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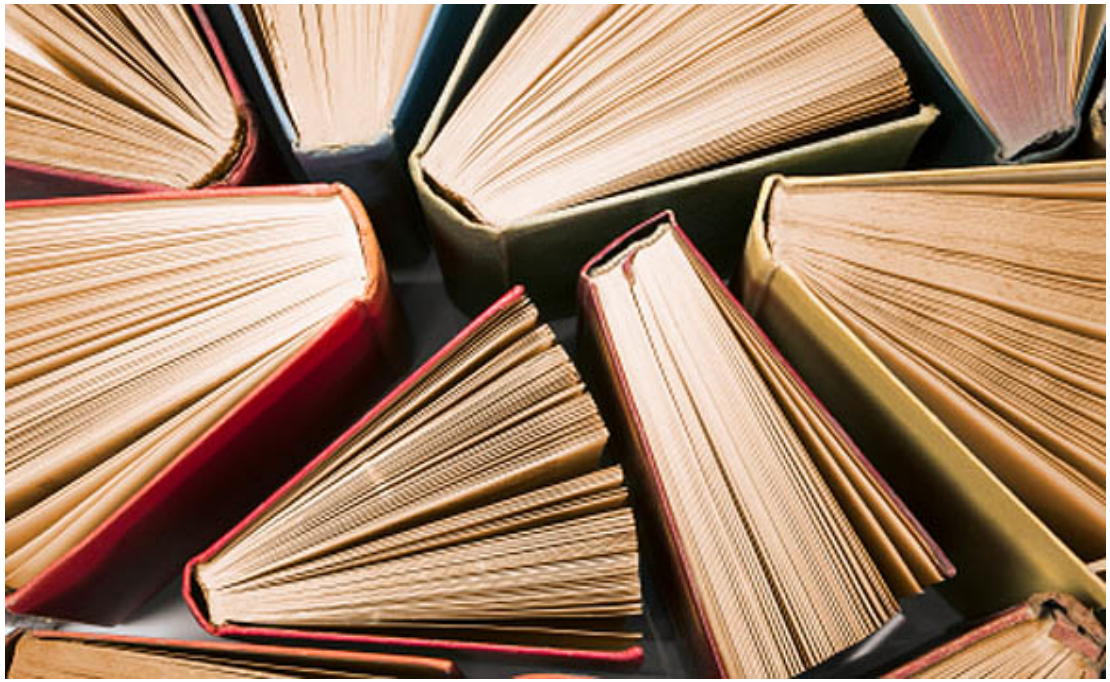

Developing a platform for the analysis of historical sources… and more

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The Digital Humanities joint research project

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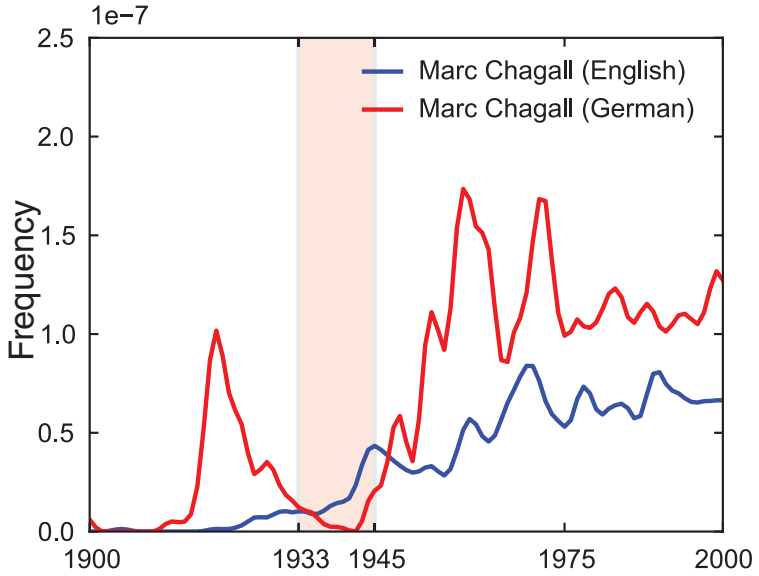
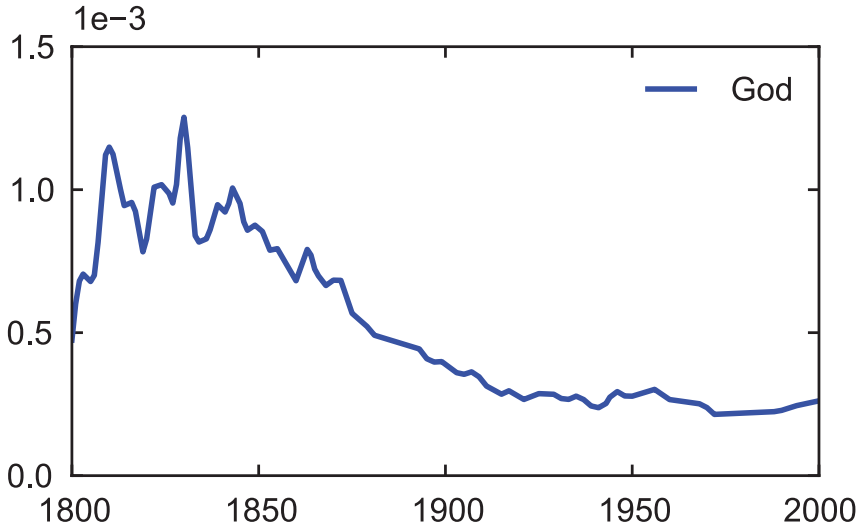
EMANUELE PIANTA

A bit of Culturomics

Quantitative Analysis of Culture Using Millions of Digitized Books, Jean-Baptiste Michel et al., Science 331, 176-182 (2010)

- Corpus of digitized texts containing about 4% of GoogleBooks.
- *Culturomics*: application of data collection and analysis techniques to the study of human culture





"God is not dead but needs a new publicist"

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“Close” and “distant” reading

Graphs, Maps, Trees: Abstract Models for a Literary History, Franco Moretti, 2007, Verso, London.

- Mode of analysis called *distant reading* (vs. *close reading*), where thousands of books are automatically scanned and analyzed in an attempt to understand long-term and large-scale trends
- Empirical data are the key to better knowledge of literature because they are “independent from interpretation”

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The ALCIDE project

Analysis of **L**anguage and **C**ontent **I**n a **D**igital **E**nvironment:

- A digital history project: "*capacity, accessibility, flexibility, diversity, manipulability, interactivity and hypertextuality*" (Cohen and Rosenzweig, 2005).
- First collaboration between ICT center and Italian-German Historical Institute at FBK
- **Goal**: develop an online platform to perform temporal, geographical, linguistic and semantic analysis of historical documents
- Tailor state-of-the-art tools for Natural Language Processing to the requirements of researchers in contemporary history

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ALCIDE Project: Requirements

Requirements:

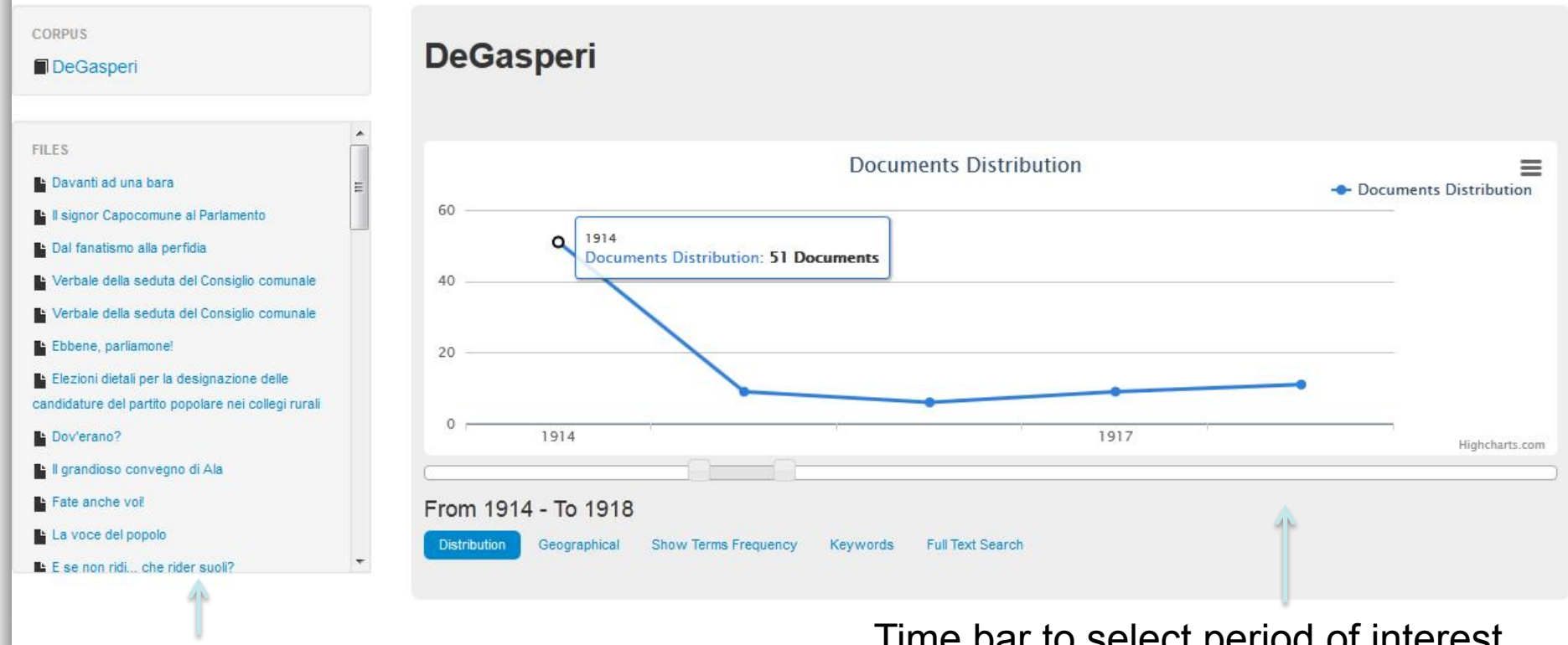
- Select the temporal span of the research on the fly
- Pass easily from *distant* to close *reading*
- The platform should not be bound to a specific historical period
- Reduce manual effort to the minimum
- Intuitive interface, quick system response, modularity
- Multilinguality
- Standard formats (XML for input files, HTML5 for visualization)

ALCIDE Project: : First use case

- Complete collection of Alcide De Gasperi's writings (1881 – 1954)
- Around 3.000 documents, 3.000.000 tokens (~70.000 lemmas)
- Includes articles, speeches transcriptions, official documents, etc.

ALCIDE: “Distant” reading

1. Documents distribution over time (metadata: **year** of publication)



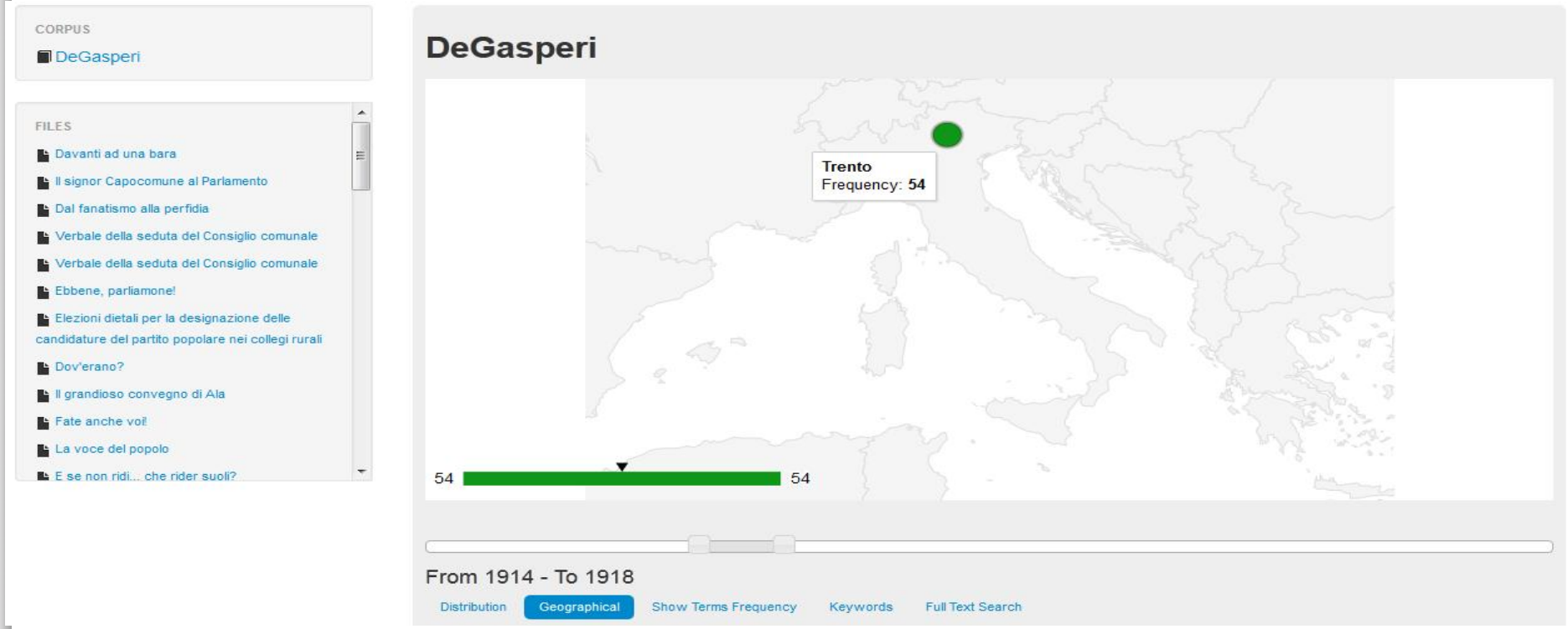
Documents list for the selected year

Time bar to select period of interest

Q: *In which year did De Gasperi publish most?*

ALCIDE: “Distant” reading

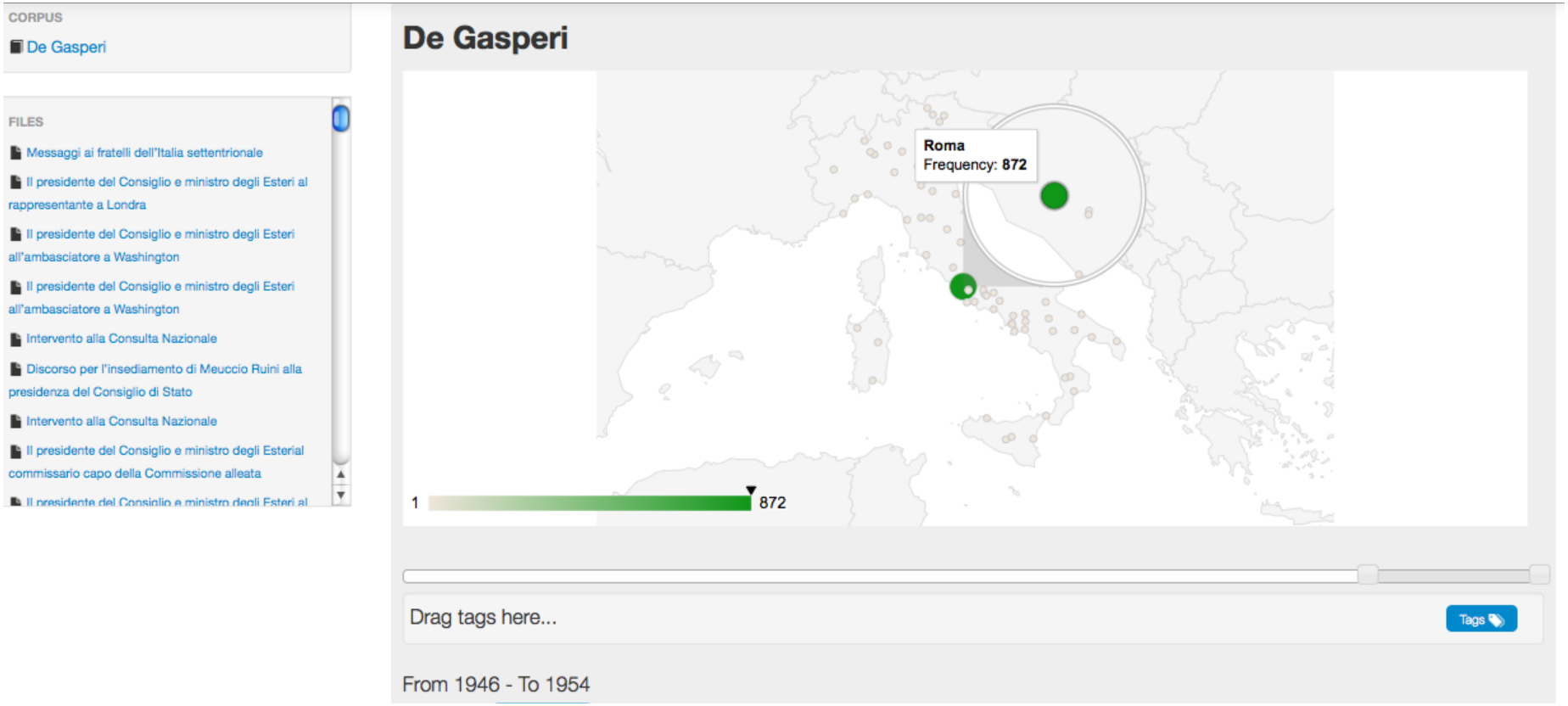
2. Documents distribution per **place** of publication



Q: *In which city were most documents published during World War I?*

ALCIDE: “Distant” reading

2. Documents distribution per **place** of publication

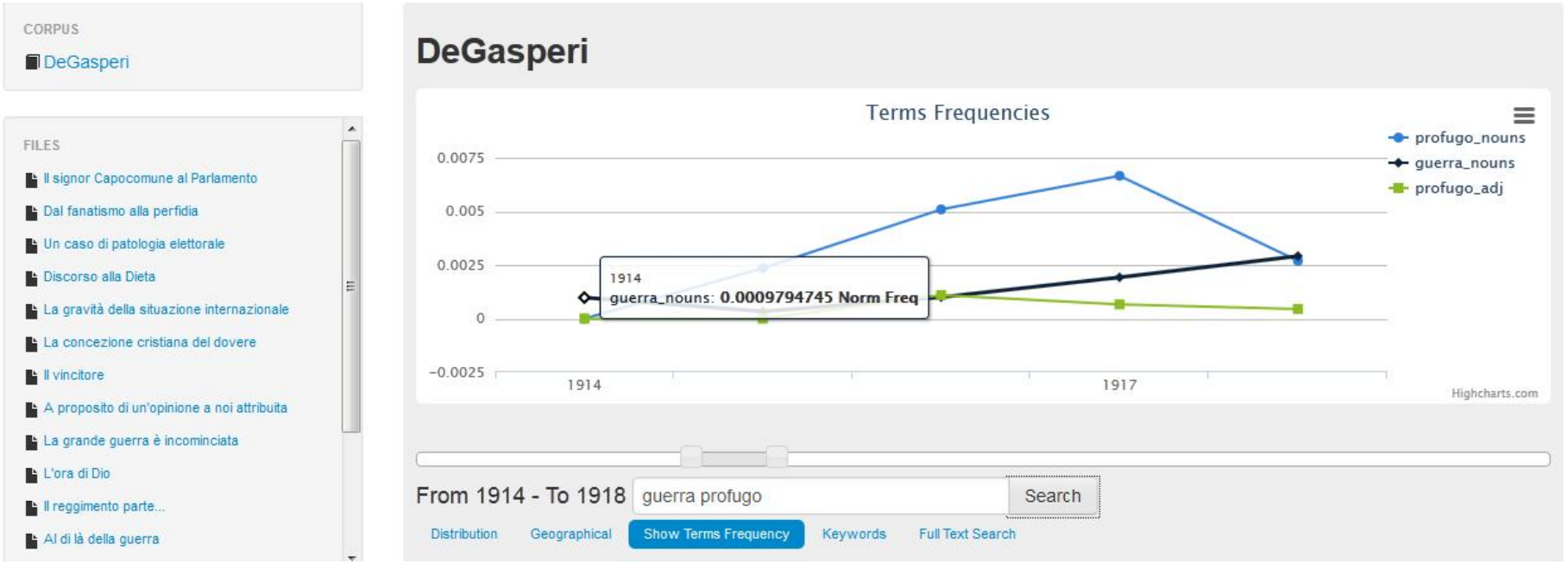


Q: *In which city were most documents published after World War II?*

ALCIDE: “Distant” reading

3. Lemmas & tokens distribution over time

Pre-processing with PoS tagger and lemmatizer from TextPro

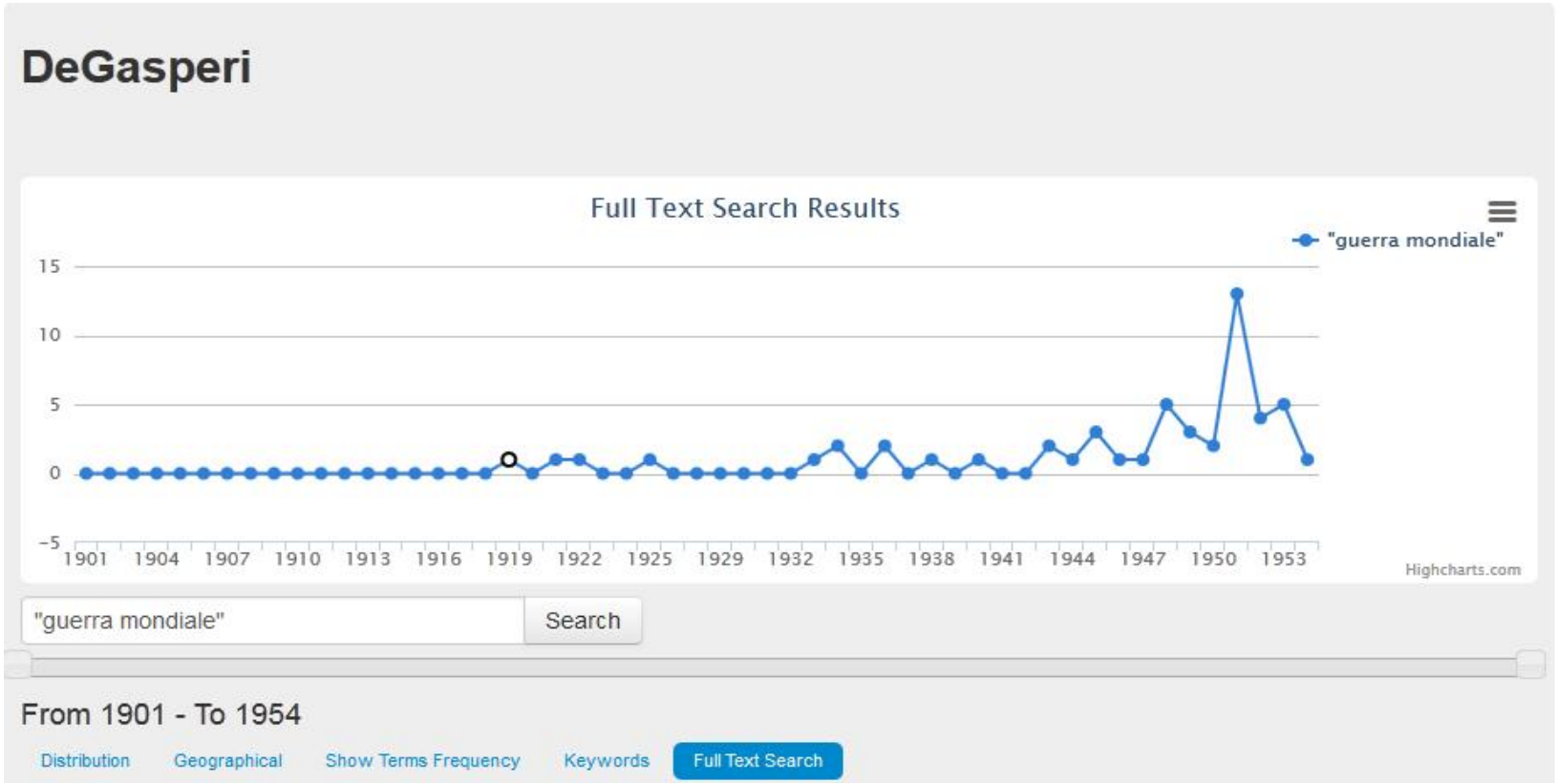


Q: *When did the issue of refugees become relevant for De Gasperi?*

ALCIDE: “Distant” reading

3. Lemmas & tokens distribution over time

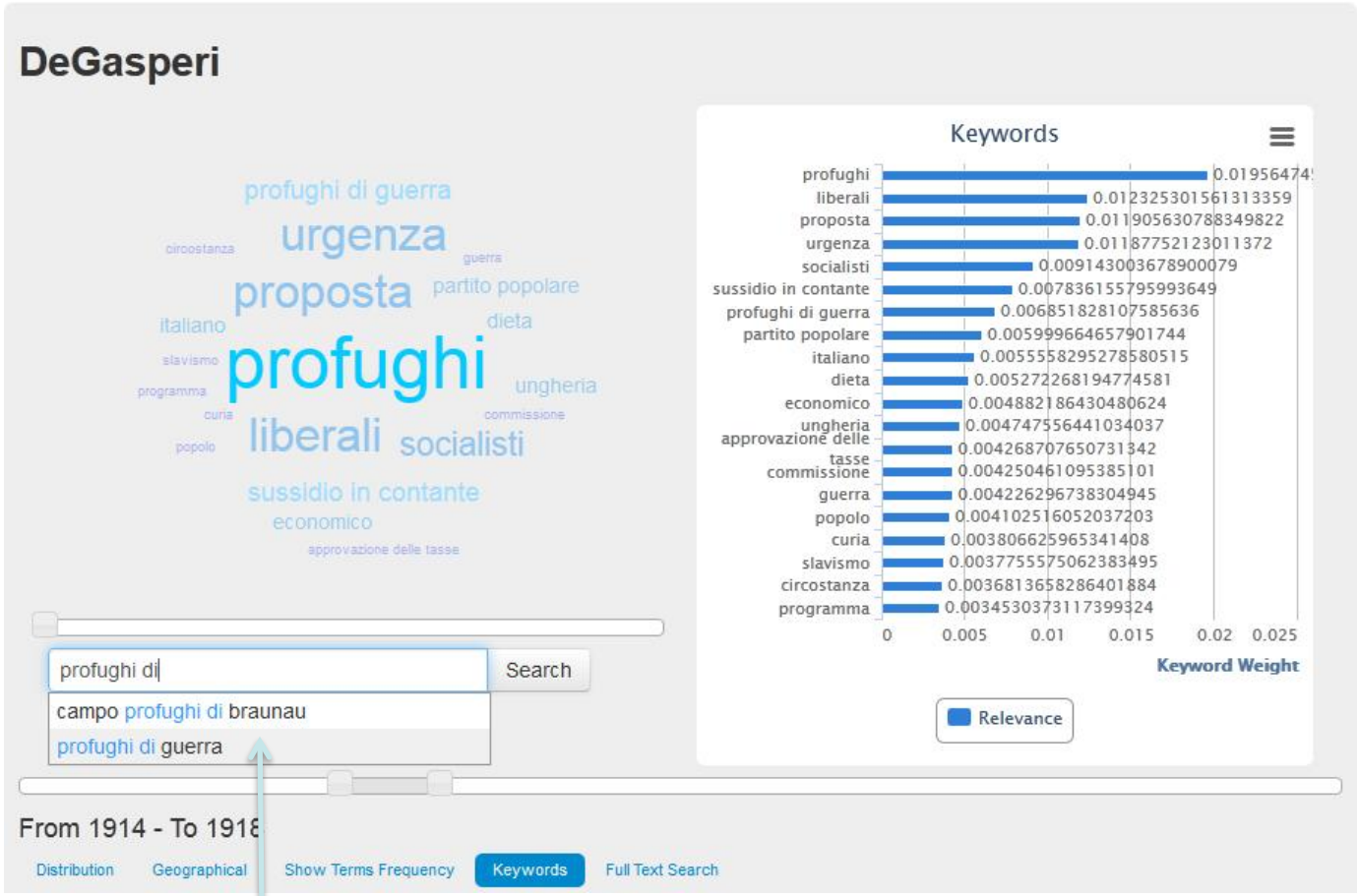
Pre-processing with PoS tagger and lemmatizer from TextPro



Q: *When was “world war” first mentioned by De Gasperi?*

ALCIDE: “Distant” reading

4. Search & visualization of key-concepts



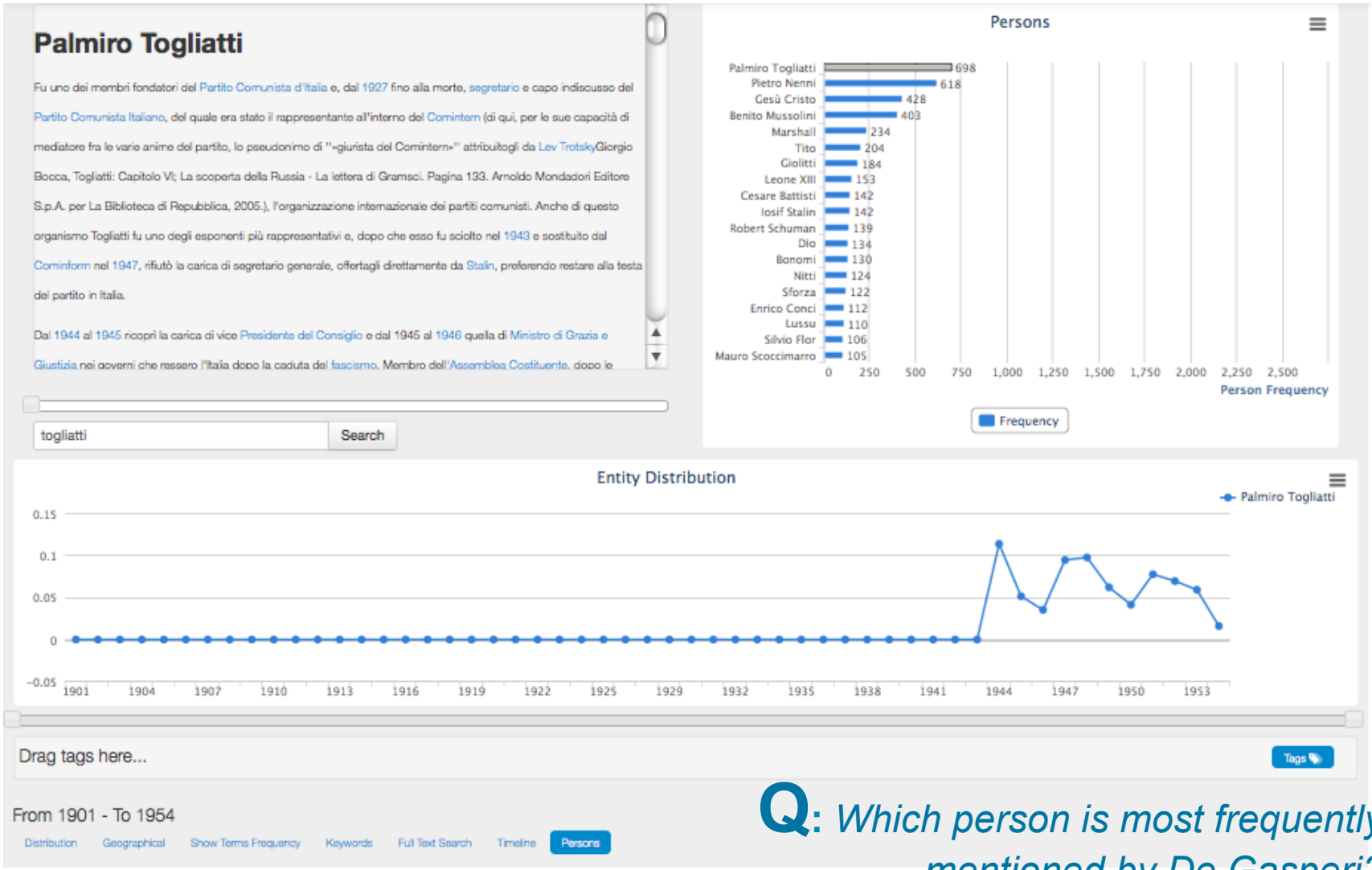
Key-concepts extracted at document level and then merged

Key-concept suggestion

Q: *Which were the main topics dealt with by De Gasperi between 1914 and 1918?*

ALCIDE: “Distant” reading

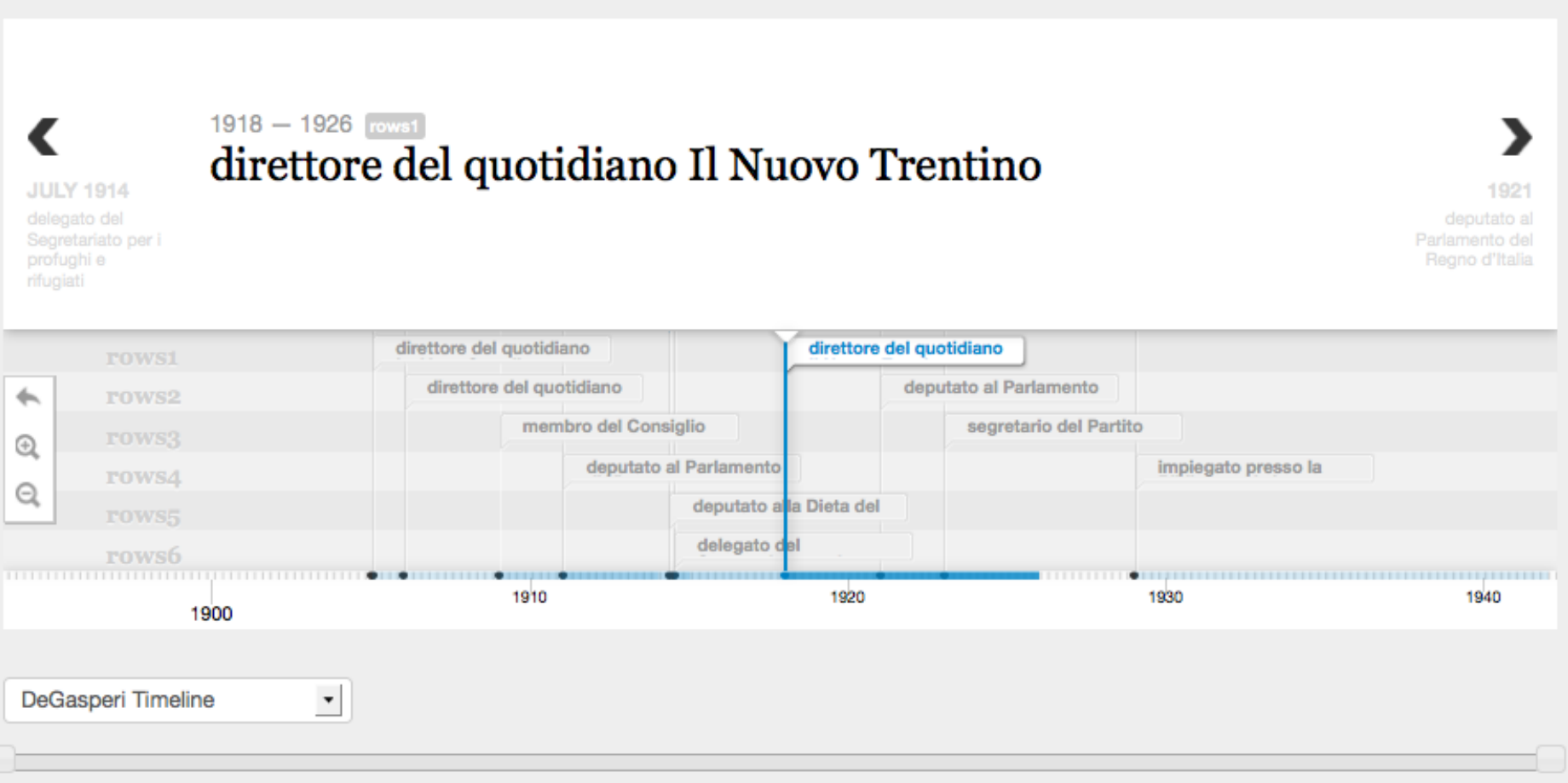
5. Search and visualization of persons’ names



Q: *Which person is most frequently mentioned by De Gasperi?*

ALCIDE: “Distant” reading

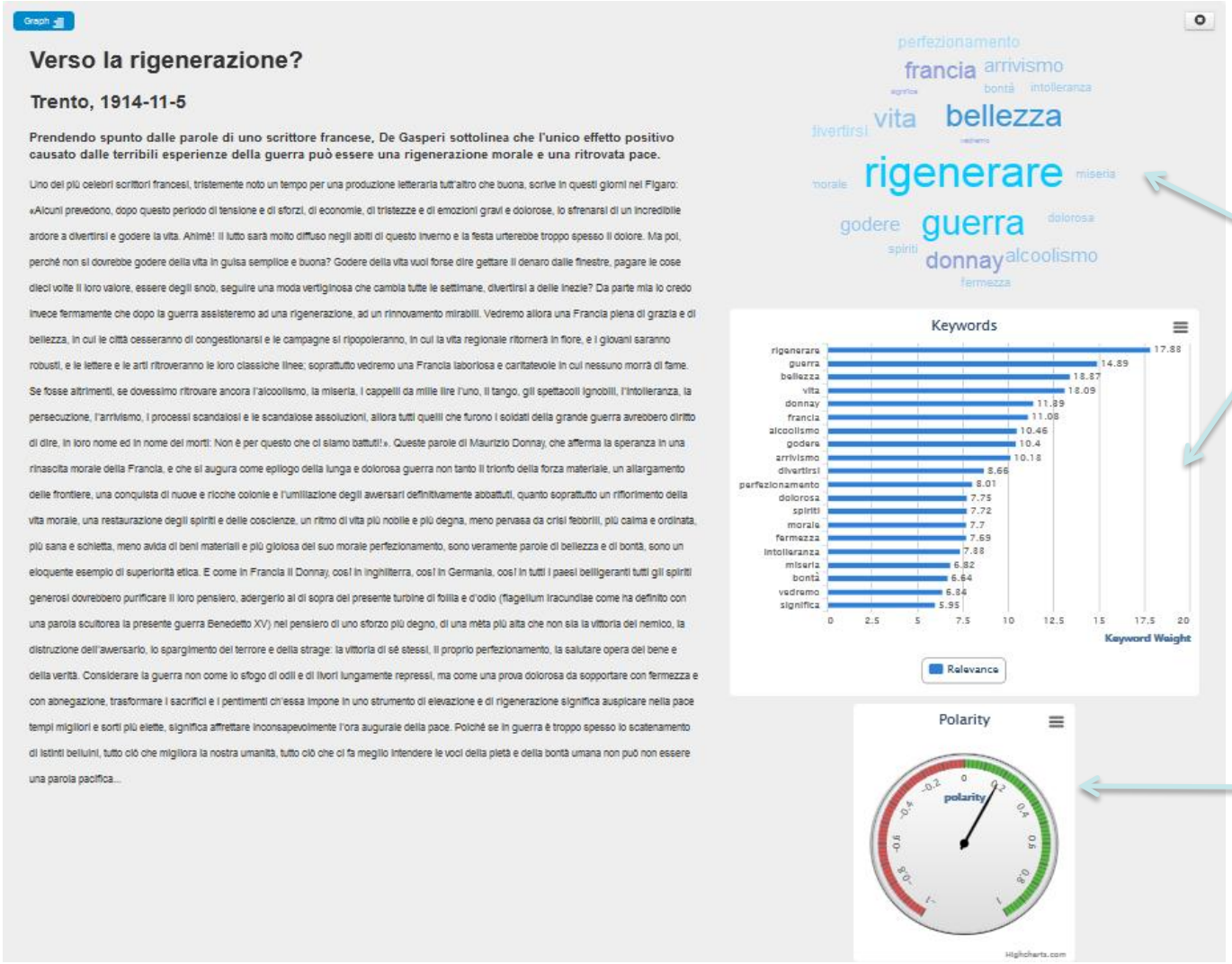
6. Timeline personalization, visualization and comparison



Q: *What speeches did De Gasperi give during the Russian revolution?*

ALCIDE: “Close” reading

7. Visualization at document level

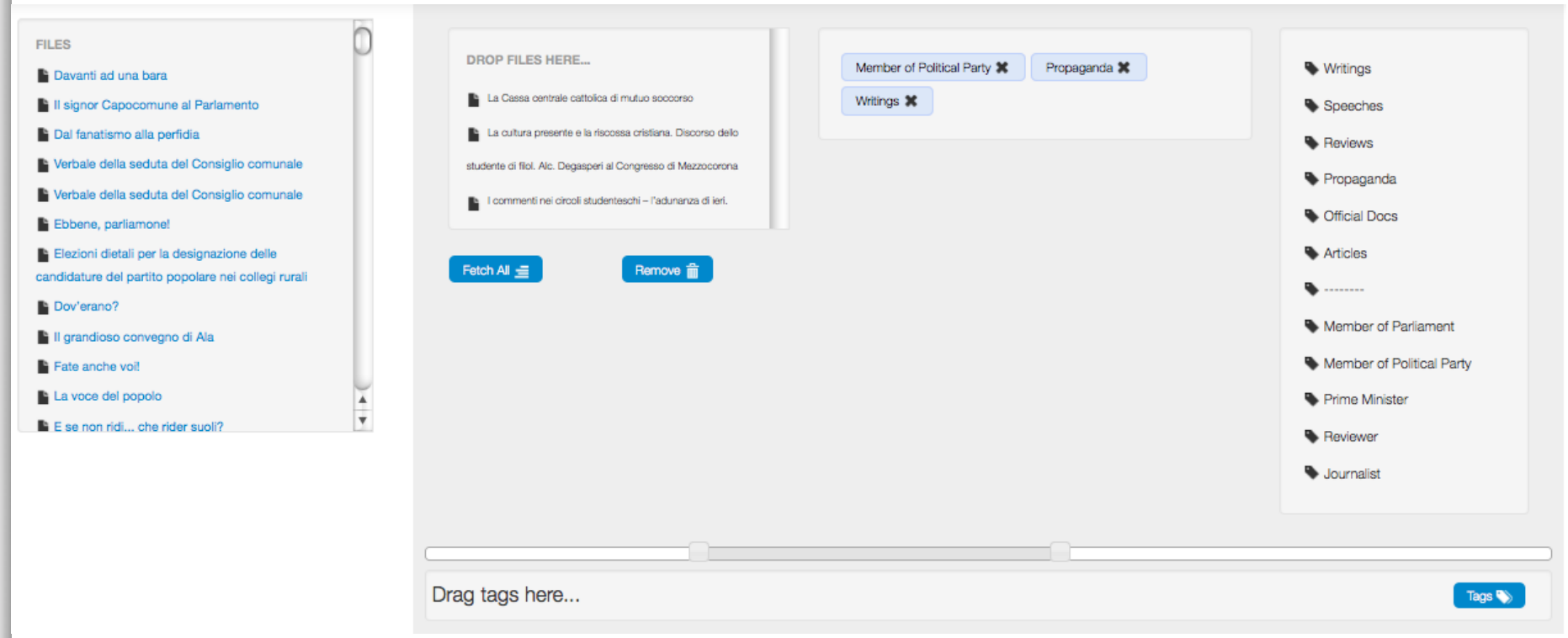


Key-concepts

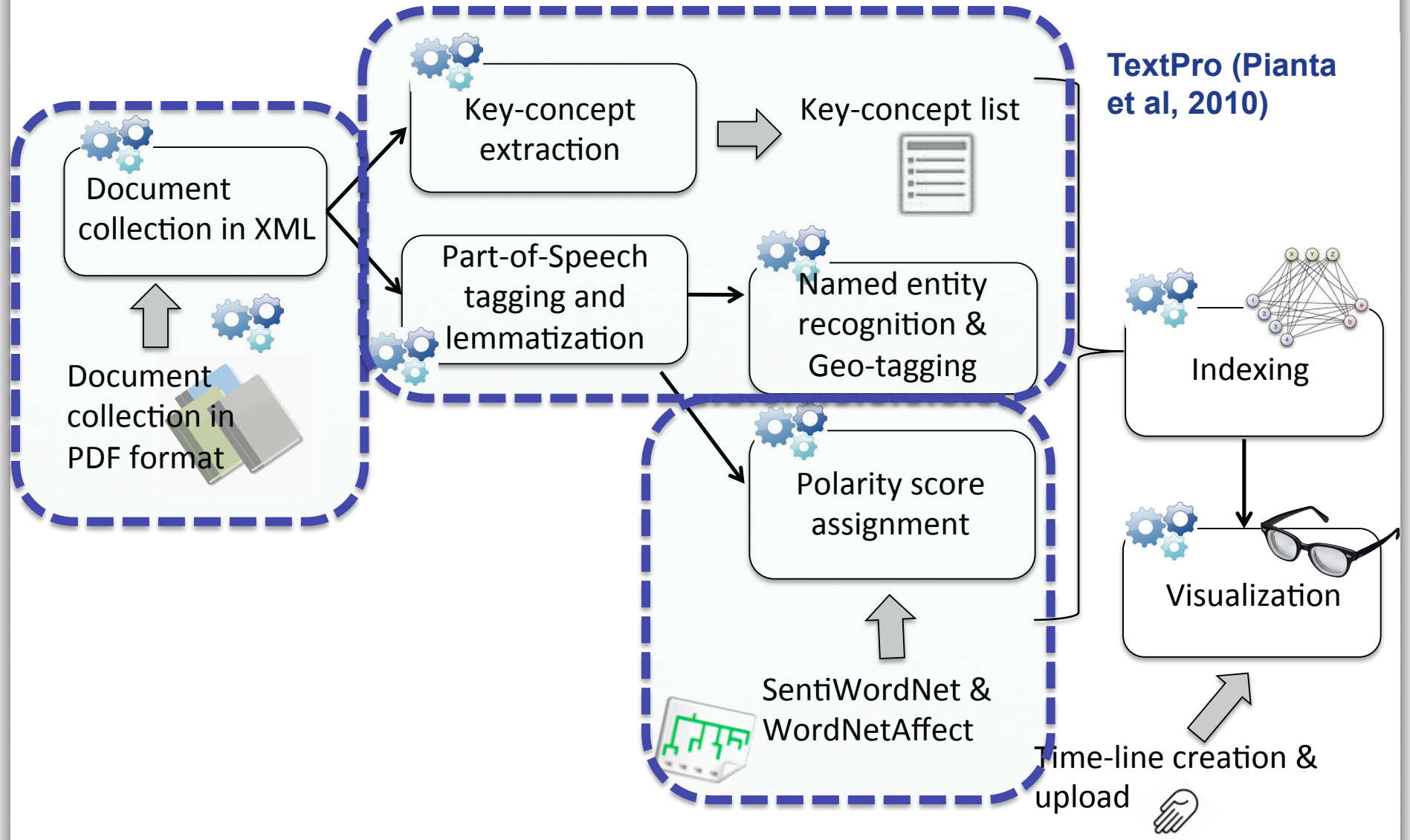
Polarity (positive or negative) at document level

ALCIDE: Tag manager for documents annotation

8. Manual tagging of single or sets of documents



From paper to bits



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Outcome of system evaluation

Focus group with expert users and evaluation based on System Usability Scale questionnaire:

- Some functionalities (*Timeline*, entities linked to *Wikipedia*) should be part of a learners' view
- Revise frequency normalization criteria
- Relevance of key-concepts is too "subjective"
- An automatic analysis of semantic change would be useful, for instance looking at co-occurrences: which association measures?
- Polarity at *concept* level would be more useful than at *document* level

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Polarity annotation: a feasible task?

- How difficult is it to annotate polarity at concept level **on historical data**?
- Manual annotation of "*trade union*" e "*trade unionism*", 525 sentences
- Annotation performed using the *CrowdFlower* platform
- 5 judgements for each occurrence, 4 possible labels: positive, negative, neutral, don't know.
- Gold standard of 60 sentences annotated in-house by two interns
- Compare crowdsourced annotation with gold standard and with automatic polarity labelling via SentiWordNet/ WordNetAffect

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Polarity annotation: a feasible task?

	Crowdsourcing	SentiWNW/ WNAffect
Total	68.30%	43%
Negative	55.50%	22%
Positive	**80%**	31%
Neutral	46.60%	**86%**
Don't know	0	n.a.

Accuracy w.r.t. gold data

Low agreement between annotators, both in-house and via crowdsourcing

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A.L.C.I.D.E. project: Next steps

- Extend the system with the functionalities highlighted during the experts' evaluation
- Tag the corpus to distinguish between transcriptions of speeches, official documents, propaganda writings, etc.: how do vocabulary, discourse structure, style, readability change?
- Add other corpora, also in English
- Use the platform to discover something relevant to history scholars!

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Conclusions

- Many lessons learnt in the first project months:
  - A platform like A.L.C.I.D.E. can be effectively used only if “digital” and “humanities” collaborate from the very beginning, must be a two-way communication
  - NLP technology must be re-thought: make processes more intuitive, include users in the loop, importance of visualization/interfaces
  - We are not just technology providers!

- Many challenges ahead:
  - New project involving MART and MUSEION for exploration platform of verbo-visual art: recommend artworks based on similarity? Crowdsourcing text transcription? How to encode the graphical component?
  - Horizon 2020

THANK YOU!