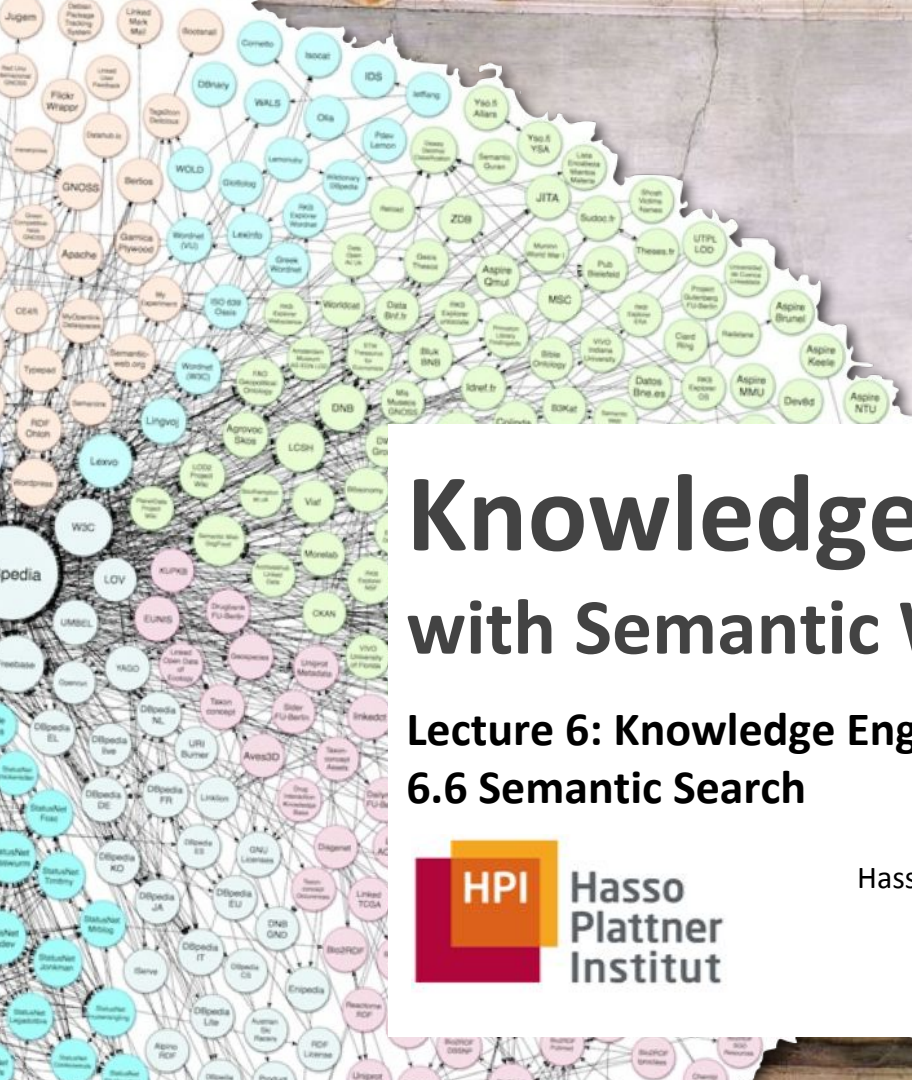


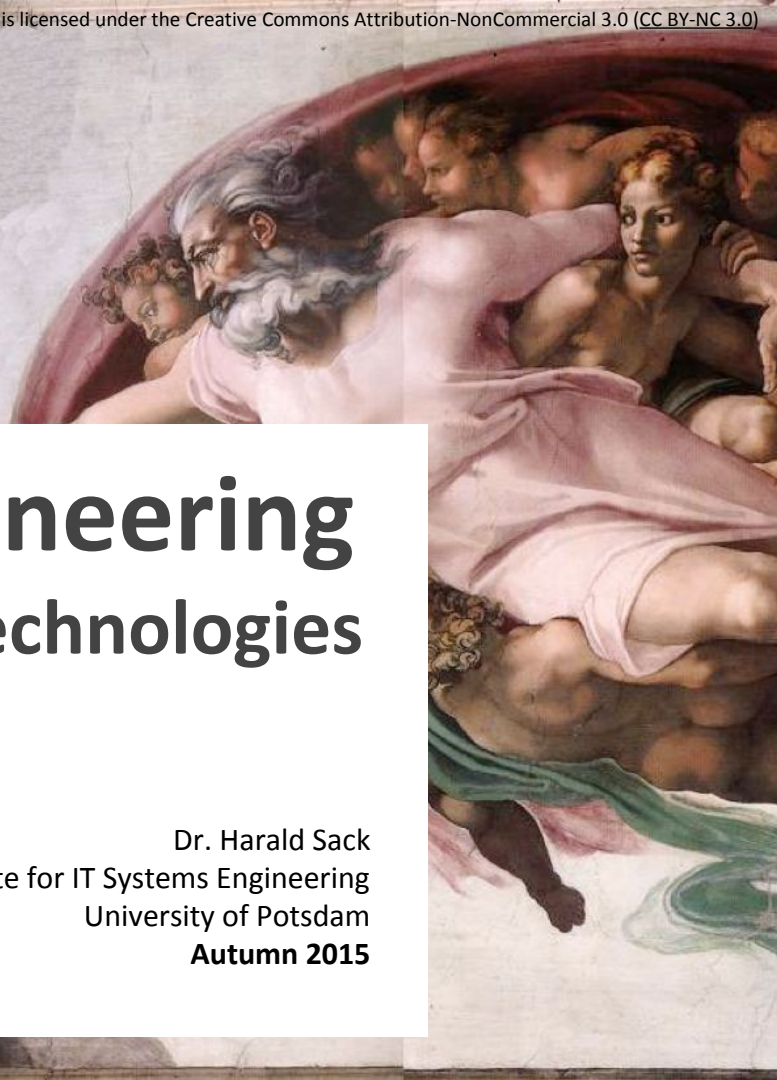


Knowledge Engineering with Semantic Web Technologies

Lecture 6: Knowledge Engineering 6.6 Semantic Search



Dr. Harald Sack
Hasso Plattner Institute for IT Systems Engineering
University of Potsdam
Autumn 2015



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Jules Verne - Wikipedia, the free encyclopedia
https://en.wikipedia.org/wiki/Jules_Verne Wikipedia
 Jules Gabriel Verne (/vɜːn/; French: [ʒyl vɛʁn]; 8 February 1828 – 24 March 1905) was a French novelist, poet, and playwright best known for his adventure ...
 Twenty Thousand Leagues - Jules Verne bibliography - From the Earth to the Moon

Jules Verne - Author - Biography.com
www.biography.com/people/jules-verne-9517579
 Jules Verne was a 19th century French author whose revolutionary science-fiction novels, including Around the World in Eighty Days and Twenty Thousand ...

Jules Verne - The Literature Network
www.online-literature.com/verne/
 Jules Verne (1828-1905), noted French scientific author wrote Around the World in Eighty Days (1873), Journey to the Center of the Earth (1864), and Twenty Thousand Leagues Under The Sea (1869); ... After attending boarding school during which he started to write short stories and ...

Home | Restaurant le Jules Verne - Tour Eiffel Paris
www.lejulesverne-paris.com/
 The Jules Verne. ///. For Christmas at lunch, live an exceptional moment with an exclusive menu created for the event. On Christmas ...

In the news



Francis Joyon may start Jules Verne on Saturday

Scuttlebutt Sailing News - 13 hours ago

The Jules Verne Trophy is a prize for the fastest circumnavigation of the world by any type of ...

More news for jules verne

Jules Verne | French author | Britannica.com
www.britannica.com/biography/Jules-Verne Encyclopaedia Britannica
 Apr 22, 2015 - Prolific French author whose writings laid much of the foundation of modern science fiction. Verne's father, intending that Jules follow in his ...

The UnMuseum - Jules Verne - Museum of Unnatural Mystery
www.unmuseum.org/verne.htm
 Jules Verne was born on February 8, 1828, in the city of Nantes, France. His father, Pierre Verne, was a lawyer. From the family's summer house just outside the ...

Jules Verne - IMDb
www.imdb.com/name/nm0894523/ Internet Movie Database
 Jules Verne, Writer: Journey to the Center of the Earth.



Jules Verne

Novelist

Jules Gabriel Verne was a French novelist, poet, and playwright best known for his adventure novels and his profound influence on the literary genre of science fiction. Wikipedia

Born: February 8, 1828, Nantes, France

Died: March 24, 1905, Amiens, France

Full name: Jules Gabriel Verne

Influenced by: Edgar Allan Poe, Alexandre Dumas, Victor Hugo, Daniel Defoe, James Fenimore Cooper, George Sand

Quotes

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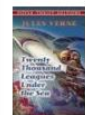
We may brave human laws, but we cannot resist natural ones.

I believe cats to be spirits come to earth. A cat, I am sure, could walk on a cloud without coming through.

Science, my lad, is made up of mistakes, but they are mistakes which it is useful to make, because they lead little by little to the truth.

Books

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Twenty Thousand Leagues...
1870

Around the World in Eighty Da...
1873

Journey to the Center of the Earth
1864

The Mysterious Island
1874

From the Earth to the Moon
1865

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www.j-verne.de =

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Kontakt [Translate this page](#)

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Sie finden uns in **Berlin** – Charlottenburg, am S-Bahnhof Savignyplatz zwischen dem Bahnhof Zoo und dem Kurfürstendamm.

Jules-Verne-Oberschule

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1 **Jules-Verne-Oberschule** · Website
030 5618059 · Vernerstr. 48 · 12621 Berlin
[Directions](#)

Jules – Verne – Club | Willkommen in der ... [Translate this page](#)

www.jules-verne-club.de =

Willkommen in der Welt von **Jules Verne**. DIE deutschsprachige Basis in Fragen zu und um **Jules Verne** mit engen Kontakten weltweit. Eine Auswahl unserer ...

Jules Verne, Berlin - Restaurant ... [Translate this page](#)

www.tripadvisor.de > ... > **Berlin** > Restaurants **Berlin** - Bewertungen =

Jules Verne, Berlin: 150 Bewertungen - bei TripAdvisor auf Platz 678 von 6.883 von 6.883 **Berlin** Restaurants; mit 4/5 von Reisenden bewertet.

Deutsch

Hi Anja



Jules Verne

Romanautor



Jules-Gabriel Verne war ein französischer Schriftsteller. Bekannt wurde er vor allem durch seine Romane Die Reise zum Mittelpunkt der Erde, 20.000 Meilen unter dem Meer sowie Reise um die Erde in 80 Tagen. Neben Hugo Gerns... +

[Wikipedia](#)

Born: 8. Feb 1828 · Nantes, Frankreich

Died: 24. Mrz 1905 · Amiens, Frankreich

Spouse: **Honorine de Viane Morel** (1857 - 1905)

Children: **Michel Verne** (Son) · **Suzanne Morel** (Daughter) · **Valentine Morel** (Daughter)

Parents: **Pierre Verne** · **Sophie Allotte de la Fuyé**

Education: **Lycée Georges Clemenceau** (1844 - 1846)

Written works



20.000 Meilen unter dem Meer



Die Reise zum Mittelpunkt...



Reise um die Erde in 80 Tagen



Die geheimnisvolle Insel



Von der Erde zum Mond

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H.g. Wells



Hugo Gernsback



Alexandre Dumas der Ältere



Victor Hugo



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jules verne was called father

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说家、剧作家及诗人。凡尔纳出生于法国港口城市南特的一个中产阶级家庭，早年依从其父亲的意愿在巴黎学习法律，之后...

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Jules Verne - Wikipedia, the free encyclopedia



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en.wikipedia.org/wiki/... - 百度快照

Jules Verne_百度翻译

Jules Verne

【释义】 《法国作家，被誉为“科幻小说之父” 儒勒·凡尔纳；
[全部释义>>](#)

【例句】 **Jules Verne**: Anything one man can imagine, other men can make real.
凡尔纳：但凡能想象到的事物，必定有人能将它实现。
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fanyi.baidu.com

巴黎Le Jules Verne电话/地址/菜系/点评/营业时间【携程攻略】



如果你的荷包够鼓的话,可以选择来Le **Jules Verne**用餐,在埃菲尔铁塔125米高的平台上,可以看到巴黎全景。如果说白天的巴黎像一个30岁的优雅少妇的话,那么晚上的巴黎...

you.ctrip.com/food/par... - 百度快照 - 82%好评

Jules Verne是什么意思_Jules Verne在线翻译_英语_读音_用..._海词

海词词典,最权威的学习词典,为您提供Jules Verne的在线翻译,Jules Verne是什么意思,Jules Verne的真人发音,权威用法和精选例句等。

[dict.cn/Jules Verne](http://dict.cn/Jules_Verne) - 百度快照 - 84%好评

Jules Verne

The Works of **Jules Verne** **Jules Verne** **Verne**, **Jules** (1828-1905), French author, who is often regarded as the father of science fiction. He was born...

www.jules-verne.co.uk/ - 百度快照 - 评价 - 翻译此页

jules verne_百度图片 - 举报图片



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英国剧作家
诗人散文家



罗尔德·达尔

剧作家和短
篇小说作家



莱曼·弗兰克·

美国儿童文
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Name: Jules Gabriel Verne

Birth and Death: February 8, 1828 - March 24, 1905

Summary: Jules Verne (1828.2.8 ~ 1905.3.24), it is the famous 19th century French novelist, playwright and poet. Verne was born in a middle class family port city of Nantes, France, early according to study law in Paris from his father's wishes, after ...

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Jules Verne

[Interpretation] ("Father of science fiction," the French writer known) Jules Verne;
All Interpretation >>

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If you have enough pockets drum, you can choose to Le [Jules Verne](#) dine in the 125-meter-high platform of the Eiffel Tower, you can see the panoramic view of Paris. If, as a 30-year-old elegant young woman during the day, then Paris, then at night in Paris ...

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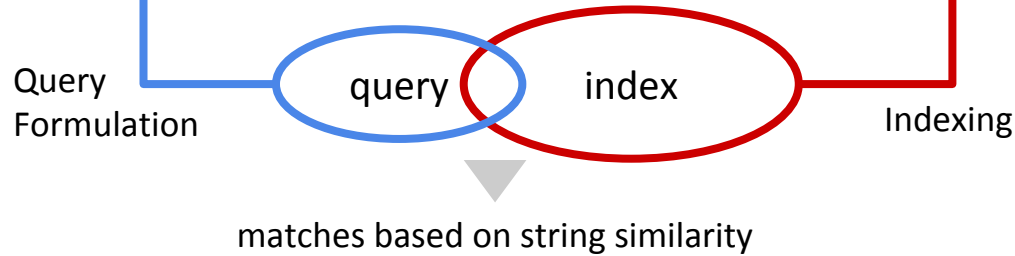
The Information Retrieval Paradigm



Set of Queries



Set of Documents



Classical Information Retrieval

Simplified Form



search query

search term



search index

keywords

searching, vb. , in allen ger
sprachen bezeugt: got.sokjan,
ags. sēcan, as. sokian, an. Soekj

[Bd. 20, Sp. 835]

sēza, ahd. suohhan. aus idg. sprachen steht
am nächsten lat. sāgiospūre, air. saigim gehe
einer sache nach, suche; zur weiteren
verwandschaft vgl. Walde-Pokorny 2, 449.
der umlaut des stammvokals erscheint im nd.,
er wird im md. verzeichnet von Crecelius
oberhess. wb. 827; Spiess henneb. id. 248;
Hertel Thüringen 240; Gerbet Vogtland 425
und auf kolonialem boden bei
Schröder deutsche mundarten des ungrischen
berglandes 225.
neben eigentlichem suchen 'einer sache
nachspüren, sich bemühen, sie
aufzufinden' (dann auch 'jemanden
aufsuchen, ihn bedrohen, angreifen') steht
eine reich bezeugte bedeutungsgruppe mehr

document corpus



document

The Information Retrieval Dilemma



- ambiguity of natural language (polysemy)
- different words/expressions for the same concept (synonyms, metaphors)

A full-page action shot of Tom Brady, quarterback of the New England Patriots, running with the football. He is wearing his iconic blue, white, and red uniform with the number 12. He is in mid-stride, looking back over his shoulder. The background is a blurred stadium scene with an American flag and other players.

JE

**HEISENBERG
CAN WAIT.**

**SUNDAY NIGHT FOOTBALL
#SNF**

- **Annotation** of (text-based) metadata with explicit semantics as e.g. semantic entities
- **Entity-based Information Retrieval**
 - Language independent
- Make use of underlying Knowledge Base, as e.g.
 - content-based similarities among entities
 - content-based relationships between entities
- Interoperable metadata via semantic annotations
 - for content-based description
 - for structural and technical description
- Content-Based Navigation and Result Filtering (Search Facets)

Semantic Search vs. Keyword-Based Search

- **Query String Refinement**
enables more precise or more complete search results
- **Cross Referencing**
enables to complement search results with additional associated or similar information
- **Fuzzy Search**
enables the determination of nearby results and results related by content
- **Exploratory Search**
enables visualization and navigation of the search space
- **Reasoning**
enables to complement search results with implicitly given information

Entity Based Search

Search Query:

Armstrong on the Moon

Named Entity Resolution

dbr:Neil Armstrong

dbr:Moon

Indexing

The first Man on the Moon

dbr:Neil Armstrong

....
On the Moon, the 38-year-old civilian commander, radios to earth and the mission control room here: "Houston, Tranquility Base here, The Eagle has landed."
....

dbr:Moon

Named Entity Resolution

Entity-Based Query Matching

- simple entity matching
- similarity-based entity matching
- relationship-based entity matching
- ...

Entity Based Search

Search Query:

Armstrong on the Moon

Named Entity Resolution

dbr:Neil_Armstrong

dbr:Moon

Indexing

The 2nd Man on the Moon

...
Legendary astronaut Buzz Aldrin has revealed some captivating pieces of Apollo 11 memorabilia on social media in the last few days.
...

dbr:Moon

dbr:Buzz_Aldrin

dbr:Neil_Armstrong

↑
semantic
similarity
↓

Named Entity Resolution

Entity-Based Query Matching

- simple entity matching
- **similarity-based entity matching**
- relationship-based entity matching
- ...

two entities are considered **semantically similar**,

- if they share many property/value pairs
- if they share many properties with similar values

Entity Based Search

Search Query:

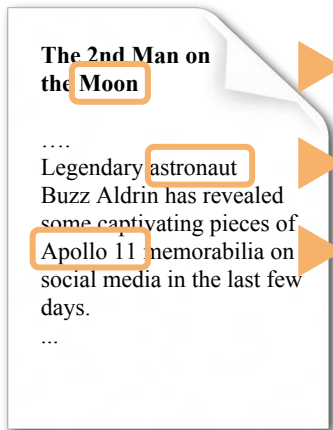
Armstrong on the Moon

Named Entity Resolution

dbr:Neil_Armstrong

dbr:Moon

Indexing



dbr:Moon

dbo:Astronaut

dbr:Apollo_11

dbo:mission

dbr:Neil_Armstrong

Entity-Based Query Matching

- simple entity matching
- similarity-based entity matching
- **relationship-based entity matching**
- ...

rdf:type

Named Entity Resolution

Entity Suggestion

Insert/edit entity



Find Entities:

Suggestions:

Person

	Armstrong Williams [Person, Agent]
	William W. Armstrong (journalist) [OfficeHolder, Person, Agent]
	Campbell Armstrong [Person, Writer, Artist, Agent]
	Dylan Armstrong [Person, Athlete, Agent]
	Antonio Armstrong [Person, GridironFootballPlayer, Athlete, Agent]
	Chris Armstrong (Canadian football) [GridironFootballPlayer, Athlete, Person, Agent]
	Scot Armstrong [Person, Agent]

Place

	Armstrong County, Pennsylvania [AdministrativeRegion, AdministrativeArea, PopulatedPlace, Place]
	Armstrong (crater) [LunarCrater, NaturalPlace, Place]
	Armstrong Township, Vanderburgh Co [Town, Settlement, PopulatedPlace, Place]
	Armstrong Township, Lycoming Count [Town, Settlement, PopulatedPlace, Place]
	Armstrong County, Texas [AdministrativeRegion, AdministrativeArea, PopulatedPlace, Place]
	Armstrong Township, Indiana County, [Town, Settlement, PopulatedPlace, Place]
	Armstrong Tunnel [Building, ArchitecturalStructure, Place]

Thing

	Armstrong Gun
	Armstrong Creek
	Armstrong (surname)
	Armstrong (automobile)
	Armstrong Township, Pennsylvania
	Armstrong (Clan)
	Armstrong (cyclecar) [Automobile, MeanOfTransportation, Product]

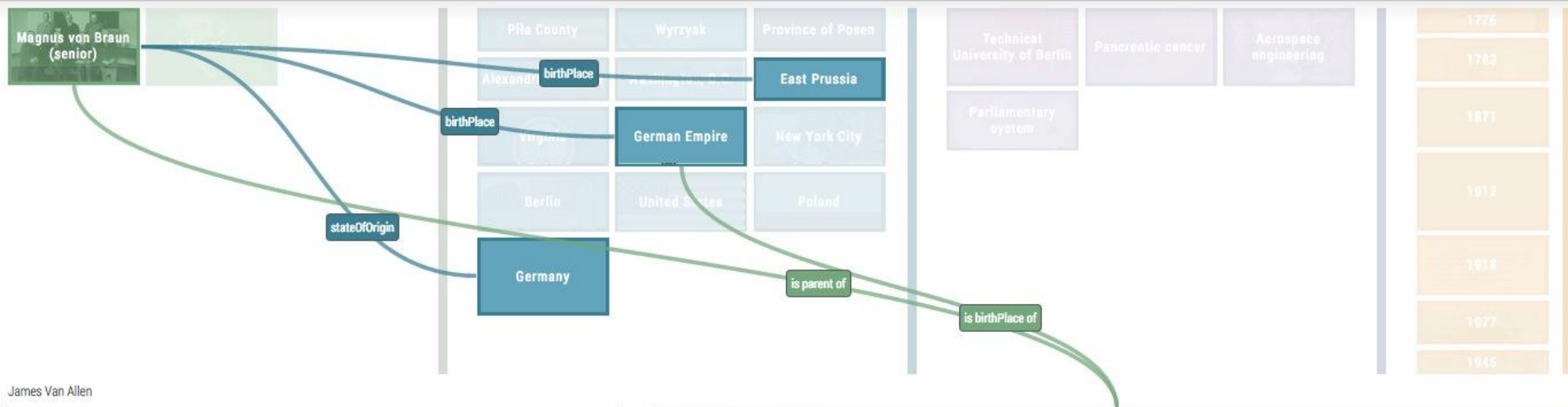
Event

	Kittanning Expedition [MilitaryConflict, Event]
--	---

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Information Exploration



James Van Allen

15 Recommended Articles:

- #1 Willy Ley Founder Of The German Rocket Society
- #2 The First Us Space Station Skylab
- #3 Hermann Oberths Dream Of Space Travel
- #4 Wolfgang Pauli And The Pauli Principle
- #5 Maria Goeppert Mayer And The Nuclear Shell Model
- #6 Peter von Miller and the Deutsches Museum

Wernher von Braun



Wernher Magnus Maximilian, Freiherr von Braun (March 23, 1912 – June 16, 1977) was a German rocket engineer and space architect. He was one of the leading figures in the development of rocket technology in Germany during World War II and, subsequently, in the United States. He is credited as being the "Father of Rocket Science". In his 20s and early 30s, von Braun was the central figure in the Nazis' rocket development program, responsible for the design and realization of the V-2 combat rocket during World War II. After the war, he and some select members of his rocket team were taken to the United States as part of the then-secret Operation Paperclip. Von Braun worked on the United States Army intermediate range ballistic missile (IRBM) program before his group was assimilated by NASA. Under NASA, he served as

DBpedia: Wernher von Braun

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07: Exploratory Search

OpenHPI - Course Knowledge Engineering with Semantic Web Technologies

Lecture 6: Knowledge Engineering