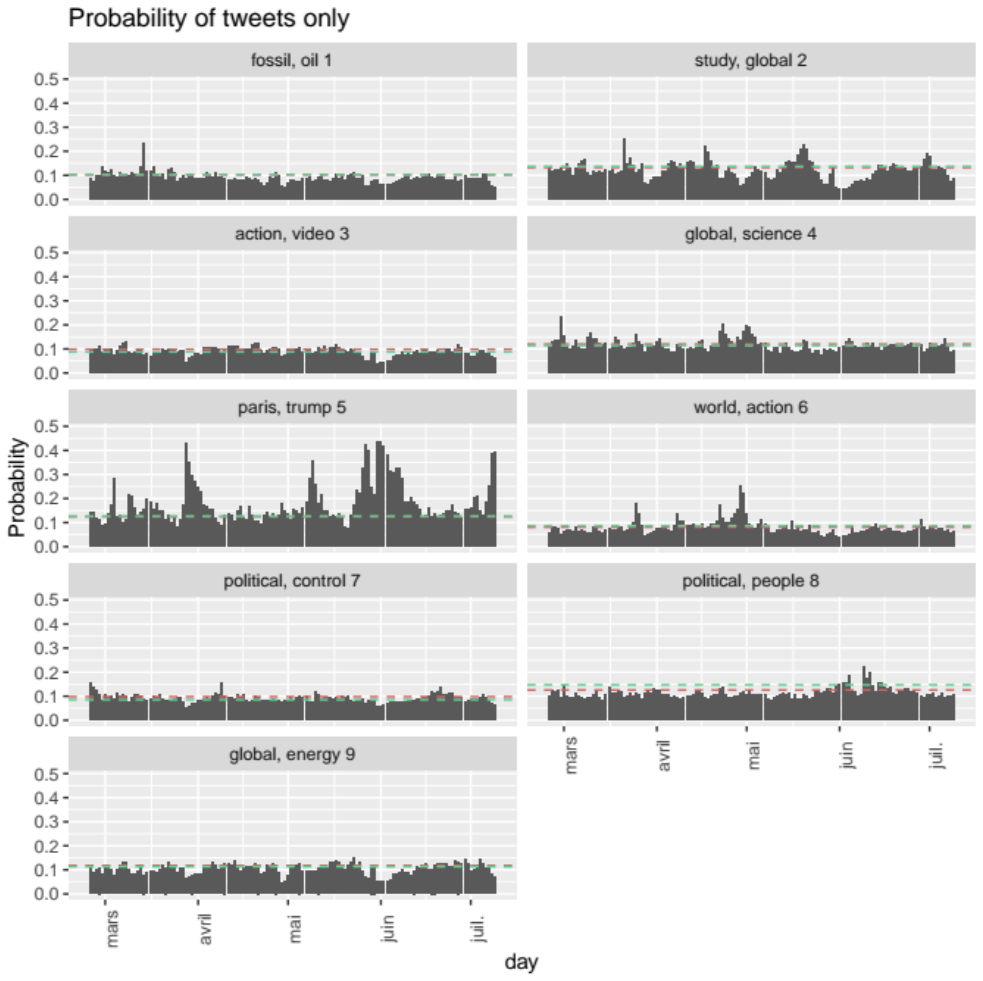


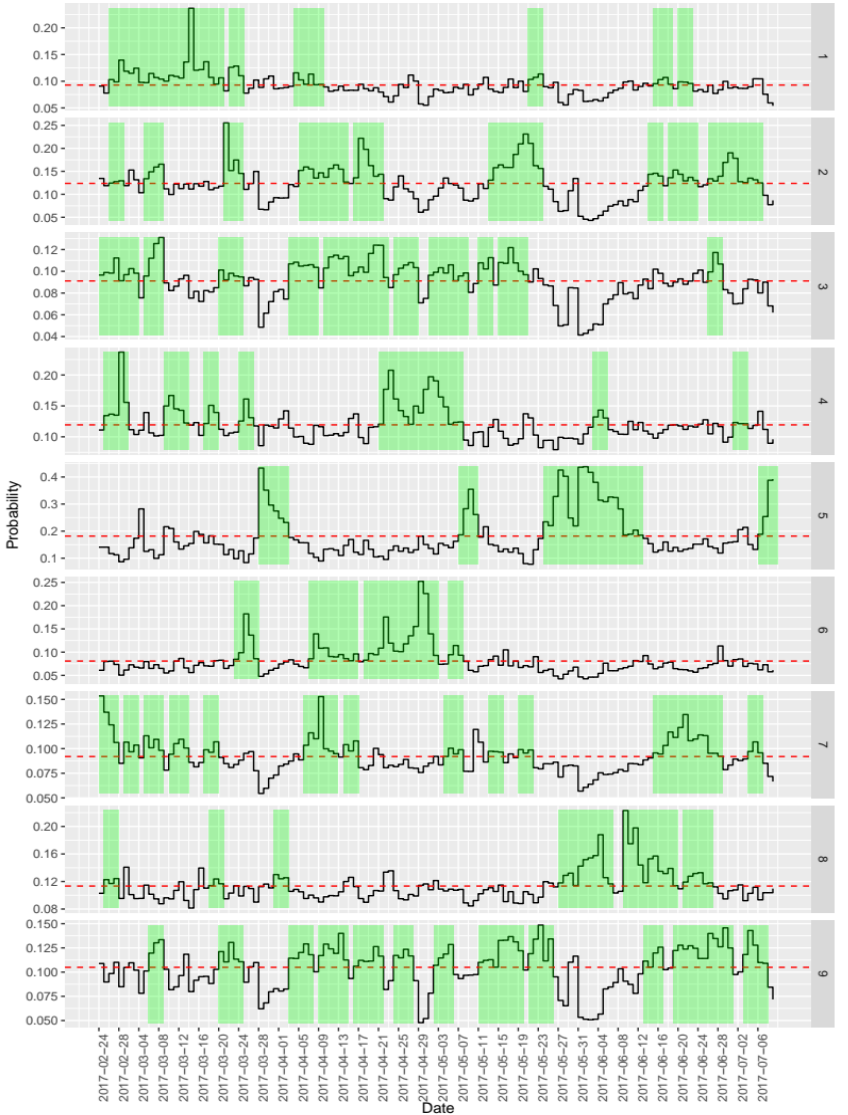
Temporal Aspect

- Focus on probability of topics change in time
- Real life events discovery based on probability peaks

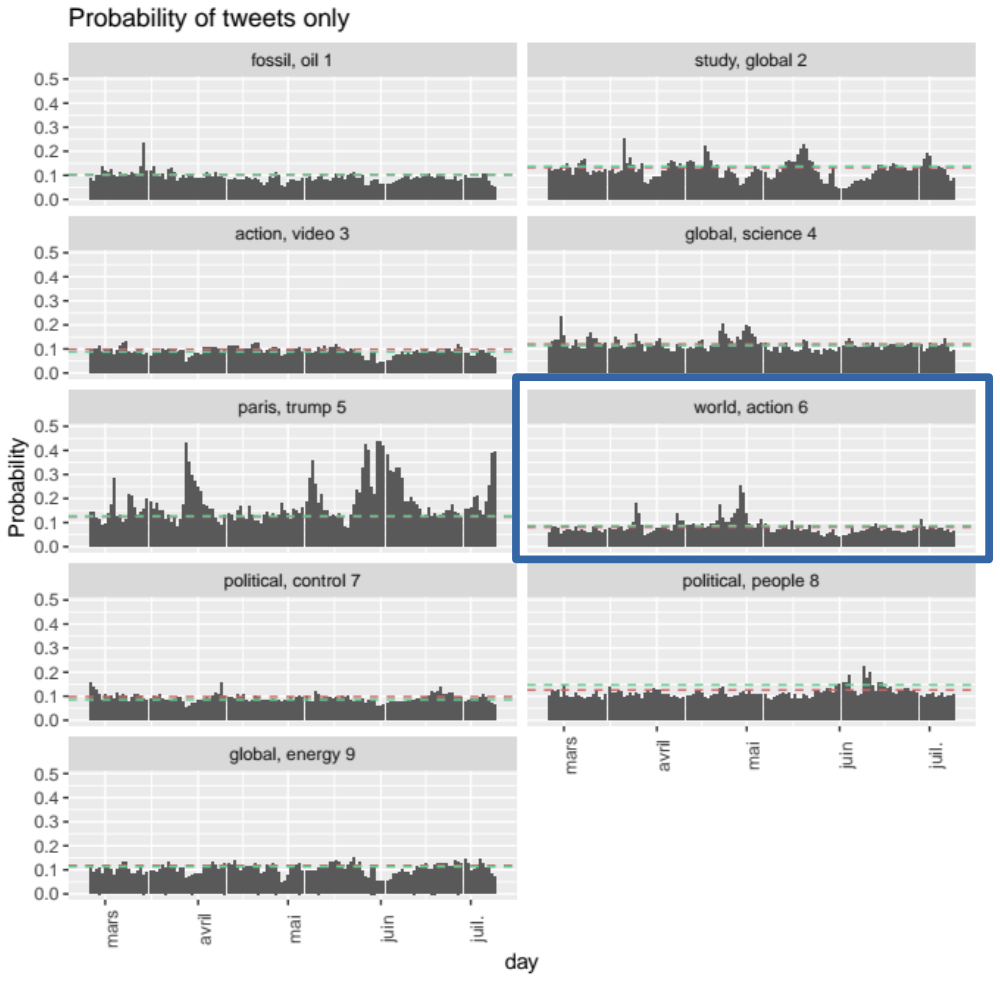


Events detection



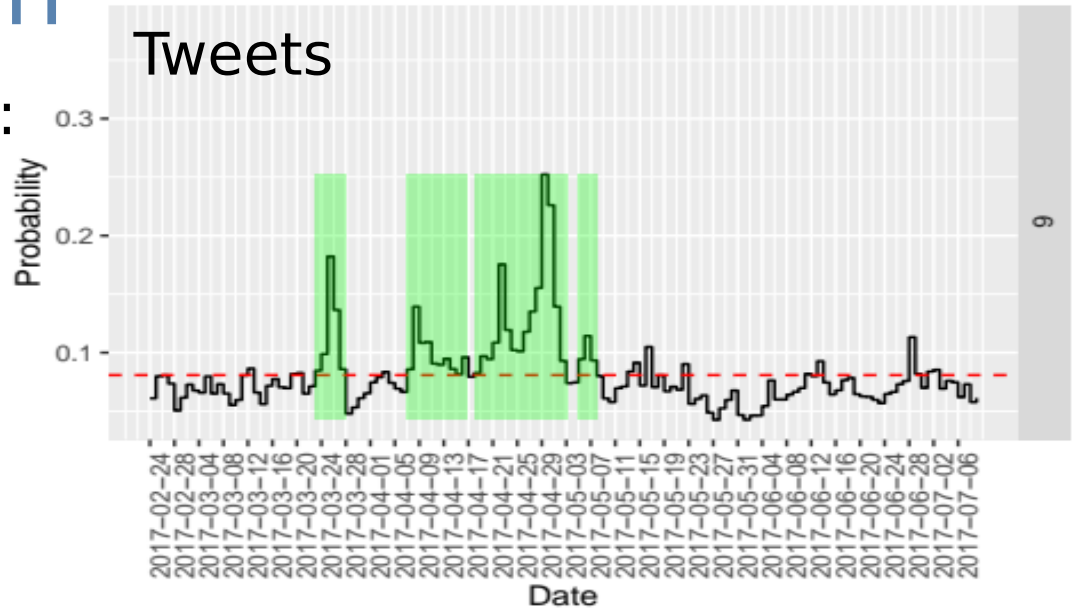


Events detection



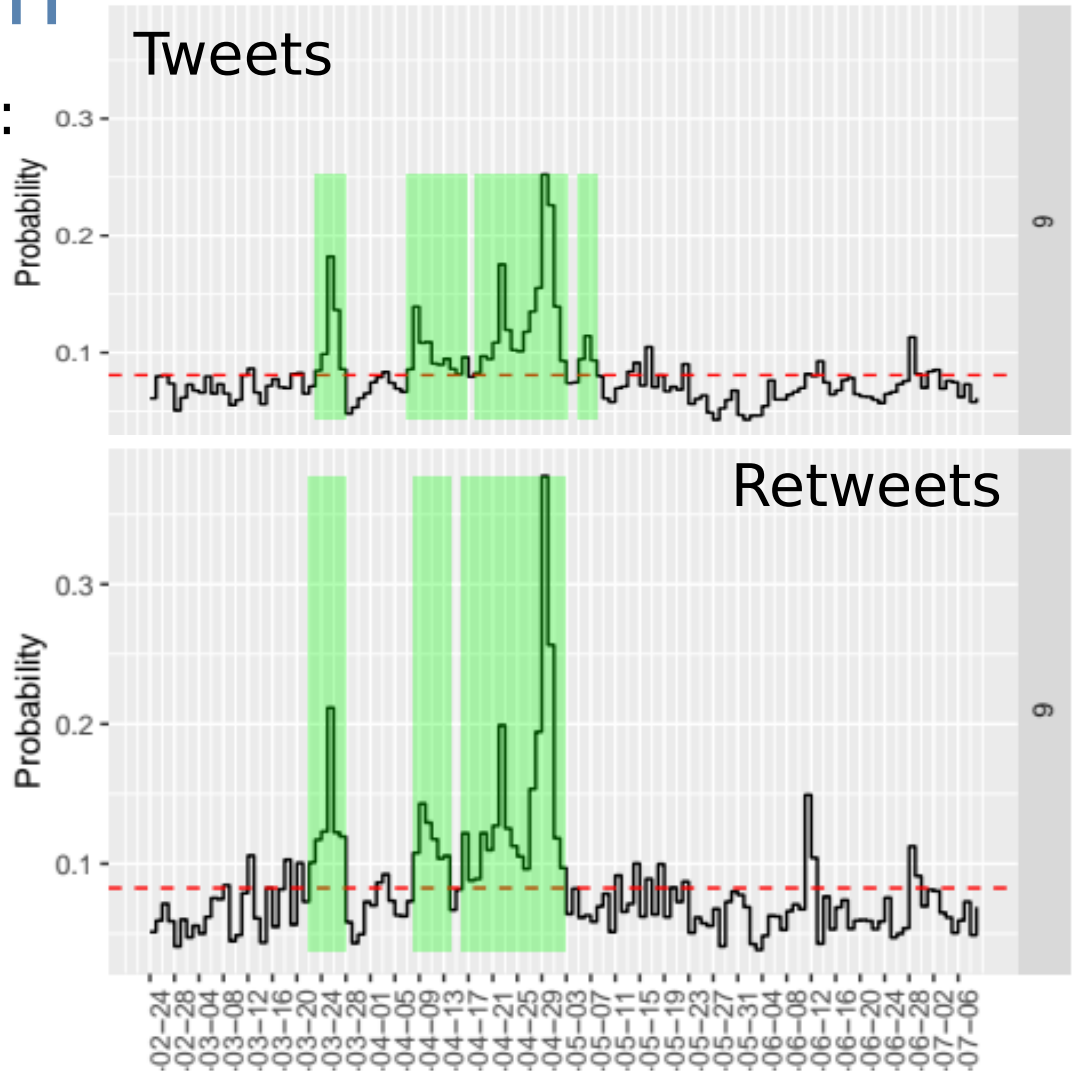
Events detection

- Two different semantics:
  - about information



Events detection

- Two different semantics:
  - about information
  - about exchange of information



Event determination

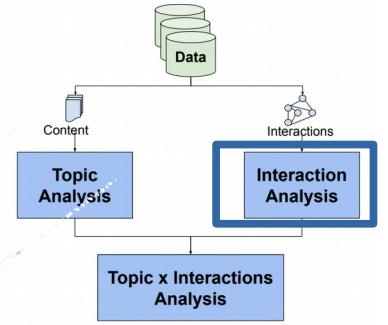
- Top tweets (max number of retweets)

Date	Retweets	User Name	Followers	Text
2017-04-29	23715	CNN	33889033	time-lapse, bird's-eye video shows thousands of protesters marching toward white house for action on climate change
2017-04-29	17202	HillaryClinton	14184025	great to see ppl take to the streets & combat climate change, protect the next generation & fight for jobs & economic justice. #climatemarch
2017-04-29	5516	mattmfm	40582	wow: enormous crowd for the climate march today, just a week after the march for science. people are fired up.
2017-04-29	5229	LeoDiCaprio	17422580	honored to join indigenous leaders and native peoples as they fight for climate justice. join me in standing with them. #climatemarch
2017-04-29	2984	BuzzFeed News	870719	leonardo dicaprio (and thousands of other people) are at the #climatemarch in washington, dc to demand action on climate change

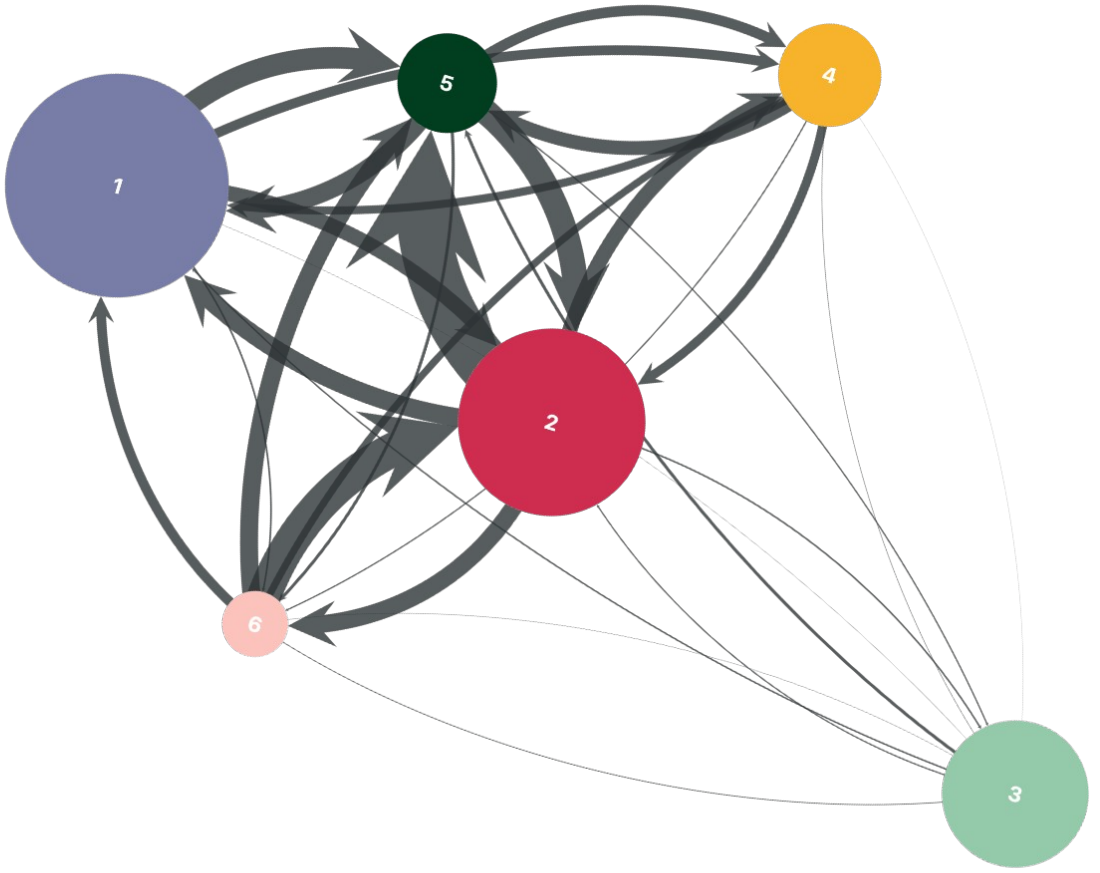
- Real-word event: Climate March 2017

Interaction Analysis

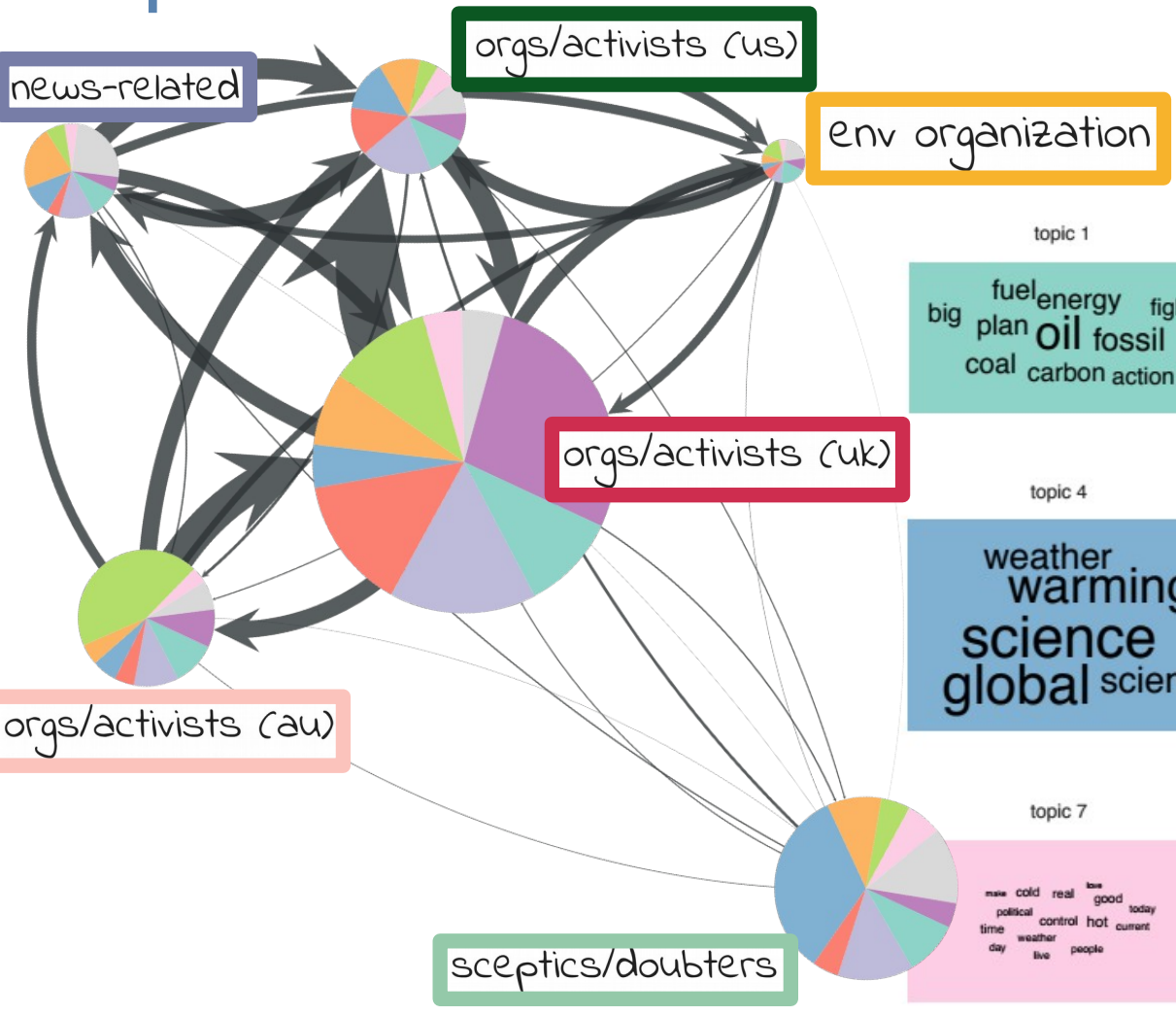
- Louvain method for community detection

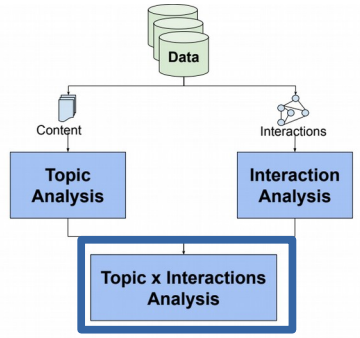


Interaction Analysis



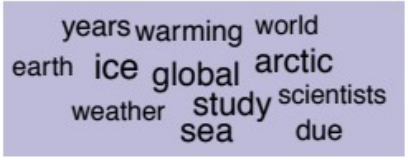
Topics x Interactions Analysis





topic 1

topic 2



topic 3

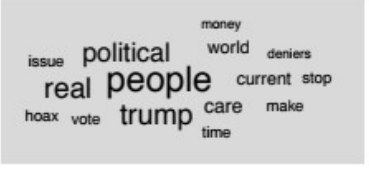
topic 4

topic 5

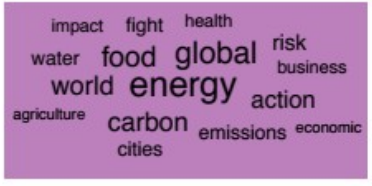
topic 6

topic 7

topic 8



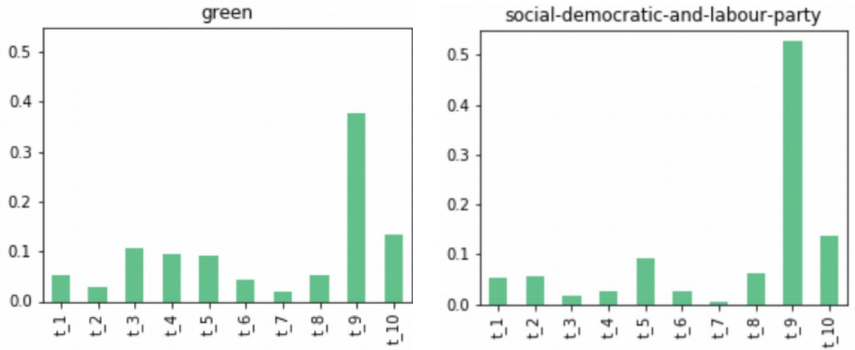
topic 9



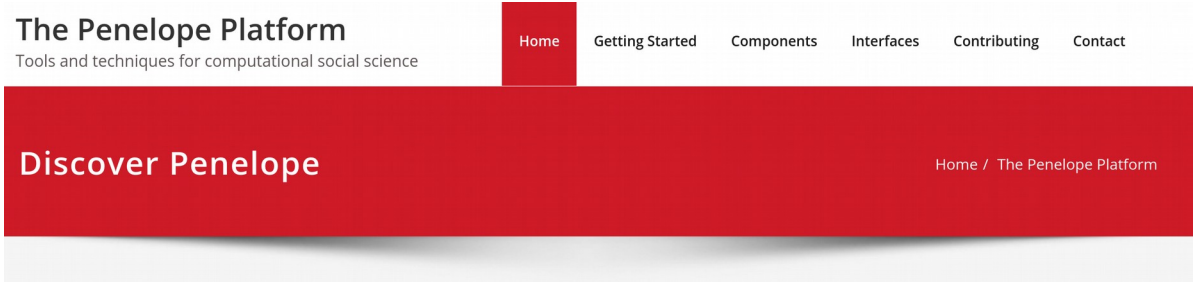
Future works

- Interaction network for the speeches

  → parties distinction



- Generalization for the tools of PENELOPE



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Thank you!