

A Semantic Web Navigation Tool for Exploring the Henri Poincaré Correspondence Corpus

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Context

A navigation tool for the Henri Poincaré correspondence corpus

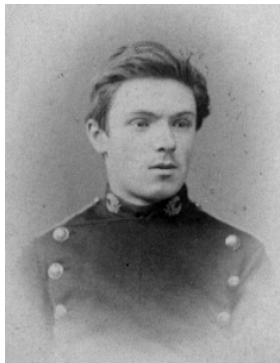
- ▶ Exploitation of a historical corpus with Semantic Web technologies
- ▶ Presentation of a navigation system designed for exploring the corpus graph
- ▶ System which relies on the use of a flexible search mechanism to enhance similarities between resources

System available for exploring other RDF corpora

The Henri Poincaré correspondence corpus



Henri Poincaré (1854-1912)



1873

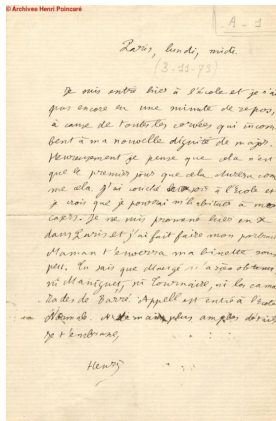


1887



1908

The Henri Poincaré correspondence corpus

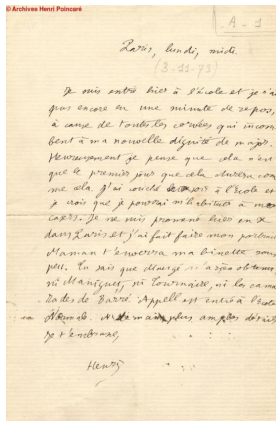


Henri Poincaré to Aline
Poincaré, 1873

Online publishing

- Around 2000 letters (private, administrative and scientific exchanges)

The Henri Poincaré correspondence corpus

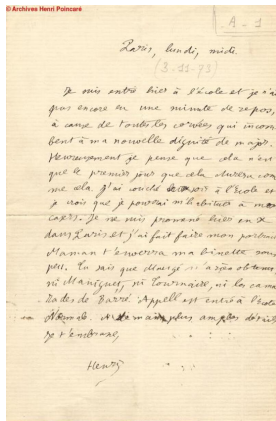


Henri Poincaré to Aline
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Online publishing

- ▶ Around 2000 letters (private, administrative and scientific exchanges)
- ▶ Rich source of historical information
 - Scientific theories
 - Academies and administrations
 - Social, political and cultural context

The Henri Poincaré correspondence corpus



Henri Poincaré to Aline
Poincaré, 1873

Online publishing

- ▶ Around 2000 letters (private, administrative and scientific exchanges)
- ▶ Rich source of historical information
 - Scientific theories
 - Academies and administrations
 - Social, political and cultural context
- ▶ Semantic Web technologies used to structure and to exploit data

A website dedicated to the work and correspondence of Henri Poincaré¹



LA CORRESPONDANCE D'HENRI POINCARÉ

Accueil	Lettres	Recherche	Index
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LETTRE : Henri Poincaré à Aline Boutroux - 3 novembre 1873

[Modifier l'item](#)

Transcription

Métadonnées

Citer ce document

[3 novembre 1873¹]

Paris, lundi, midi.

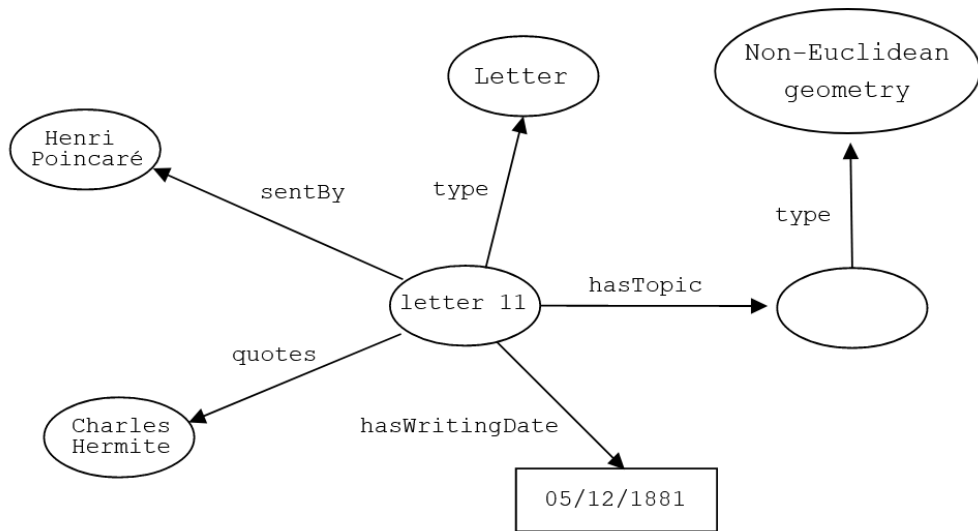
Je suis entré hier à l'école² et je n'ai pas encore eu une minute de repos, à cause de toutes les nouvelles corvées qui incombent à ma nouvelle dignité de **major**. Heureusement je pense que cela n'est que le premier jour que cela durera comme cela. J'ai couché hier soir à l'École et je crois que je pourrai m'habituer à mon **casern**. Je me suis promené hier en **X**³ dans Paris et j'ai fait faire mon portrait⁴. **Maman** t'enverra ma binette sous peu. Tu sais que **Maugé**⁵ n'a rien obtenu, ni **Maniguet**⁶, ni **Tournaire**, ni les camarades de **Barré**⁷. **Appell** est entré à l'École Normale⁸. À demain plus amples détails.

Je t'embrasse,

Henri

1. Comme de nombreuses autres, cette lettre n'avait pas de destinataire précis. La référence à **Eugénie Poincaré** laisse supposer qu'elle s'adressait plutôt à la sœur de **Poincaré**, **Aline**. On sait que toute la famille avait accompagné le jeune polytechnicien à Paris pour sa rentrée. Il est est probable qu'**Eugénie Poincaré** était restée quelques jours à Paris tandis qu'**Aline** et **Émile-Léon Poincaré** étaient retournés à Nancy.↩

Resource Description Framework (RDF)



An ontology based on RDF Schema (RDFS)

RDFS

The RDFS language is used for representing domain knowledge

The Archives Henri-Poincaré ontology (AHPo)

- ▶ An ontology created for corpus resources representation
- ▶ which relies on several standards vocabularies (dcterm, foaf, rel, bibo, etc.)
- ▶ which is still evolving but which should be published soon

Corpus querying

SPARQL query language used for querying the corpus.

$Q =$ | Give the letters sent by Henri Poincaré
to Gösta Mittag-Leffler between 1880 and 1895
having optics as a topic.

$Q =$ |

```
SELECT ?l
WHERE { ?l a letter .
        ?l sentBy henriPoincaré . ?l sentTo göstaMittagLeffler .
        ?l hasTopic optics . ?l hasWritingDate ?y .
        FILTER(YEAR(?y) >= 1880 AND YEAR(?y) <= 1895)}
```

A navigation system for exploring the RDF graph

Issue and general idea

Querying the corpus with SPARQL?

This approach leads to three difficulties

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2. Good understanding of the ontology schema required
3. Exact results sometimes do not encourage the exploration aspect when studying the corpus

Our proposal

A dynamic tool proposing a visual exploration of the corpus which allows to navigate through resources

Presentation of the navigation system

General idea

- ▶ Start with an initial resource (e.g. a letter)
- ▶ Extract relevant conditions for creating filters
- ▶ Generate queries using these filtering conditions
- ▶ Results are presented in a chronological-based view
- ▶ Focus can be changed from a resource to another

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For the Henri Poincaré correspondence corpus

Easily identify letters sent during the same temporal period, having the same correspondent, quoting the same people or institutions.

Demonstration

Generate new filtering conditions?

The use of a flexible querying system

SQTRL

A tool associated with a language, named **SQTRL (SPARQL Query Transformation Rule Language)** has been designed to enable flexible querying.

Generate new filtering conditions?

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Transformation rules

Different kind of rules can be created:

- ▶ Application-independent (generalization, specialization, etc.);
- ▶ Application-dependent (switching sender/recipient of the letter, replacing someone by a colleague, etc.).

A flexible querying system

Initial query

$Q =$ | Give the letters sent by Henri Poincaré to
Giovanni Battista Guccia between 1900 and 1905,
having geometry as a topic and quoting a scientist.

A flexible querying system

Initial query

$Q =$ | Give the letters sent by Henri Poincaré to
Giovanni Battista Guccia between 1900 and 1905,
having **geometry** as a topic and quoting a scientist.

Generated query (by generalizing the topic)

$Q_1 =$ | Give the letters sent by Henri Poincaré to
Giovanni Battista Guccia between 1900 and 1905,
having **mathematics** as a topic and quoting a scientist.

A flexible querying system

Initial query

$Q =$ | Give the letters sent by Henri Poincaré to
Giovanni Battista Guccia **between 1900 and 1905**,
having geometry as a topic and quoting a scientist.

Generated query (by extending the temporal bounds)

$Q_2 =$ | Give the letters sent by Henri Poincaré to
Giovanni Battista Guccia **between 1898 and 1907**,
having geometry as a topic and quoting a scientist.

A flexible querying system

Initial query

$Q =$ | Give the letters sent by **Henri Poincaré** to
| **Giovanni Battista Guccia** between 1900 and 1905,
| having geometry as a topic and quoting a scientist.

Generated query (by switching the sender and the recipient)

$Q_3 =$ | Give the letters sent by **Giovanni Battista Guccia** to
| **Henri Poincaré** between 1900 and 1905,
| having geometry as a topic and quoting a scientist.

A flexible querying system

Initial query

$Q =$ | Give the letters sent by Henri Poincaré to
| **Giovanni Battista Guccia** between 1900 and 1905,
| having geometry as a topic and quoting a scientist.

Generated query (by replacing Guccia)

$Q_4 =$ | Give the letters sent by Henri Poincaré to
| **an Italian** between 1900 and 1905,
| having geometry as a topic and quoting a scientist.

A flexible querying system

Initial query

$Q =$ | Give the letters sent by Henri Poincaré to
Giovanni Battista Guccia between 1900 and 1905,
having geometry as a topic and quoting a scientist.

Generated query (by replacing Guccia)

$Q_5 =$ | Give the letters sent by Henri Poincaré to
a member of the *Circolo Matematico di Palermo*
between 1900 and 1905,
having geometry as a topic and quoting a scientist.

Reusability of the navigation system?

System reusability

Conditions for reusing the tool with another corpus

1. RDF data exposed through a public or local SPARQL endpoint

System reusability

Conditions for reusing the tool with another corpus

1. RDF data exposed through a public or local SPARQL endpoint
2. Results which can be presented using a chronological-based view

System reusability

Conditions for reusing the tool with another corpus

1. RDF data exposed through a public or local SPARQL endpoint
2. Results which can be presented using a chronological-based view
3. Resources described with labels:
e.g. `http://e-hp.ahp-numerique.fr/ahpo#/843` associated to
Henri Poincaré

Several DBpedia use cases

About: **Crime and Punishment**

An Entity of Type : [work](#), from Named Graph : <http://dbpedia.org>, within Data Space : [dbpedia.org](#)

Crime and Punishment (pre-reform Russian: Преступление и наказание; post-reform Russian: Преступление и наказание, tr. Prestupléníye i nakazániye, IPA: [prʲɪstuˈplʲenʲɪjɐ ɪ nəkəˈzanʲɪjɐ]) is a novel by the Russian author Fyodor Dostoevsky. It was first published in the literary journal The Russian Messenger in twelve monthly installments during 1866. It was later published in a single volume. It is the second of Dostoevsky's full-length novels following his return from ten years of exile in Siberia. Crime and Punishment is considered the first great novel of his "mature" period of writing. The novel is often cited as one of the supreme achievements in literature.

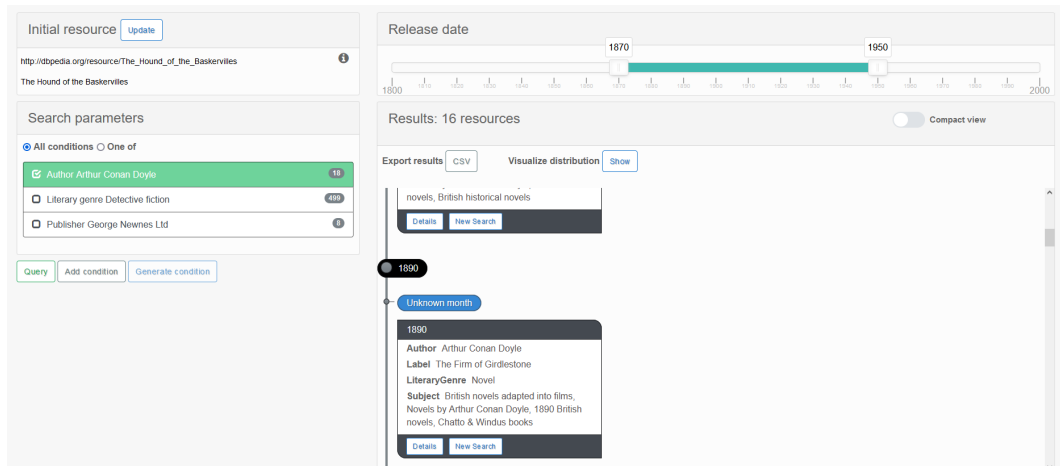
Property	Value
dbo:abstract	<ul style="list-style-type: none">Crime and Punishment (pre-reform Russian: Преступление и наказание; post-reform Russian: Преступление и наказание, tr. Prestupléníye i nakazániye, IPA: [prʲɪstuˈplʲenʲɪjɐ ɪ nəkəˈzanʲɪjɐ]) is a novel by the Russian author Fyodor Dostoevsky. It was first published in the literary journal The Russian Messenger in twelve monthly installments during 1866. It was later published in a single volume. It is the second of Dostoevsky's full-length novels following his return from ten years of exile in Siberia. Crime and Punishment is considered the first great novel of his "mature" period of writing. The novel is often cited as one of the supreme achievements in literature. Crime and Punishment focuses on the mental anguish and moral dilemmas of Rodion Raskolnikov, an impoverished ex-student in Saint Petersburg who formulates a plan to kill an unscrupulous pawnbroker for her money. Before the killing, Raskolnikov believes that with the money he could liberate himself from poverty and go on to perform great deeds. However, once it is done he finds himself racked with confusion, paranoia, and disgust for what he has done. His justifications disintegrate completely as he struggles with guilt and horror and confronts the real-world consequences of his deed. ^(en)
dbo:author	<ul style="list-style-type: none">dbr:Fyodor_Dostoyevsky
dbo:dcc	<ul style="list-style-type: none">891.73/3 20
dbo:lcc	<ul style="list-style-type: none">PG3326 .P7 1993
dbo:literaryGenre	<ul style="list-style-type: none">dbr:Philosophical_noveldbr:Crime_fiction

Several DBpedia use cases

Literary works

Works by the same author, associated with the same movement, dealing with the same themes, written in the same language, etc.

The Hound of the Baskervilles, by Sir Arthur Conan Doyle



Several DBpedia use cases

Literary works

Works by the same author, associated with the same movement, dealing with the same themes, written in the same language, etc.

Musical albums

Works of the same artist, associated with the same musical genre, produced by the same individual, etc.

Man-child, by Herbie Hancock

Initial resource [Update](#)

<http://dbpedia.org/resource/Man-Child> ⓘ

Man-Child

Search parameters

☒ All conditions ☐ One of

☐ Artist Herbie Hancock 47

☒ Genre Jazz-funk 243

☐ Producer Herbie Hancock 13

☐ Genre Jazz fusion 1531

☐ Producer David Rubinson 42

[Query](#) [Add condition](#) [Generate condition](#)

Released

19701978

196019621964196619681970197219741976197819801982198419861988199019921994199619982000

Results: 74 resources ☐ Compact view

Export results [CSV](#) Visualize distribution [Show](#)

[Details](#) [New Search](#)

1972

Unknown month

1972

Artist Jimmy Smith (musician)
Genre Jazz-funk, Jazz fusion
Label Bluesmith

[Details](#) [New Search](#)

1972

Artist Donald Byrd
Genre Jazz, Jazz-funk, Jazz fusion
Label Ethiopian Knights
Producer George Butler (record producer)

[Details](#) [New Search](#)

1972

Artist Grant Green
Genre Jazz-funk
Label Live at The Lighthouse (Grant Green album)

[Details](#) [New Search](#)

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Several DBpedia use cases

Literary works

Works by the same author, associated with the same movement, dealing with the same themes, written in the same language, etc.

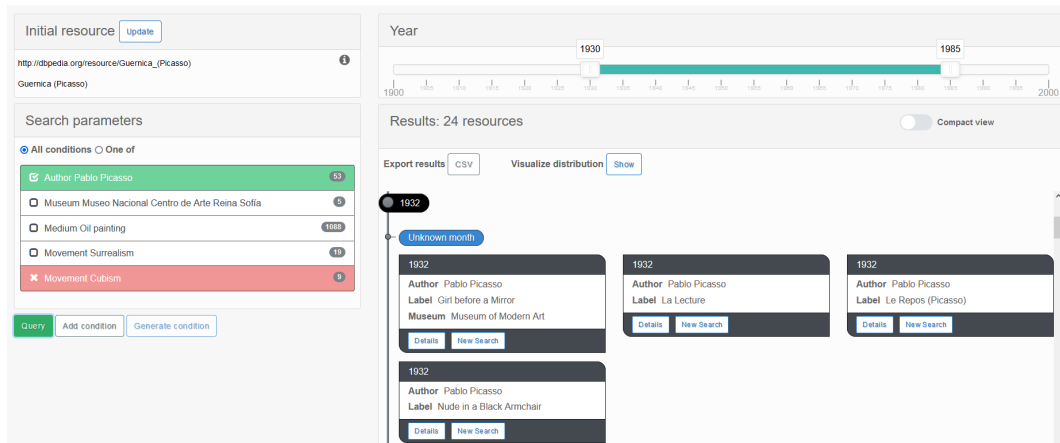
Musical albums

Works of the same artist, associated with the same musical genre, produced by the same individual, etc.

Painting

Paintings by the same artist, associated with the same movement, preserved in the same institution, etc.

Guernica, by Pablo Picasso



System reusability

Configuration file

- ▶ SPARQL endpoint URL
- ▶ Bounds of the time interval linked to the filter
- ▶ Ontology properties to use for:
 - ▶ chronological presentation and filtering;
 - ▶ generating conditions to search for similar resources;
 - ▶ finding the labels associated with the resources ;
 - ▶ specifying information to be displayed for each result.
- ▶ Main language to be used for labels

System reusability

GitHub² repository containing

- ▶ The application source code (Java backend and Web frontend);
- ▶ A deployed version of the backend application;
- ▶ Three versions of the configuration file;
- ▶ A user guide and technical documentation.

Any corpus suggestion for testing or collaboration?

²https://github.com/nlasolle/rdf_navigation_tool

Thank you for listening!

`nicolas.lasolle@univ-lorraine.fr`



Archives Henri Poincaré
Philosophie et Recherches sur les
Sciences et les Technologies



IMPACT
OLKi

SQTRL

```
<rule iri="http://sqtrl-rules/generic/1"  
  label="Generalize object class">  
  <context>?C rdfs:subClassOf ?D</context>  
  <left>?x ?p ?C</left>  
  <right>?x ?p ?D</right>  
  <cost>5.0</cost>  
  <exception>?C rdfs:subClassOf ?X . ?X rdfs:subClassOf ?D</exception>  
  <exception>FILTER(?C != ?D)</exception>  
  <explanation>Generalizing ?C in ?D</explanation>  
</rule>
```

