



# Semantic Web

Svetla Boytcheva

Published in Artificial Intelligence in Plain English · Oct 7 ✨ Member-only

## Reasoning on Graphs with LLMs: A New Era of Knowledge Integration?

Recent years have seen astounding advances in language model capabilities. Models like GPT-3 can display impressive reasoning skill...



Published in Artificial Intelligence in Plain English · Oct 8 ✨ Member-only

## Enhancing Reasoning Capabilities of AI systems with Knowledge Graphs

Reasoning, the ability to make logical inferences from existing information, is key to intelligence. It enables solving complex...



Anthony Alcaraz in Artificial Intelligence in Plain English · Nov 15 ✨ Member-only

## New Research Proves Knowledge Graphs Drastically Improve Accuracy of Large Language Models on Complex Data

Natural language interfaces to databases have long been a holy grail ...



Published in Towards Data Science · Nov 14 ✨ Member-only

## Embeddings + Knowledge Graphs: The Ultimate Tools for RAG Systems

The advent of large language models (LLMs), trained on vast amounts of text data, has been one of the most significant breakthroughs in...



AI 10 min read

⊕ ...



Ankush k Singal in ILLUMINATION'S MIRROR -  
32 min read ✨

## Unveiling the Potential of Text Clustering and Knowledge Graphs using LLM

Ankush k Singal





## Knowledge Graph

**DO YOU USE SEMANTIC TECHNOLOGIES  
AND KNOWLEDGE GRAPHS?**

About 107,000,000 results (0.49 seconds)

<https://www.uni-sofia.bg> · Translate this page

⋮

## Софийски университет "Св. Климент Охридски": Начало

... Електронно проследяване на документи · Web администратори · Дискусионен форум. © 2013, Софийски университет "Св. Климент Охридски" [webmaster@uni-sofia.bg](mailto:webmaster@uni-sofia.bg).

Results from uni-sofia.bg



### Sofia University

The University - Faculties - Education - Tuition fees - ...

### Факултети

телефон: 9308 381 8468 290 ; факс: 8465 143 ...

### Sofia University St. Kliment ...

Faculties - Admission - Departments - Education - ...

### Прием

Софийски Университет Св. Климент Охридски.

[https://en.wikipedia.org/wiki/Sofia\\_University](https://en.wikipedia.org/wiki/Sofia_University) ::

## Sofia University - Wikipedia

It has been consistently ranked as the top **university** in Bulgaria according to national and international rankings, being constantly among the best four percent ...

Students: ~18,911

Motto: Ipsa scientia potestas est

Motto in English: Knowledge itself is power

Endowment: \$125 million

[History](#) · [Faculties and departments](#) · [Notable alumni](#)



See photos



Burrata Italiana Shipka 11  
Бурата Италиана Шипка

See outside

### Sofia University St. Kliment Ohridski

Website Directions Save Call

Higher educational institution in Sofia

Sofia University, "St. Kliment Ohridski" at the University of Sofia, is the oldest higher education institution in Bulgaria. [Wikipedia](#)

**Address:** bul. "Tsar Osvoboditel" 15, 1504 Sofia Center, Sofia

**Hours:** Open · Closes 11PM ▾

**Phone:** 02 930 8200

**Rector:** Anatas Gerdzhikov

**Undergraduate tuition and fees:** International tuition 3,300 BGN (2011 – 12)

**Founded:** October 1, 1888

**Affiliations:** European University Association

**Color:** Purple

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# Google Knowledge Graph

 23 languages ▾

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[Read](#) [Edit](#) [View history](#)

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History

Criticism

Lack of source attribution

Declining Wikipedia article  
readership

Bias

See also

References



SCAN ME



From Wikipedia, the free encyclopedia

*"Knowledge Graph" redirects here. For the general concept in information science, see [Knowledge graph](#). For other uses, see [Knowledge Graph \(disambiguation\)](#).*

The **Google Knowledge Graph** is a [knowledge base](#) from which Google serves relevant information in an infobox beside its [search results](#). This allows the user to see the answer in a glance, as an [instant answer](#). The data is generated automatically from a variety of sources, covering places, people, businesses, and more.<sup>[1][2]</sup>

The information covered by Google's Knowledge Graph grew quickly after launch, tripling its size within seven months (covering 570 million entities and 18 billion facts<sup>[3]</sup>). By mid-2016, Google reported that it held 70 billion facts<sup>[4]</sup> and answered "roughly one-third" of the 100 billion monthly searches they handled. By May 2020, this had grown to 500 billion facts on 5 billion entities.<sup>[5]</sup>

There is no official documentation of how the Google Knowledge Graph is implemented.<sup>[6]</sup> According to Google, its information is retrieved from many sources, including the [CIA World Factbook](#) and [Wikipedia](#).<sup>[7]</sup> It is used to answer direct spoken questions in [Google Assistant](#)<sup>[8][9]</sup> and [Google Home](#) voice queries.<sup>[10]</sup> It has been criticized for providing answers without [source attribution](#) nor [citations](#).<sup>[11]</sup>

## History [edit]

Google announced its Knowledge Graph on May 16, 2012, as a way to significantly enhance the value of information returned by Google searches.<sup>[7]</sup> Initially available only in English, it was expanded in December 2012 to Spanish, French, German, Portuguese, Japanese, Russian and Italian.<sup>[12]</sup> Bengali support was added in March 2017.<sup>[13]</sup>



### Thomas Jefferson

3rd U.S. President

Thomas Jefferson was an American Founding Father, the principal author of the Declaration of Independence, and the third President of the United States. [Wikipedia](#)

Born: April 13, 1743, Shadwell, VA

Died: July 4, 1826, Charlottesville, VA

Presidential term: March 4, 1801 – March 4, 1809

Spouse: Martha Jefferson (m. 1772–1822)

Party: Democratic-Republican Party

Awards: AIA Gold Medal

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Knowledge panel data about  [Thomas Jefferson](#) displayed on [Google Search](#), as of January 2015



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The Free Encyclopedia

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# Sofia University

From Wikipedia, the free encyclopedia

Coordinates: 42°41'37"N 23°20'6"E

For the Japanese university, see [Sophia University](#). For the American university, see [Sofia University \(California\)](#).

**Sofia University**, "St. Kliment Ohridski" at the University of Sofia, (Bulgarian: Софийски университет „Св. Климент Охридски“, Sofijski universitet „Sv. Kliment Ohridski“) is the oldest higher education institution in Bulgaria.

Founded on 1 October 1888, the edifice of the university was constructed between 1924 and 1934 with the financial support of the brothers [Evlogi Georgiev](#) and [Hristo Georgiev](#) (whose sculptures are now featured on its façade) and has an area of 18,624 m<sup>2</sup> and a total of 324 premises. The university has 16 faculties and three departments, where over 21,000 students receive their education. The current rector is [Anastas Gerdzhikov](#).

It has been consistently ranked as the top university in Bulgaria according to national and international rankings, being constantly among the best four percent of world universities according to [QS World University Rankings](#).

## Contents [hide]

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- [2 Faculties and departments](#)
  - [2.1 Faculties](#)
- [3 Departments](#)
  - [3.1 Affiliated bodies](#)
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## Sofia University "St. Kliment Ohridski"

Софийски университет „Св. Климент Охридски“  
Latin: *Universitas Serdicensis*

<b>Motto</b>	Ipsa scientia potestas est
<b>Motto in English</b>	Knowledge itself is power
<b>Type</b>	Public
<b>Established</b>	1888
<b>Affiliation</b>	EUA
<b>Endowment</b>	\$125 million
<b>Rector</b>	Anastas Gerdzhikov
<b>Academic staff</b>	1,700
<b>Students</b>	~18,911
<b>Address</b>	15 Tsar Osvoboditel Boulevard, Sofia, Bulgaria 42°41'37"N 23°20'6"E
<b>Campus</b>	Urban
<b>Colors</b>	Purple
<b>Website</b>	<a href="http://uni-sofia.bg">uni-sofia.bg</a> ↗

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[Entity Label Lookup](#)
[Entity URI Lookup](#)
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## Precision Search & Find

**Search Text**


Hint: You can [add this engine](#) in search bar of an OpenSearch - capable browser

Faceted Search & Find service v1.17\_git39 as of Aug 09 2019



[OpenLink Virtuoso](#) version 07.20.3232 as of Aug 9 2019, on Linux (x86\_64)

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<https://en.wikipedia.org/wiki/DBpedia>



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Formats

Faceted Browser

Sparql Endpoint

## About: Sofia University

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

The University of Sofia (St. Kliment Ohridski) or simply Sofia University (Bulgarian: Софийски университет „Св. Климент Охридски“, Sofiyski universitet „Sv. Kliment Ohridski“) is the oldest higher education institution in Bulgaria, founded on 1 October, 1888. The edifice of the university was constructed between 1924 and 1934 with the financial support of the brothers Evlogi Georgiev and Hristo Georgiev, whose sculptures are now featured on its façade, and has an area of 18,624 m<sup>2</sup> and a total of 324 premises.

### Property

### Value

[dbo:abstract](#)

- The University of Sofia (St. Kliment Ohridski) or simply Sofia University (Bulgarian: Софийски университет „Св. Климент Охридски“, Sofiyski universitet „Sv. Kliment Ohridski“) is the oldest higher education institution in Bulgaria, founded on 1 October, 1888. The edifice of the university was constructed between 1924 and 1934 with the financial support of the brothers Evlogi Georgiev and Hristo Georgiev, whose sculptures are now featured on its façade, and has an area of 18,624 m<sup>2</sup> and a total of 324 premises. The university has 16 faculties and three departments, where over 21,000 students receive their education. In addition, it also has a university library, a university press, a computer centre, a sports centre and several other structures. The current rector is Anastas Gerdzhikov. Sofia University has been consistently ranked as the top university in Bulgaria according to national and international rankings, and is constantly among the best 4 percent of world universities according to QS World University Rankings. (en)

[dbo:affiliation](#)

- [dbr:European\\_University\\_Association](#)

[dbo:campus](#)

- [dbr:Urbanization](#)



<https://lookup.dbpedia.org/index.html>



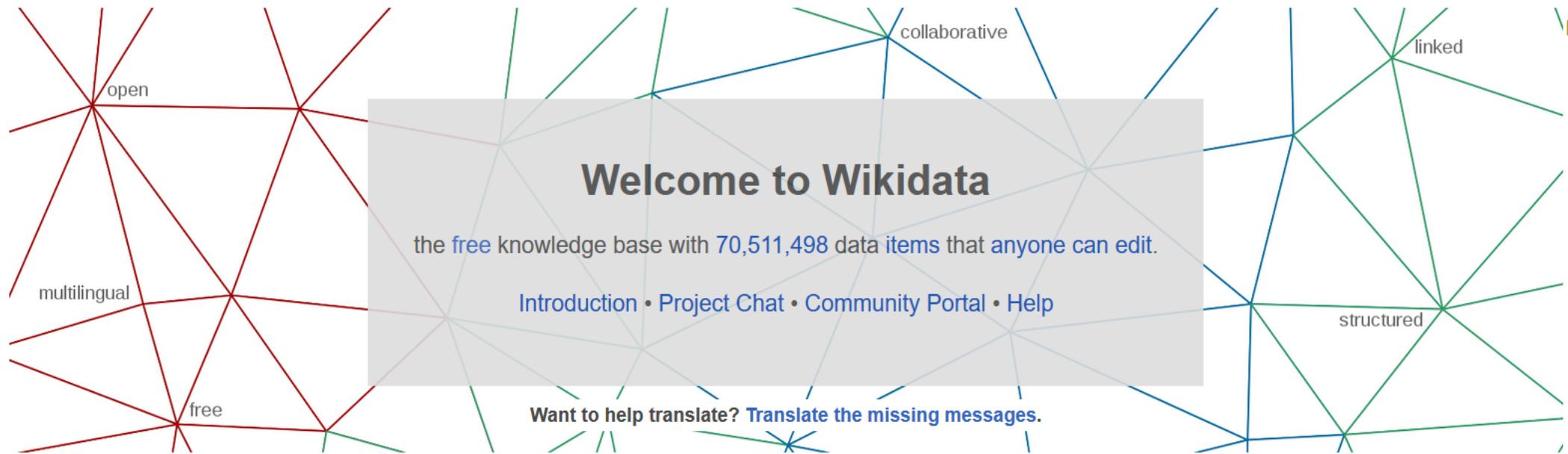
Main page  
Community portal  
Project chat  
Create a new Item  
Create a new Lexeme  
Recent changes  
Random Item  
Query Service  
Nearby  
Help  
Donate  
In other projects

Wikimedia Commons  
MediaWiki  
Meta-Wiki  
Wikispecies  
Wikibooks  
Wikimania  
Wikinews  
Wikipedia  
Wikiquote  
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## Welcome!

Wikidata is a free and open knowledge base that can be read and edited by both humans and machines.

Wikidata acts as central storage for the **structured data** of its Wikimedia projects, including Wikipedia, Wikivoyage, Wiktionary, Wikisource, and others.

Wikidata also provides support to many other sites and services beyond the projects! The content of Wikidata is available under a free license.



## Learn about data

New to the wonderful world of data? Develop and improve your data literacy through content designed to get you up to speed and feeling comfortable with the fundamentals in no time.





# Sofia University (Q841581)

university in Sofia, Bulgaria

University of Sofia | BFUS | St. Kliment Ohridski | Sofiyski universitet | Sv. Kliment Ohridski | St. Kliment Ohridski University

▼ In more languages

Configure

Language	Label	Description	Also known as
English	Sofia University	university in Sofia, Bulgaria	University of Sofia BFUS St. Kliment Ohridski Sofiyski universitet Sv. Kliment Ohridski St. Kliment Ohridski University
Bulgarian	Софийски университет	университет в България	
Russian	Софийский университет	университет в Софии, Болгария	СУ Св. Климент Охридски Софийский государственный у...
Turkish	Sofya Üniversitesi	No description defined	

All entered languages

## Statements

instance of	public university  ► 1 reference
	open-access publisher  ► 1 reference

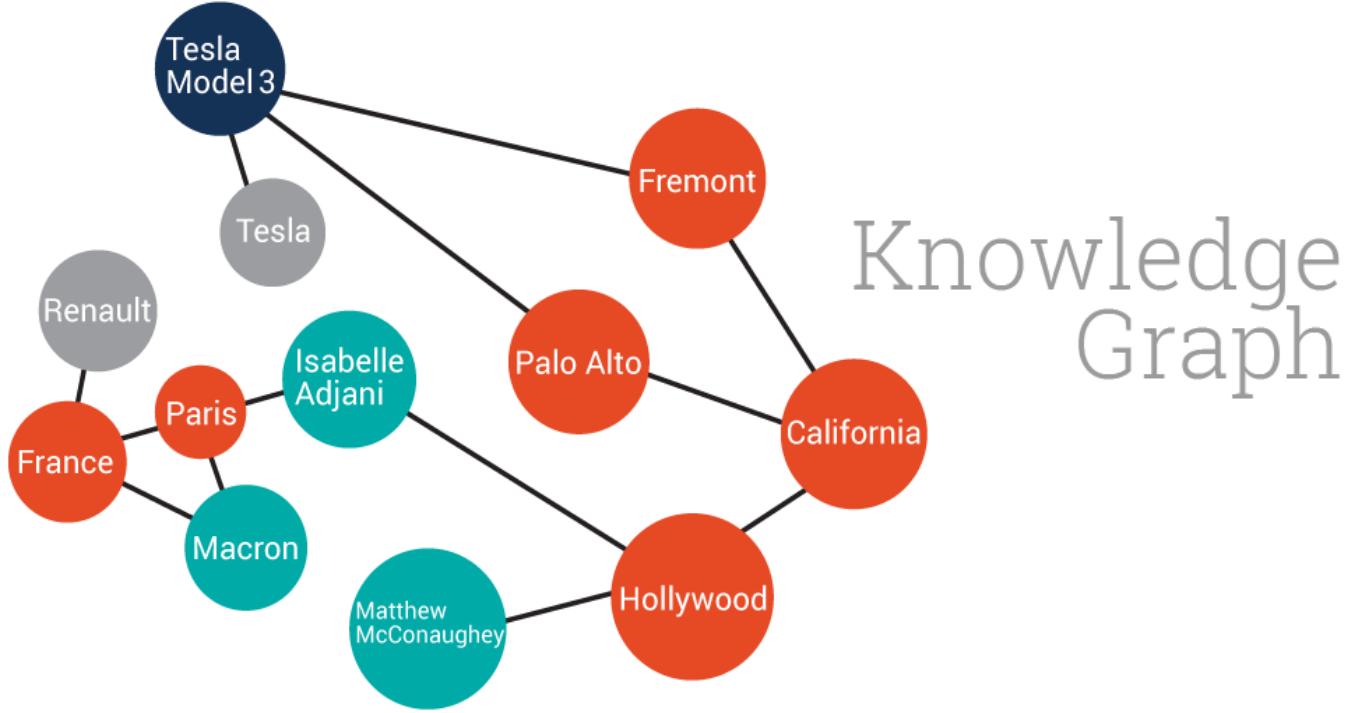
image	
	Sofia University panorama 2.jpg 2,762 × 1,107; 2.17 MB
	media legend Bâtiment du rectorat. (French)

## Wikipedia (36 entries)

ar	جامعة صوفيا
az	Sofiya Universiteti
be	Сафійскі ўніверсітэт імя Святога Клімента Охрыдскага
bg	Софийски университет
ckb	زانکۆی سوپھیا
de	Universität Sofia
en	Sofia University
eo	Sofia Universitato
es	Universidad de Sofía
et	Sofia Ülikool
fa	دانشگاه صوفیه
fr	Université Saint-Clément-d'Ohrid de Sofia
he	אוניברסיטת סופיה
hr	Sveučilište u Sofiji
hu	Szófiai Ohridi Szent Kelemen Egyetem
hy	Սոֆիայի համալսարան
id	Universitas Sofia
it	Università di Sofia
ja	ソフィア大学
ka	სოფიას უნივერსიტეტი
ko	소피아 대학교
la	Universitas Serdicensis
mk	Софиски универзитет „Св. Климент Охридски“
pl	Uniwersytet Sofijski im. św. Klemensa z Ochrydy
pt	Universidade de Sófia
ro	Universitatea din Sofia
ru	Софийский университет
sh	Univerzitet sv. Kliment Ohridski u Sofiji
sq	Universiteti i Sofjes
sr	Универзитет у Софији
sv	Sofias universitet
tl	Unibersidad ng Sofia (Bulgaria)
tr	Sofya Üniversitesi



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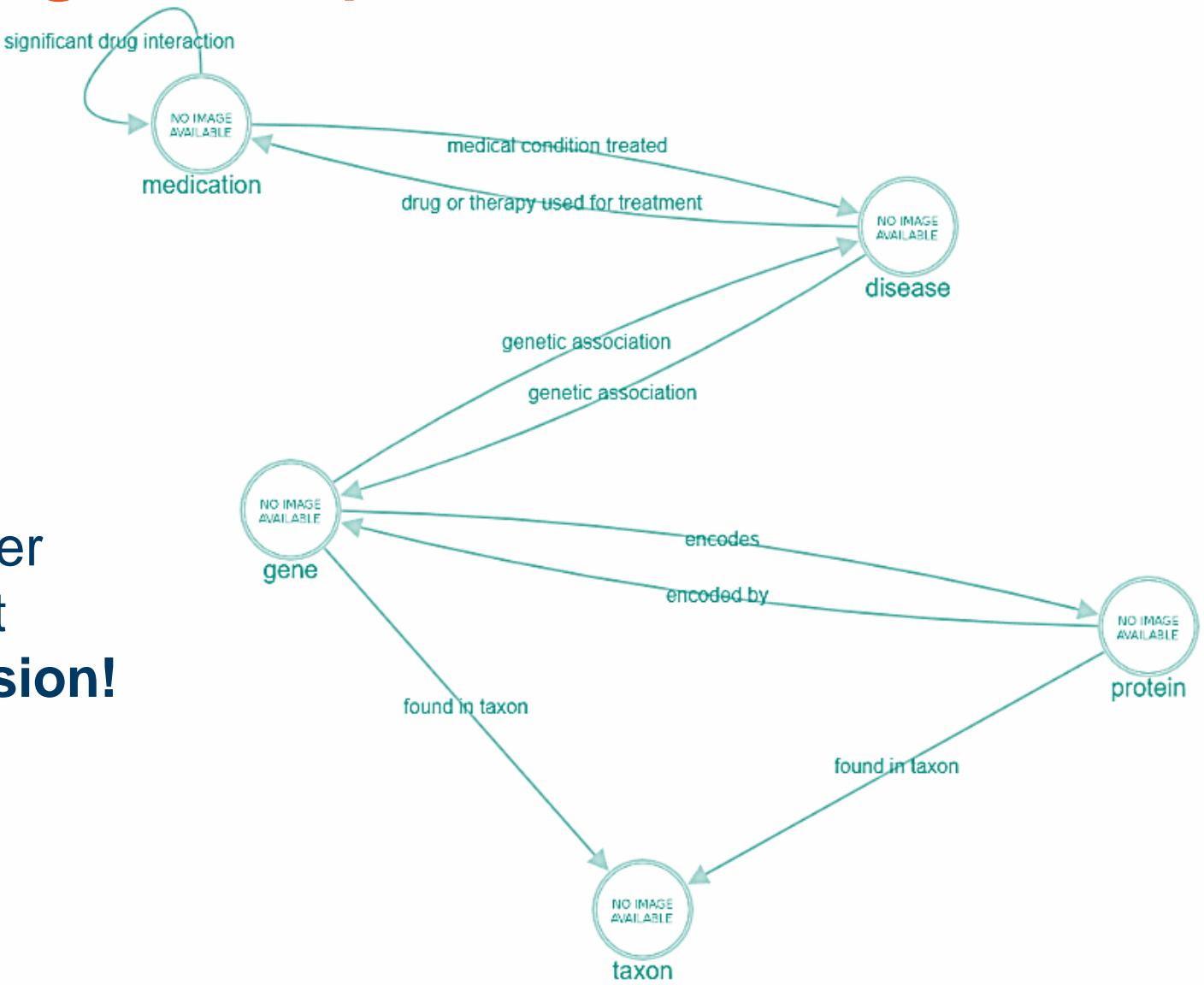


## Knowledge Graph

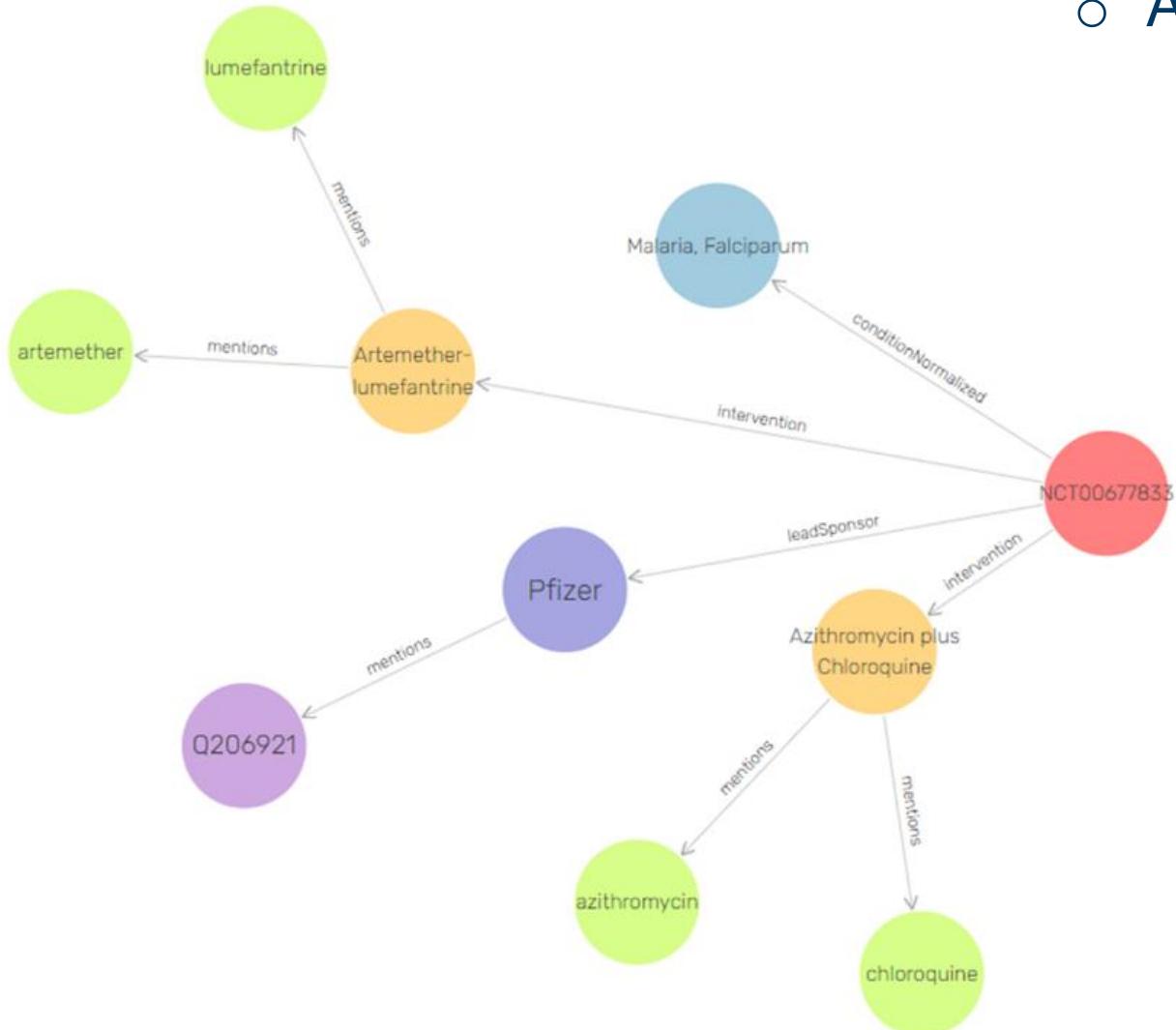
# WHAT IS A KNOWLEDGE GRAPH?

# What is a Knowledge Graph?

- KG represents a collection of interlinked descriptions of concepts and entities
  - ✓ Concepts describe each other
  - ✓ Connections provide context
  - ✓ **Context helps comprehension!**



# What is a Knowledge Graph?



- A KG can be used as:
  - ✓ **Database**: can be queried
  - ✓ **Graph**: can be analyzed as a network
  - ✓ **Knowledge base**: new facts can be inferred

# Welcome to the metaphactory demo system

This demo system is based on the open Wikidata knowledge graph!



Explore our example collection

  
Advanced Search

## Use Cases

A 3D molecular model showing a complex organic molecule with green carbon atoms, red oxygen atoms, and blue nitrogen atoms. A circular selection tool is overlaid on the molecule.

**Life Sciences**

Explore relations between diseases, drugs, symptoms, genes, and proteins, and find out what metaphactory can do for drug discovery, drug repurposing, clinical trial scoping and more.

...



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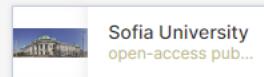


# Sofia University

URI: <http://www.wikidata.org/entity/Q841581>

Type: open-access publisher, university

Description: university in Sofia, Bulgaria



Sofia University  
open-access pub...

Connections x

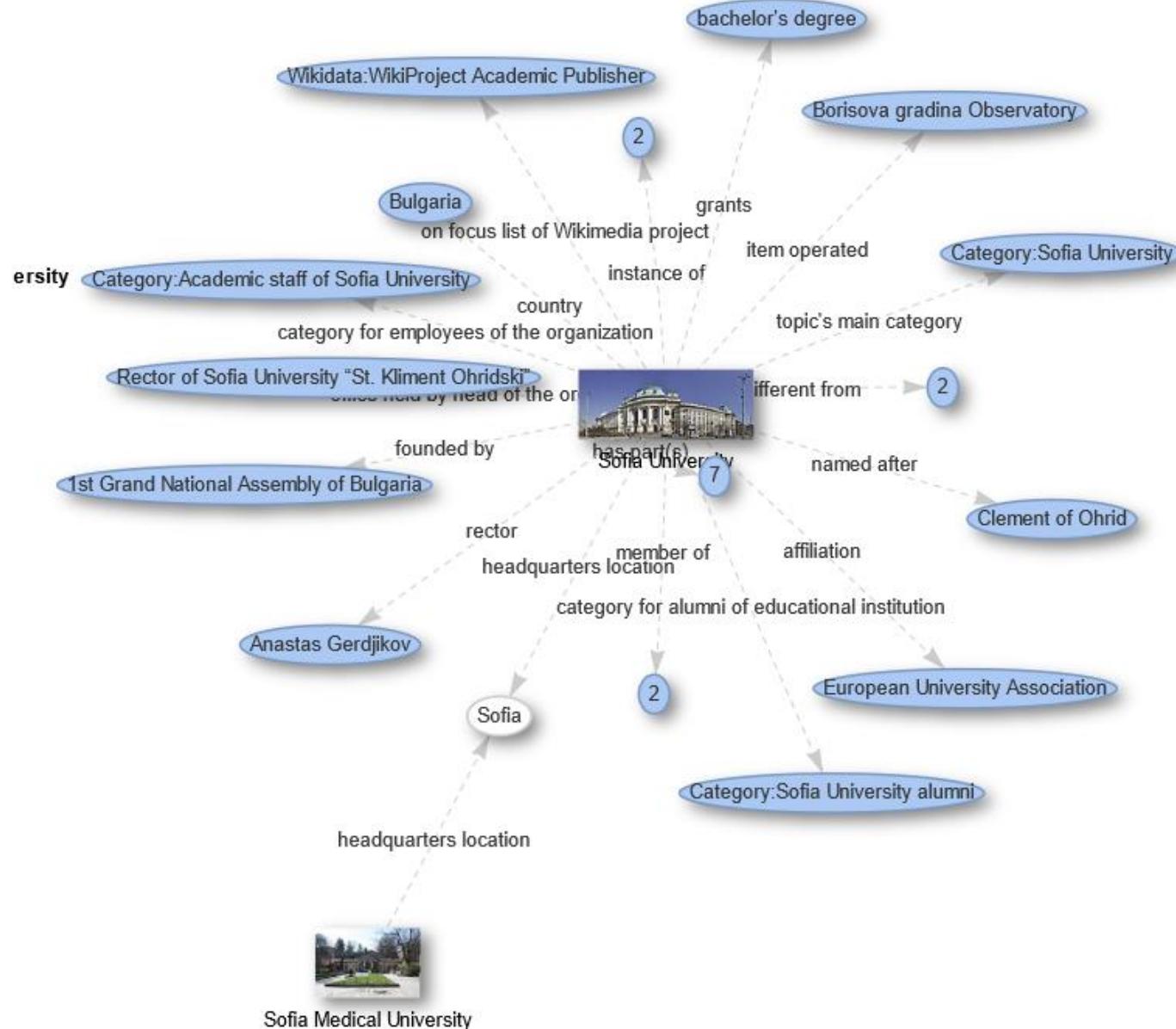
Search for...

All 100+ >

- affiliation 1 >
- category combine... 3 >
- category for alumni... 1 >
- category for emplo... 1 >
- category's main t... 1 >
- collection 3 >

Pathfinder Force layout Export

<https://wikidata.metaphacts.com/resource/wd:Q841581>



# HOW DO WE REPRESENT INFORMATION IN KNOWLEDGE GRAPHS?



# What is RDF?



- Resource Description Framework (RDF)
  - A general method for describing data
  - By defining relationships between things
- RDF data model consists of triples
  - That represent links (or edges) in an RDF graph
  - Where the structure of each triple is Subject, Predicate, Object
- Simple, yet flexible & powerful data model
  - Easily merge data from multiple sources
  - Even if the underlying schemas differ
- Built around existing Web standards
  - XML
  - URL (URI)

[RDF - W3C Wiki](#)

**RDF Primer**

W3C Recommendation 10 February 2004

New Version Available: "RDF 1.1 Primer" (Document Status Update, 25 February 2014)

The RDF Working Group has produced a W3C Recommendation for a new version of RDF which adds features to this 2004 version, while remaining compatible. Please see ["RDF 1.1 Primer"](#) for a new version of this document, and the ["What's New in RDF 1.1"](#) document for the differences between this version of RDF and RDF 1.1.

This version:  
<http://www.w3.org/TR/2004/REC-rdf-primer-20040210/>

Latest version:  
<http://www.w3.org/TR/rdf-primer/>

Previous version:  
<http://www.w3.org/TR/2003/PR-rdf-primer-20031215/>

Editors:  
Frank Manola, [fmanola@acm.org](mailto:fmanola@acm.org)  
Eric Miller, W3C, [em@w3.org](mailto:em@w3.org)

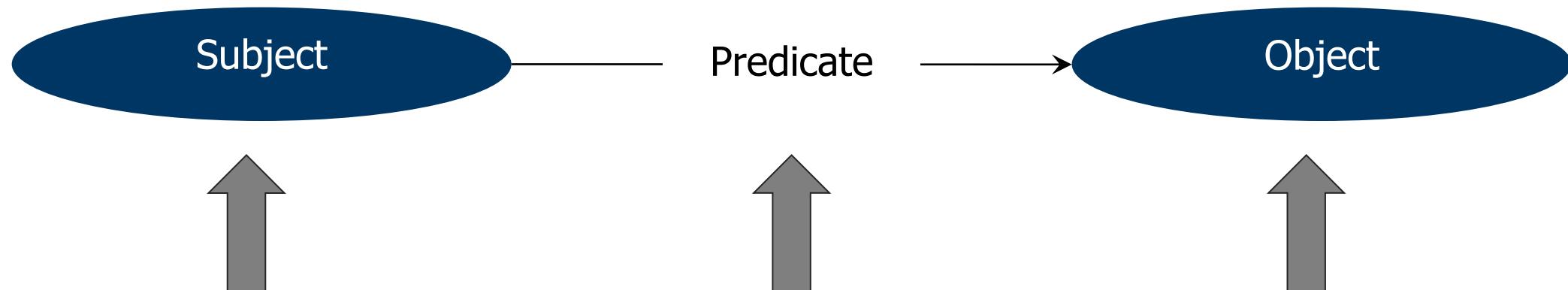
Series Editor:  
Brian McBride, Hewlett-Packard Laboratories, [bwm@hplb.hpl.hp.com](mailto:bwm@hplb.hpl.hp.com)

Please refer to the [errata](#) for this document, which may include some normative corrections.

See also [translations](#)

# RDF Statements (Triples)

- RDF Statements are formed of three parts



This is the **resource** that  
the statement is about:  
URI or blank node

The **property** that relates  
the subject and object:  
URI

Either a **resource** (URI or  
blank node) or a **literal**



# What is RDF?



Example triples:

Subject	Predicate	Object
cerebral infarction wd:Q1209150	drug or therapy used for treatment wdt:P2176	cilostazol wd:Q258591

'wd:' refers to the namespace for describing concepts in Wikidata: '<https://www.wikidata.org/wiki/>' so that 'wd:Q1209150' expands to <<https://www.wikidata.org/wiki/Q1209150>> a Universal Resource Identifier (URI).

'wdt:' refers to the namespace for describing properties (types) in Wikidata: '<https://www.wikidata.org/wiki/Property:>' so that 'wdt:P2176' expands to <<https://www.wikidata.org/wiki/Property:P2176>> a Universal Resource Identifier (URI).

# Resources, properties and literals

- **Resources** can be anything you want to describe
  - Information resources can be found on the Web
  - Non-information resources are anything else, e.g. people, places, things, events...
- Uniquely identified by a URI/IRI
  - IRI is an internationalized URI
- Or can be identified by a blank node
  - A unique anonymous value scoped to the current RDF document

# Resources, properties and literals

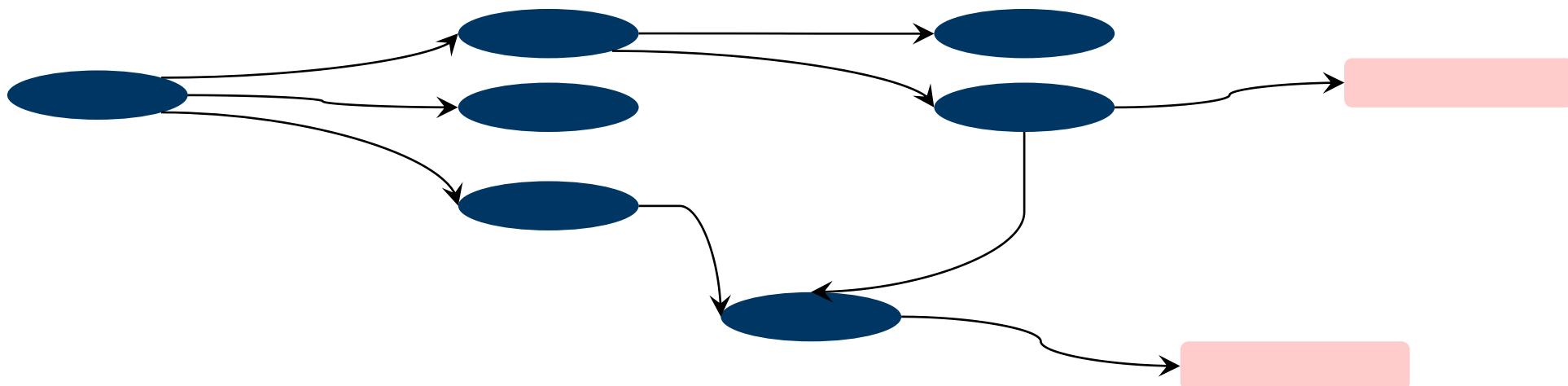
- **Properties** are the relationships between resources
  - e.g. X fatherOf Y (where X and Y are URIs)
  - Or attributes X rdfs:label “X”
- RDF schemas can define the types of things that properties apply to
- Properties are always identified by a URI

# Resources, properties and literals

- **Literals** are instances of datatypes
  - e.g. string, integer, date
- Can have a language tag
  - e.g. "Mass spectrometer"@EN
- Can have an XML schema datatype
  - "1976-00-00T00:00:00Z"^^xsd:dateTime
- Can have no specific type, i.e. just a piece of text
  - rdf:plainLiteral

# Graphs

- Resources can be both subjects and objects
- Literals can only be objects
- A collection of statements makes a directed graph



# Syntaxes

- The abstract structure of RDF is a collection of statements (triples)
- This can be written down in many ways
  - RDF/XML

```
<?xml version="1.0" encoding="utf-8" ?>
<rdf:RDF xmlns:rdf="http://www.w3.org/1999/02/22-rdf-syntax-ns#"
           xmlns:ns0="http://example.org/elements#">

  <rdf:Description rdf:about="http://en.wikipedia.org/wiki/Helium">
    <ns0:atomicNumber rdf:datatype="http://www.w3.org/2001/XMLSchema#integer">2</ns0:atomicNumber>
    <ns0:atomicMass rdf:datatype="http://www.w3.org/2001/XMLSchema#decimal">4.002602</ns0:atomicMass>
    <ns0:specificGravity rdf:datatype="http://www.w3.org/2001/XMLSchema#double">1.663E-4</ns0:specificGravity>
  </rdf:Description>

</rdf:RDF>
```

# Syntaxes

- The abstract structure of RDF is a collection of statements (triples)
- This can be written down in many ways
  - RDF/XML
  - Turtle

```
@prefix : <http://example.org/elements#> .  
  
<http://en.wikipedia.org/wiki/Helium> :atomicNumber 2 ;  
:atomicMass 4.002602 ;  
:specificGravity 1.663E-4 .
```

# Syntaxes

- The abstract structure of RDF is a collection of statements (triples)
- This can be written down in many ways
  - RDF/XML
  - Turtle
  - JSON-LD
  - ...

```
[{"@id":"http://en.wikipedia.org/wiki/Helium","http://example.org/elements#atomicNumber":  
[{"@value":2}],"http://example.org/elements#atomicMass":  
[{"@value":"4.002602","@type":"http://www.w3.org/2001/XMLSchema#decimal"}],"http://example.org/elements#  
specificGravity":[{"@value":0.0001663}]}]
```

# SAPRQL

- SPARQL Protocol and RDF Query Language
- SPARQL is an RDF query language for non-SQL databases—able to retrieve and manipulate data stored in Resource Description Framework (RDF)

---

W3C Recommendation

**W3C**

SPARQL 1.1 Query Language

W3C Recommendation 21 March 2013

This version:  
<http://www.w3.org/TR/2013/REC-sparql11-query-20130321/>

Latest version:  
<http://www.w3.org/TR/sparql11-query/>

Previous version:  
<http://www.w3.org/TR/2012/PR-sparql11-query-20121108/>

Editors:  
Steve Harris, Garlik, a part of Experian  
Andy Seaborne, The Apache Software Foundation

Previous Editor:  
Eric Prud'hommeaux, W3C

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[SPARQL 1.1 Query Language \(w3.org\)](#)

Abstract

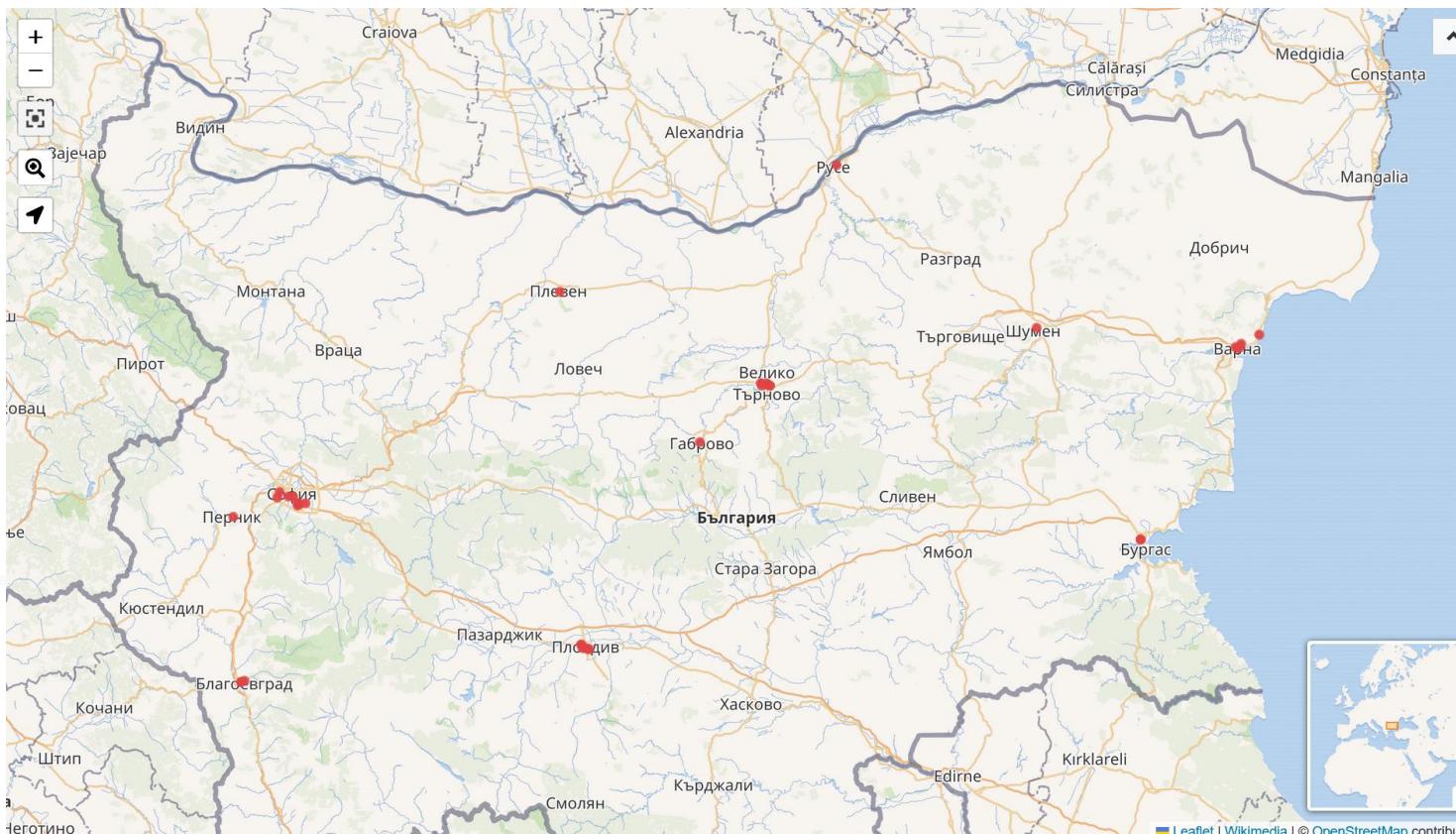
**i** Do you need help creating a query? You can build queries without having to write SPARQL in the new [Query Builder](#).



## Wikidata Query Service

[Examples](#)[Help](#)[More tools](#)[Query Builder](#)

```
1 #defaultView:Map
2 SELECT ?university ?universityLabel ?coordinates WHERE {
3   ?university wdt:P31 wd:Q3918;
4   wdt:P17 wd:Q219;
5   wdt:P625 ?coordinates.
6   SERVICE wikibase:label { bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en". }
7 }
```

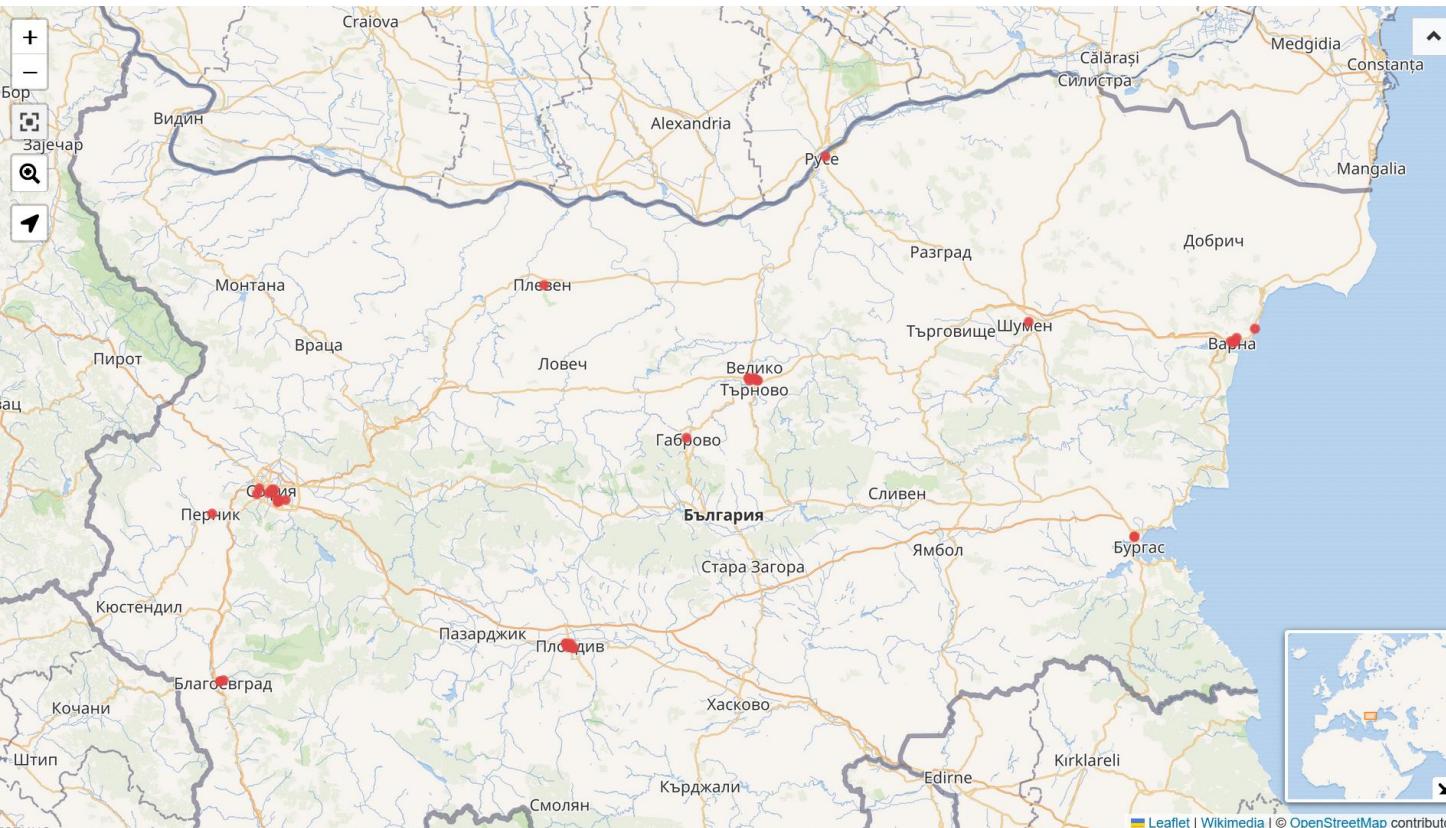


<https://w.wiki/77uo>





```
1 #defaultView:Map
2 SELECT DISTINCT ?university ?universityLabel ?coordinates ?date ?pic WHERE {
3   ?university (wdt:P31/(wdt:P279*)) wd:Q3918;
4   wdt:P17 wd:Q219;
5   wdt:P625 ?coordinates.
6   SERVICE wikibase:label { bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en". }
7 }
```



<https://w.wiki/77v6>

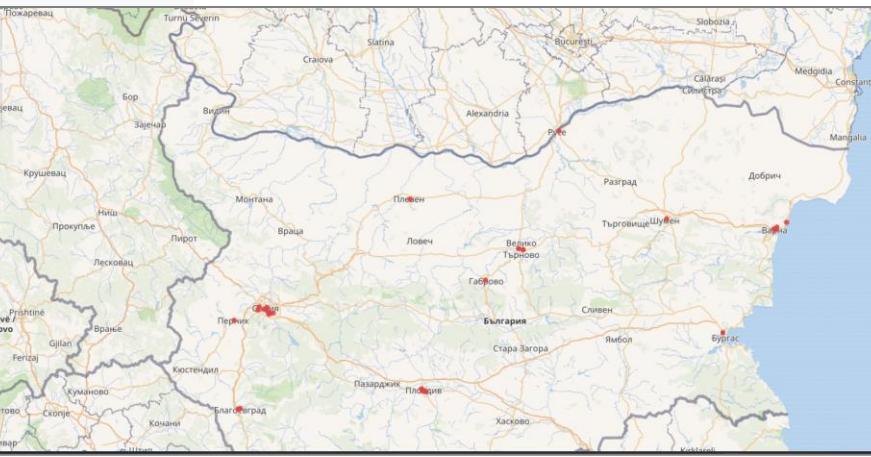


SCAN ME



```

1 SELECT DISTINCT ?university ?universityLabel ?coordinates ?date ?pic WHERE {
2   ?university (wdt:P31/(wdt:P279*)) wd:Q3918;
3     wdt:P17 wd:Q219;
4     wdt:P625 ?coordinates;
5     wdt:P571 ?date.
6   OPTIONAL { ?university wdt:P18 ?pic. }
7   SERVICE wikibase:label { bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en". }
8 }
```



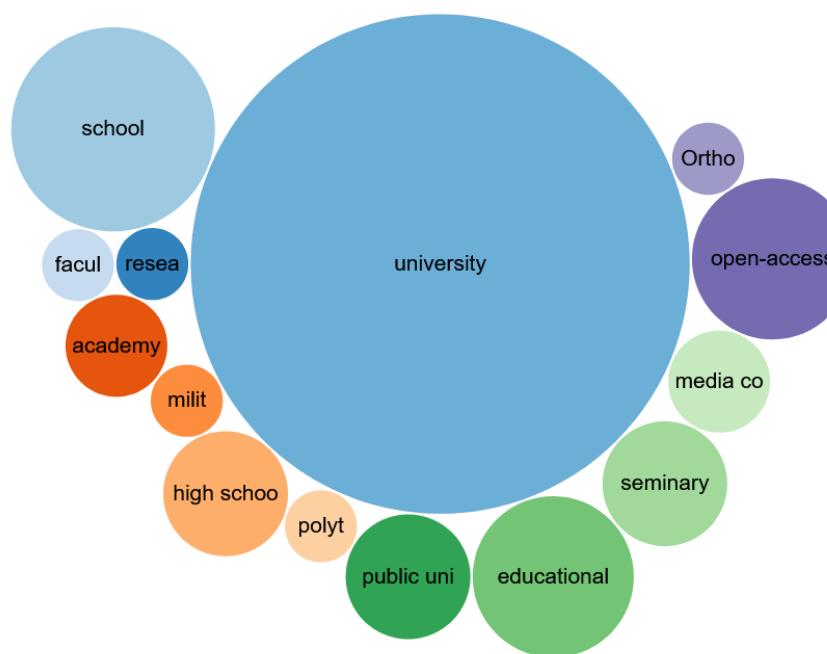
university	universityLabel	coordinates	date	pic
wd:Q1629255	Veliko Tarnovo University	Point(25.649722222 43.075833333)	1 January 1963	commons:Veliko Tarnovo Todor Bozhinov (9).JPG
wd:Q7895441	University of Forestry, Sofia	Point(23.359 42.6534)	1 January 1953	commons:UF main.JPG
wd:Q2303775	Technical University of Sofia	Point(23.3552 42.6553)	15 October 1945	commons:Sofia - TU - Rectorate.jpg
wd:Q2399293	Technical University of Gabrovo	Point(25.307259 42.875599)	1 January 1964	commons:Technical University Gabrovo.jpg
wd:Q1622169	State University of Library Studies and Information Technologies	Point(23.3552 42.6553)	1 January 1963	commons:State University of Library Studies and Information Technologies.jpg
wd:Q92309223	Agricultural Academy	Point(23.222222 42.6553)	1 January 1963	commons:Agricultural Academy.jpg
wd:Q2399361	Technical University of Varna	Point(27.906667 42.6553)	1 January 1963	commons:Technical University of Varna.jpg
wd:Q1029504	University of National and World Economy	Point(23.3552 42.6553)	1 January 1963	commons:University of National and World Economy.jpg


<https://w.wiki/77vQ>


SCAN ME



```
1 SELECT DISTINCT ?typeLabel (COUNT(*) AS ?TC) WHERE {  
2   ?university (wdt:P31/(wdt:P279*)) wd:Q3918;  
3     wdt:P31 ?type;  
4     wdt:P17 wd:Q219.  
5   OPTIONAL { ?university wdt:P131 ?location. }  
6   SERVICE wikibase:label { bd:serviceParam wikibase:language "[AUTO_LANGUAGE],en". }  
7 }  
8 GROUP BY ?typeLabel
```



<https://w.wiki/77vr>



# Massive number of knowledge bases

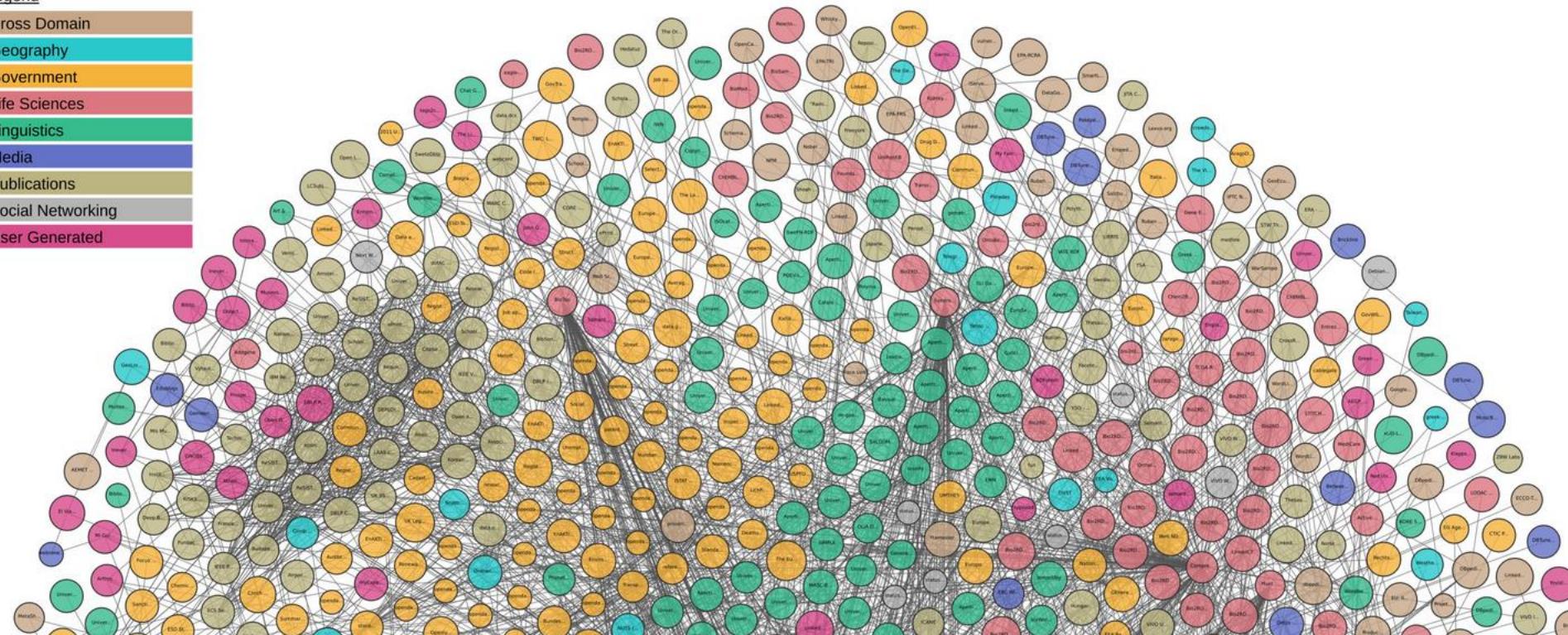
The Linked Open Data Cloud ([lod-cloud.net](http://lod-cloud.net))

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# The Linked Open Data Cloud

### Legend

- Cross Domain
  - Geography
  - Government
  - Life Sciences
  - Linguistics
  - Media
  - Publications
  - Social Networking
  - User Generated



## Introduction to Semantic Web Technologies

[login](#)

# GeoNames

The GeoNames geographical database covers all countries and contains over eleven million placenames that are available for download free of charge.

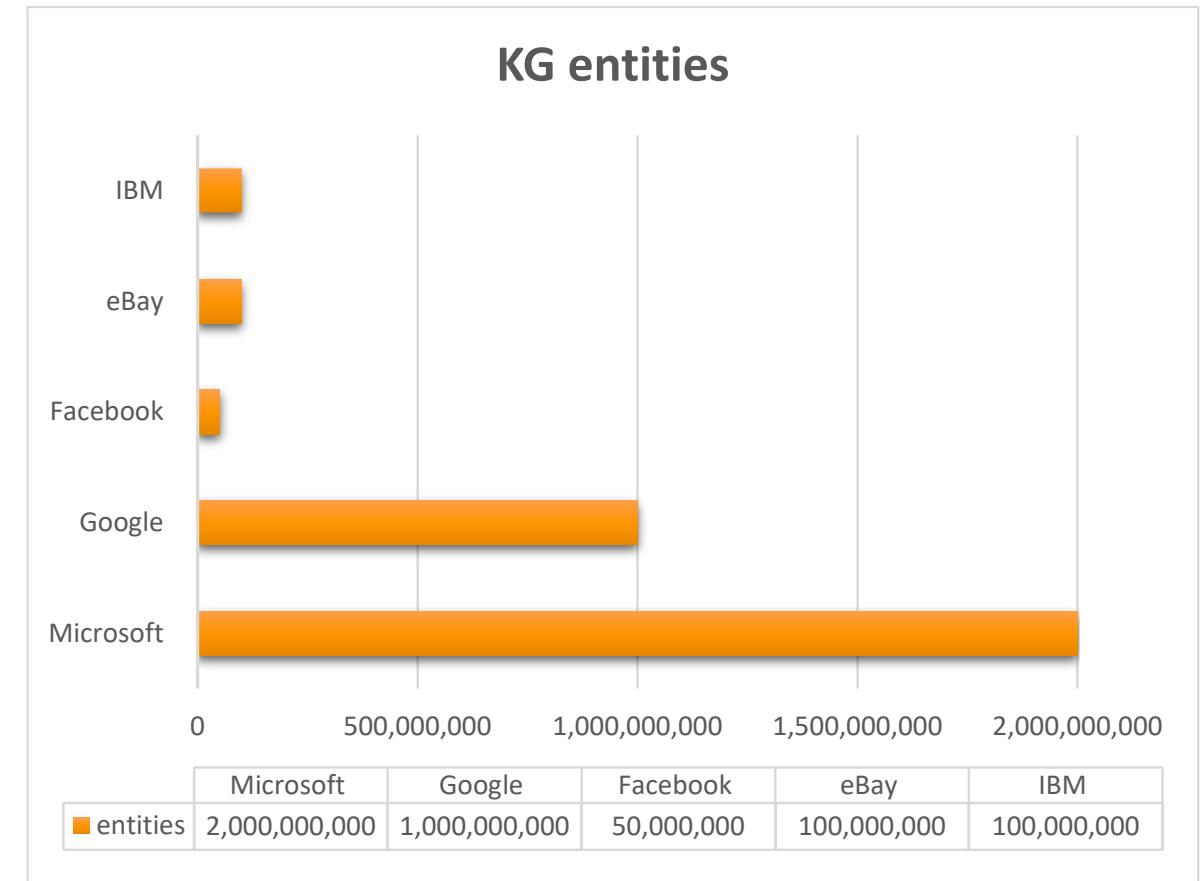
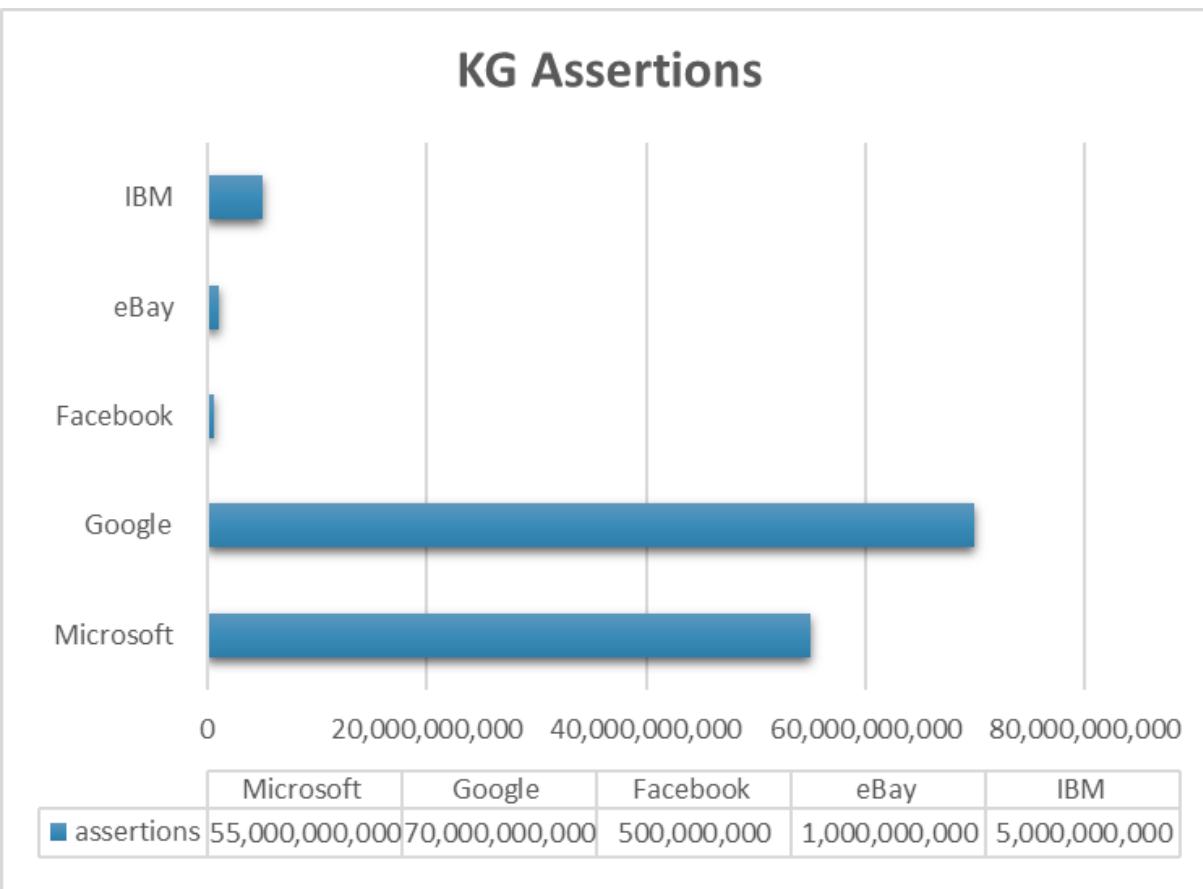
all countries

[advanced search](#)

[search](#)

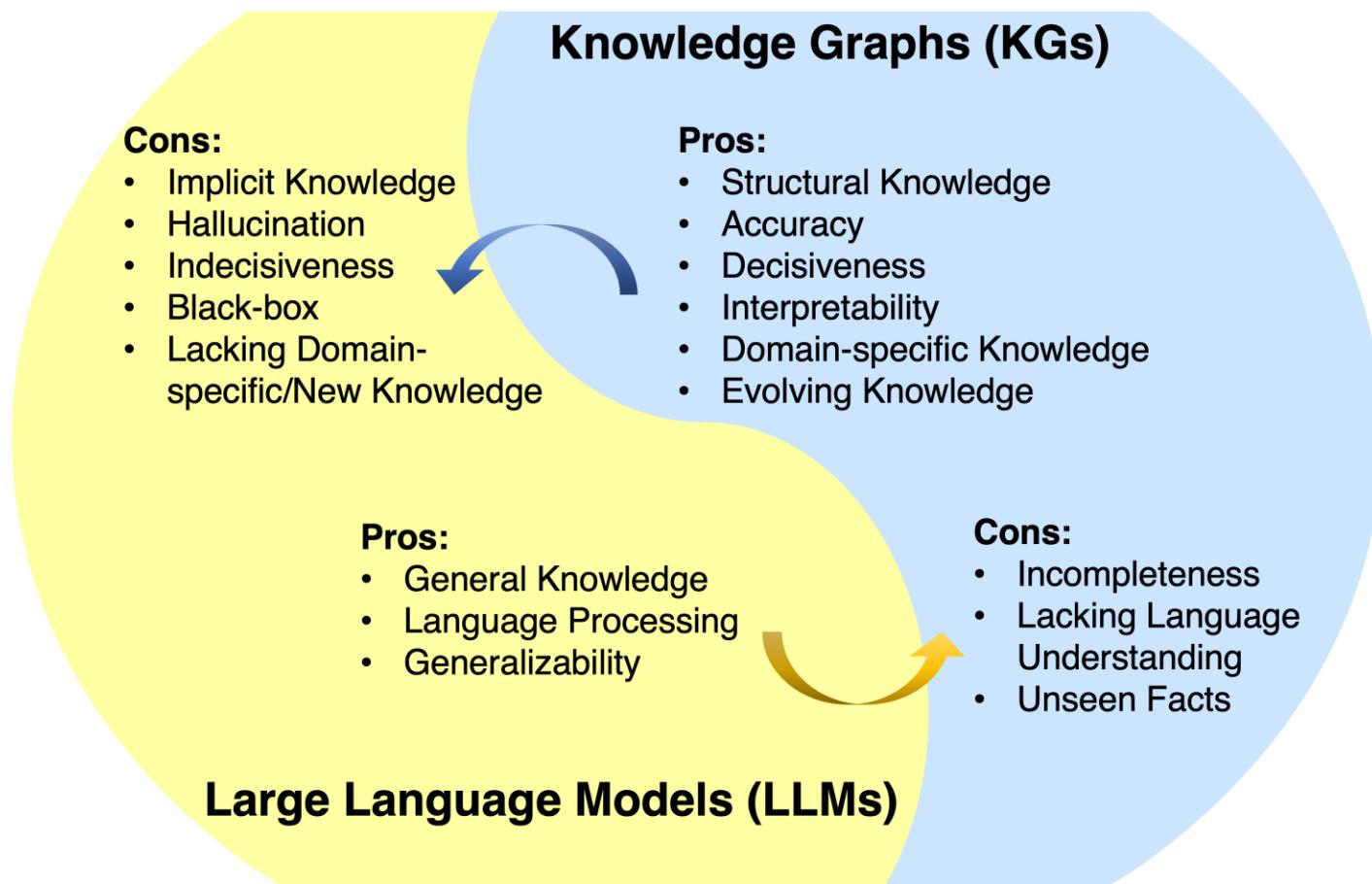
enter a location name, ex: "Paris", "Mount Everest", "New York"

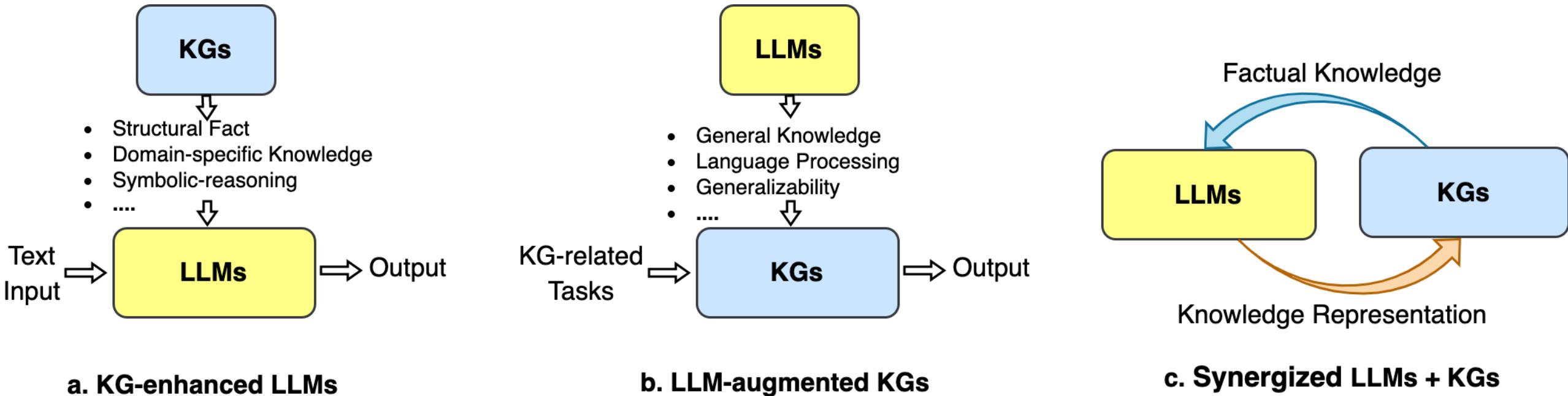
# Industry scale knowledge graphs



<https://github.com/RManLuo/Awesome-LLM-KG>

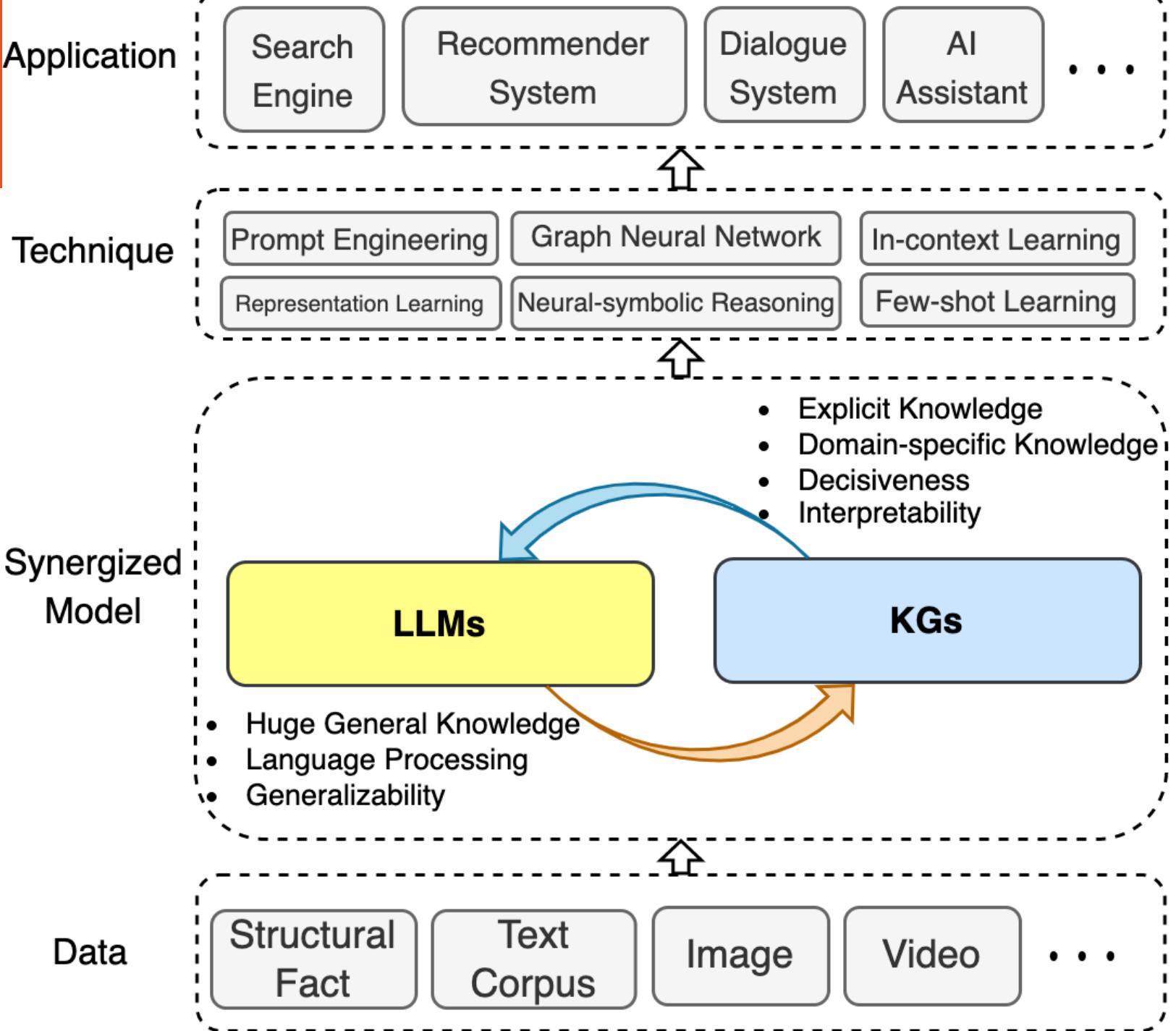
<https://github.com/zjukg/KG-LLM-Papers>



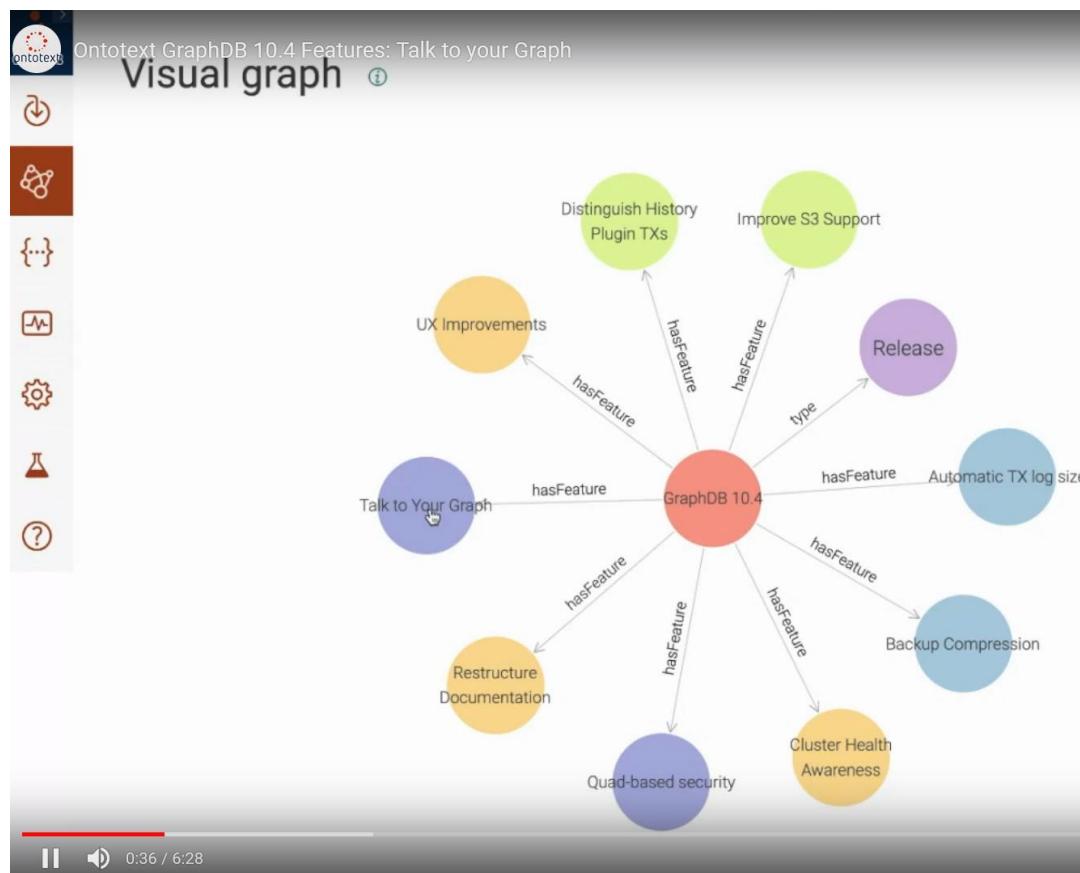


<https://github.com/RManLuo/Awesome-LLM-KG>

# LLM+KG



# GraphDB – Talk to Your Graph



[Watch later](#) [Share](#)

# Talk to Your Graph

 The Talk to Your Graph feature in GraphDB integrates the ChatGPT Retrieval Plugin with GraphDB, aimi ... [Show full comment](#)

 Talk to Your Graph

Types:

**gdb:InnovativeFeature**

RDF Rank:

0

rdfs:comment

The Talk to Your Graph feature in GraphDB integrates the ChatGPT Retrieval Plugin with GraphDB, aiming to boost ChatGPT's question-answering capabilities regarding data stored in GraphDB. Users can access a chatbot in the Workbench where they can ask natural language questions about their data, much like using the stock ChatGPT interface. The integration provides a ChatGPT Retrieval Connector whose role is to synchronize RDF data with a vector database like Weaviate or Pinecone by converting RDF data into text documents, and then indexing it as vectors via the ChatGPT Retrieval Plugin. A bonus use-case allows for similarity search, where the new connector retrieves matching document IRIs from a text query, which can then be used for further joins in SPARQL, even if the query is not a graph query.



<https://www.ontotext.com/knowledgehub/videos/graphdb-talk-to-your-graph/>

Write SPARQL query for Wikidata that identifies "What is the longest river in Europe"



To identify the longest river in Europe using a SPARQL query in Wikidata, you can use the following query:



```
sparql                                     Copy code

SELECT ?river ?riverLabel ?length
WHERE {
  ?river wdt:P31 wd:Q4022 .
  ?river wdt:P30 wd:Q46 .
  ?river wdt:P2043 ?length .
  SERVICE wikibase:label { bd:serviceParam wikibase:language "en" . }
}
ORDER BY DESC(?length)
LIMIT 1
```

# SPARQL query generation from natural language

This query retrieves rivers that are instances of "river" (wd:Q4022) and located in Europe (wd:Q46). It also retrieves their lengths using property P2043. The results are ordered in descending order by river length, and the LIMIT 1 clause ensures that only the longest river is returned.

The result will provide the longest river in Europe along with its label (name) and length.

decompose the problem "What is the longest river in Europe" in smaller subtasks



Decomposing the problem "What is the longest river in Europe" into smaller subtasks can help organize the information retrieval process. Here are some subtasks to consider:



1. **Identify the Relevant Continent:** Determine that the question is about Europe and not any other continent. This step ensures you are focused on the correct geographical context.
2. **List Major European Rivers:** Compile a list of major rivers in Europe. This can serve as a starting point for identifying the longest one.
3. **Gather Length Data:** Collect length data for each of the major European rivers. This may involve consulting reliable sources or databases that provide this information.
4. **Rank Rivers by Length:** Calculate or find rankings of the rivers based on their length, from longest to shortest.
5. **Identify the Longest River:** Determine which river ranks first in terms of length. This river is the answer to the question.
6. **Verify the Answer:** Double-check the information to ensure accuracy and reliability. Cross-reference multiple sources if necessary to confirm the longest river in Europe.
7. **Provide Additional Information:** Optionally, you can provide additional details about the longest river, such as its location, countries it flows through, and any notable features or facts about it.

By breaking down the problem into these subtasks, you can systematically approach the question and arrive at a well-informed and accurate answer.

Write SPARQL queries for Wikidata for the subtasks listed above.



Here are SPARQL queries for each of the subtasks related to finding the longest river in Europe using Wikidata:



#### 1. Identify the Relevant Continent:

sparql

Copy code

```
SELECT ?continentLabel
WHERE {
    wd:Q46 wdt:P30 ?continent .
    SERVICE wikibase:label { bd:serviceParam wikibase:language "en" . }
}
```

This query retrieves the label (name) of the continent associated with the entity representing Europe (wd:Q46).

#### 2. List Major European Rivers:

sparql

Copy code

```
SELECT ?river ?riverLabel
WHERE {
    ?river wdt:P31 wd:Q4022 .
    ?river wdt:P30 wd:Q46 .
    SERVICE wikibase:label { bd:serviceParam wikibase:language "en" . }
}
```

Regenerate

This query retrieves a list of major rivers (entities with instance of "river" and located

Send a message



THANK YOU FOR  
YOUR TIME!



# Questions?

