

Knowledge Graphs

Lecture 6 - Advanced Knowledge Graph Applications

6.6 Exploratory Search and Recommender Systems

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Leibniz-Institut für Informationsinfrastruktur

Knowledge Graphs

Lecture 6: Advanced Knowledge Graph Applications

6.1 The Graph in Knowledge Graphs

6.2 Knowledge Graph Embeddings

6.3 Knowledge Graph Completion

6.4 Knowledge Graph Mappings and Alignment

6.5 Semantic Search

6.6 Exploratory Search and Recommender Systems

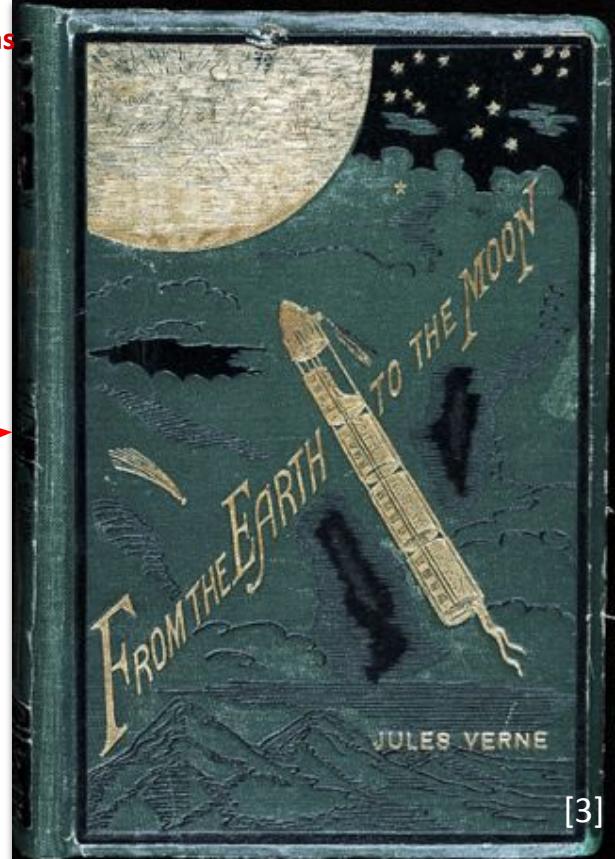
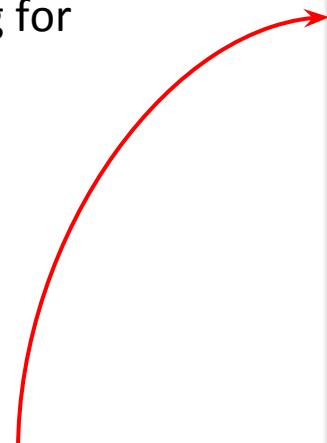


[1]

Retrieval vs. Exploration

The Retrieval Problem

- **Retrieval Problem:**
 - you are looking for **something specific**
i.e. you know what you are looking for
- How to **specify your search request?**
 - e.g. for a (specific) book:
author name, title, etc.
- Often you are using
 - (unique) identifier
 - descriptive metadata



[3]

Author: Jules Verne

Title: From the Earth to the Moon

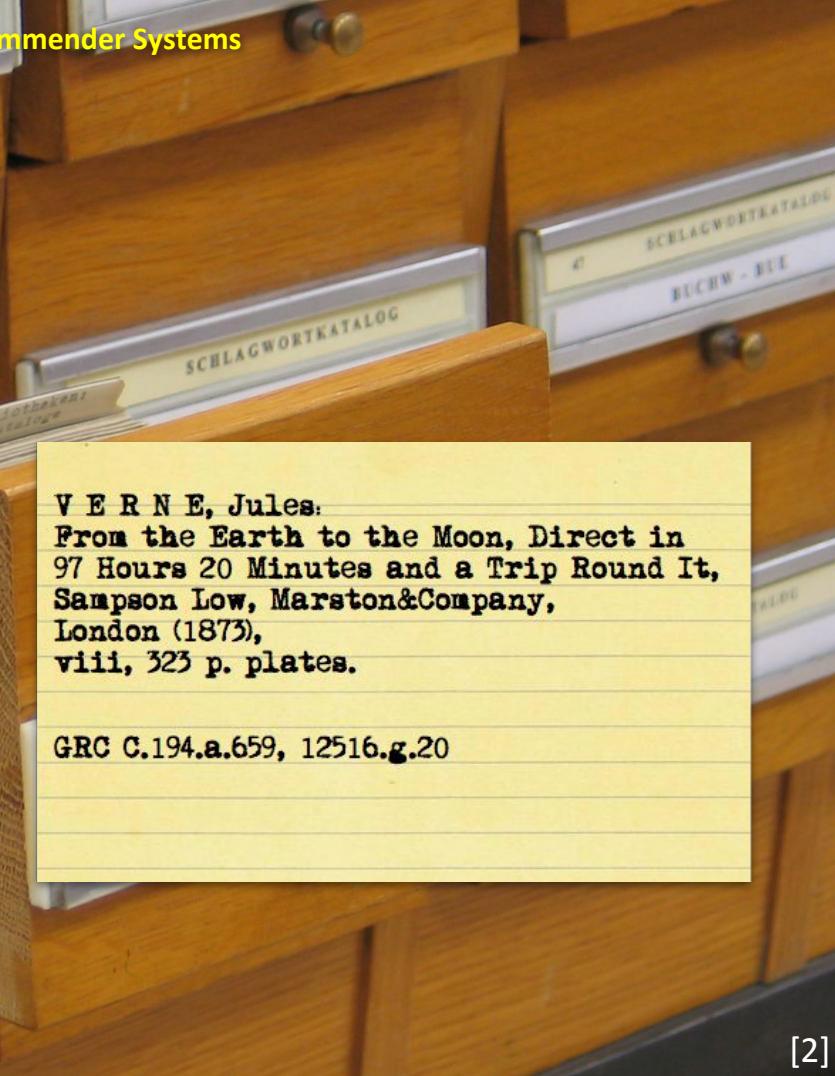
The Retrieval Problem



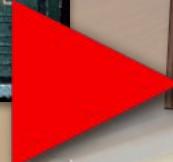
SCHLAGWORTKATALOG
BIBLIOGRAPH:N - BIBLIOTHEKEN:O - BIENENR

BAY - BEE

36



Retrieval vs. Exploration



- *Find another („comparable“) book,
(that will be of interest for me...)*
- *Find books of the same or of related topics*
- *How did the author / the topic develop over time?*
- *What else would I like to read?*
- ...

Exploratory Search





Traditional Libraries
enable Exploratory Search

...and intelligent
recommendations

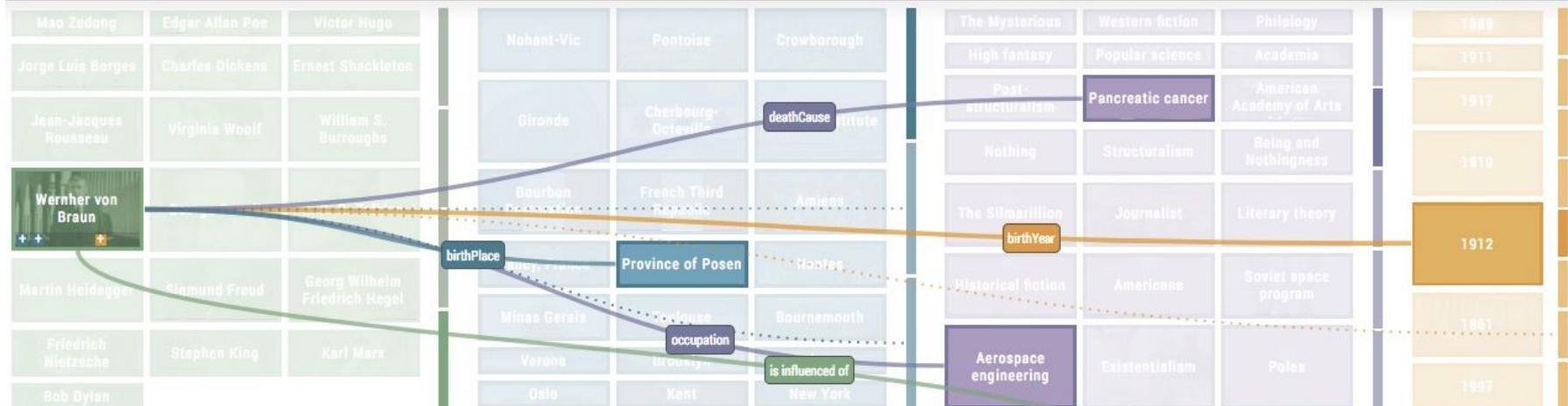
Exploratory Search

represents the activities carried out by searchers who are:

- unfamiliar with the domain of their goal (i.e. need to learn about the topic in order to understand how to achieve their goal),
- unsure about the ways to achieve their goals (either the technology or the process),
- or even unsure about their goals in the first place.

- ...**Browsing** instead of **Searching**
- ...to find something by chance, i.e. **Serendipity**
- ...to get an **overview**
- ...enable content based **navigation**

Exploratory Search and Recommendation



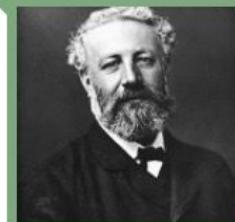
January 30

2 Recommended Articles:

#1 Edward Walter Maunder and the Sunspots

#2 Ferdinand Freiherr von Richthofen and the Silk Road

Jules Verne



Jules Gabriel Verne (French: [ʒyl vɛʁn]; 8 February 1828 – 24 March 1905) was a French novelist, poet, and playwright best known for his adventure novels and his profound influence on the literary genre of science fiction. Born to bourgeois parents in the seaport of Nantes, Verne was trained to follow in his father's footsteps as a lawyer, but quit the profession early in life to write for magazines and the stage. His collaboration with the publisher Pierre-Jules Hetzel led to the creation of the Voyages Extraordinaires, a widely popular series of scrupulously researched adventure novels including Journey to the Center of the Earth, Twenty Thousand Leagues Under the Sea, and Around the World in Eighty Days. Verne is generally considered a major literary

DBpedia: Jules Verne



http://dbpedia.org/resource/From_the_Earth_to_the_Moon

DBpedia Browse using ▾ Formats ▾

[Faceted Browser](#) [Sparql Endpoint](#)

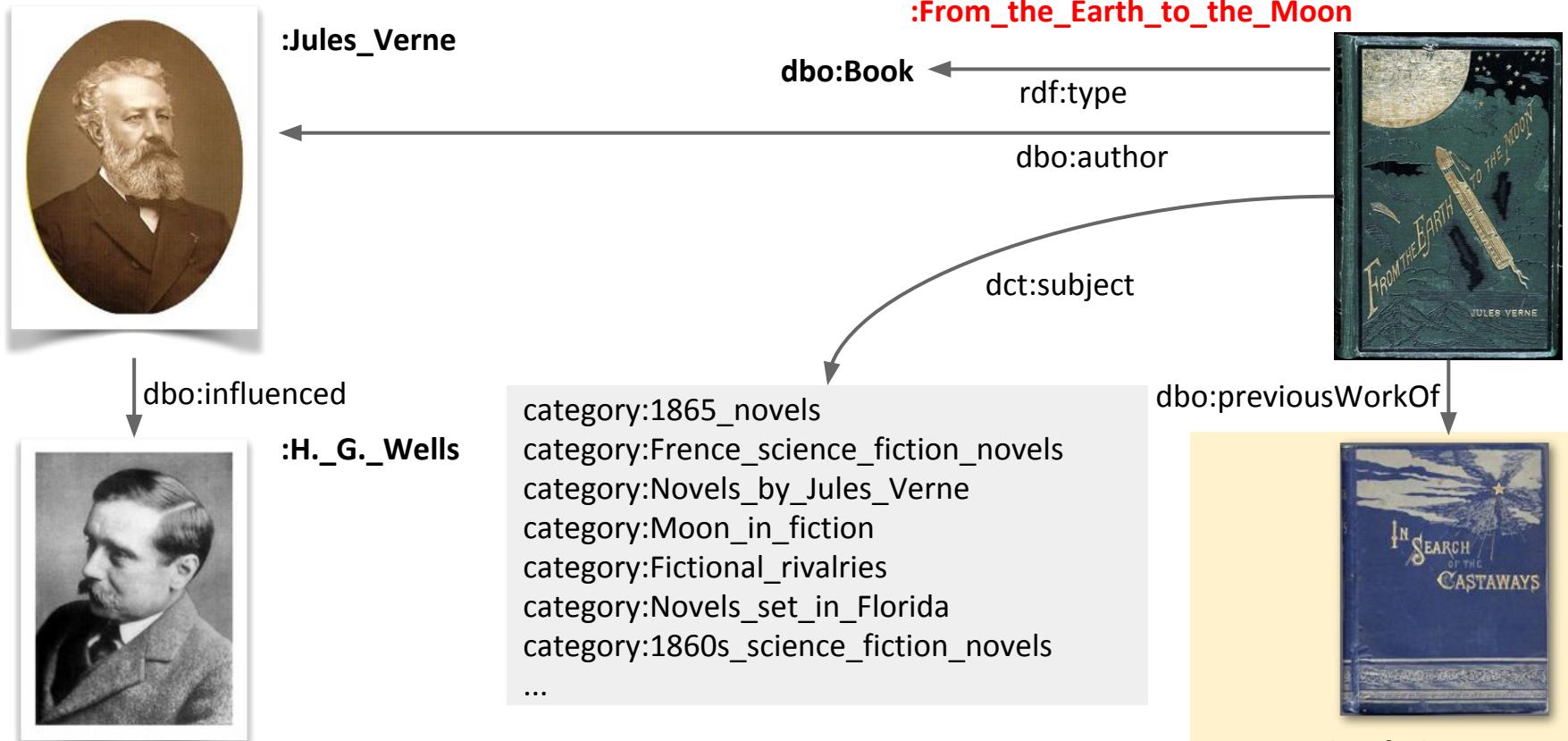
About: From the Earth to the Moon

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

From the Earth to the Moon (French: De la terre à la lune) is an 1865 novel by Jules Verne.

Property	Value
dbo:abstract	<ul style="list-style-type: none"> ▪ Von der Erde zum Mond ist ein Roman des französischen Autors Jules Verne. Der Roman wurde erstmals 1865 unter dem französischen Titel De la Terre à la Lune von dem Verleger Pierre-Jules Hetzel veröffentlicht. Die erste deutschsprachige Ausgabe erschien 1873 unter dem Titel Von der Erde zum Mond. Der englische Titel des Romans lautet From the Earth to the Moon. Es handelt sich um ein frühes Werk des Science-Fiction-Genres, das die Mondfahrt um etwa hundert Jahre vorwegnimmt. Allerdings geht es hier vor allem noch um die Vorbereitung des Abenteuers. Der Roman Reise um den Mond (Autour de la Lune) von 1870 setzte die Geschichte fort. (de) ▪ From the Earth to the Moon (French: De la terre à la lune) is an 1865 novel by Jules Verne. It tells the story of the Baltimore Gun Club, a post-American Civil War society of weapons enthusiasts, and their attempts to build an enormous sky-facing Columbiad space gun and launch three people—the Gun Club's president, his Philadelphian armor-making rival, and a French poet—in a projectile with the goal of a moon landing. The story is also notable in that Verne attempted to do some rough calculations as to the requirements for the cannon and, considering the comparative lack of any data on the subject at the time, some of his figures are surprisingly close to reality. However, his scenario turned out to be impractical for safe manned space travel since a much longer muzzle would have been required to reach escape velocity while limiting acceleration to survivable limits for the passengers. The character of Michel Ardan, the French member of the party in the novel, was inspired by the real-life photographer Félix Nadar. (en)
dbo:author	▪ dbr:Jules_Verne
dbo:illustrator	▪ dbr:Henri_de_Montaut
dbo:literaryGenre	▪ dbr:Science_fiction
dbo:mediaType	▪ dbr:Hardcover
dbo:publisher	▪ dbr:Pierre-Jules_Hetzel
dbo:series	▪ dbr:Voyages_extraordinaires
dbo:thumbnail	▪ wiki-commons:Special:FilePath/From_the_Earth_to_the_Moon_Jules_Verne.jpg?width=300

Exploratory Search via Knowledge Graphs



Exploratory Search via Knowledge Graphs

:From_the_Earth_to_the_Moon



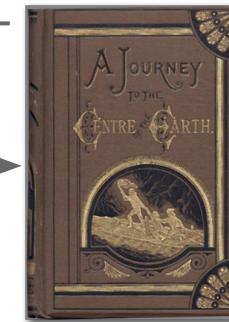
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rdf:type

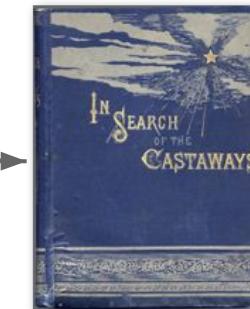
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rdf:type

dbo:previousWorkOf



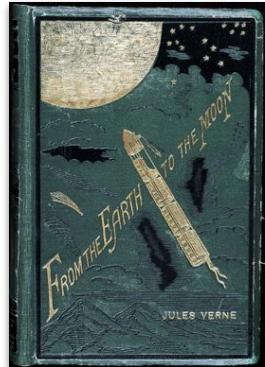
:A_Journey_to_the_Center_of_the_Earth



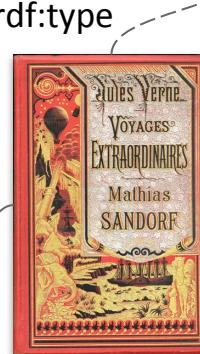
:In_Search_of_the_Castaways

Exploratory Search via Knowledge Graphs

:From_the_Earth_to_the_Moon

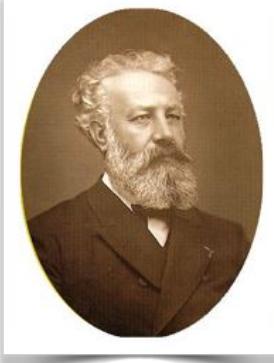


rdf:type dbo:Book rdf:type



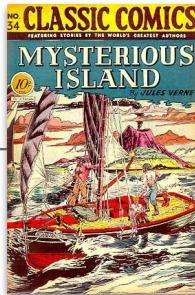
:Matthias_Sandorf

dbo:author



:Jules_Verne

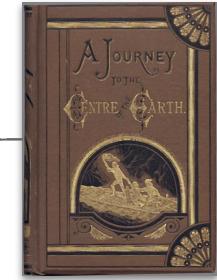
:A_Journey_to_the_Center_of_the_Earth



:The_Mysterious_Island



:Master_of_the_World_(novel)



dbo:author

dbo:author

dbo:author

rdf:type

rdf:type

rdf:type

rdf:type

rdf:type

dbo:author

dbo:author

dbo:author

dbo:author

Exploratory Search via Knowledge Graphs

:From_the_Earth_to_the_Moon



rdf:type
dbo:Book

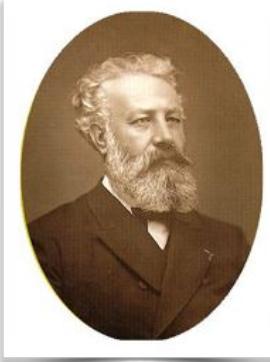
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:The_Invisible_Man

dbo:author
rdf:type
dbo:Writer

rdf:type



dbo:influenced

:Jules_Verne



:H._G._Wells

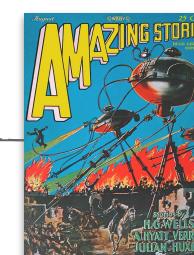
rdf:type

dbo:author

dbo:author

:The_Island_of_Dr_Moreau

:The_War_of_the_Worlds



:The_War_of_the_Worlds

Exploratory Search via Knowledge Graphs

- **Exploratory Search** represents the activities carried out by searchers who are either:
 - **unfamiliar with the domain** of their goal (i.e. need to learn about the topic in order to understand how to achieve their goal),
 - **unsure about the ways** to achieve their goals (either the technology or the process)
 - or even **unsure about their goals** in the first place.
- **Recommender Systems** seek to predict the preference a user would give to an item.

Knowledge Graph Based Recommendations

Virtuoso SPARQL Query Editor

[About](#) | [Namespace Prefixes](#) | [Inference rules](#) | [RDF views](#) | [iSPARQL](#)

Default Data Set Name (Graph IRI)

http://dbpedia.org

Query Text

```
SELECT ?s (COUNT(DISTINCT(?category)) AS ?score)
WHERE {
  dbr:From_the_Earth_to_the_Moon dct:subject ?category.
  ?s dct:subject ?category FILTER (?s != dbr:From_the_Earth_to_the_Moon) .
} GROUP BY ?s
ORDER BY DESC (?score)
```

(Security restrictions of this server do not allow you to retrieve remote RDF data, see [details](#).)

Results Format:

Execution timeout:

milliseconds (values less than 1000 are ignored)

Options:

 Strict checking of void variables

 Log debug info at the end of output (has no effect on some queries and output formats)

 Generate SPARQL compilation report (instead of executing the query)

(The result can only be sent back to browser, not saved on the server, see [details](#))

A vintage-style illustration of a face on the moon with a red bullet wound.

Now, which movie should I watch next?

...and please ...don't make boring suggestions!

Thank you very much for
your Attention!



Knowledge Graphs

6.6 Exploratory Search and Recommender Systems

Picture References:

- [1] Carl Spitzweg, The Bopokworm, 1850, [Public Domain]
https://commons.wikimedia.org/wiki/File:Carl_Spitzweg_021.jpg
- [2] Dr. Markus Gossler, The subject catalogue ("Schlagwortkatalog") of the University Library of Graz. The card shown refers to a text by Hans Schleimer who made up the rules for this catalogue.,
<https://commons.wikimedia.org/wiki/File:Schlagwortkatalog.jpg>
- [3] Jules Verne, From the Earth to the Moon,
https://commons.wikimedia.org/wiki/File:From_the_Earth_to_the_Moon_Jules_Verne.jpg
- [4] Frame from the only surviving hand-colored print of Georges Méliès's 1902 film Le voyage dans la lune.
https://commons.wikimedia.org/wiki/File:Melies_color_Voyage_dans_la_lune.jpg