Schema.org : How is it used?

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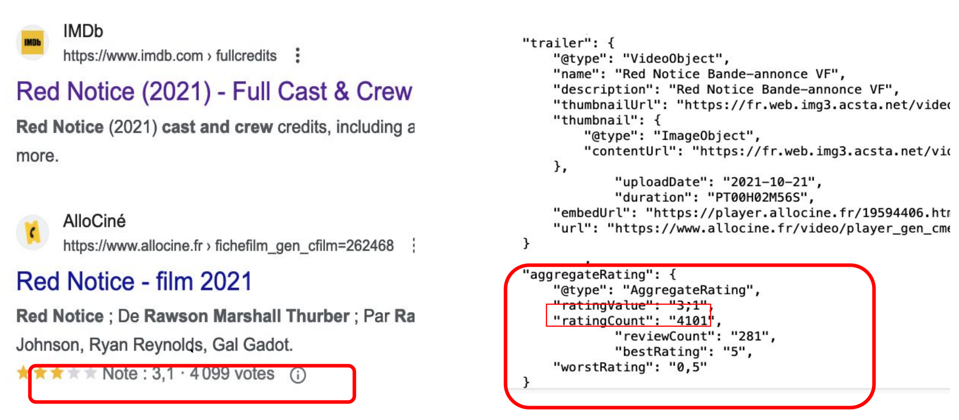
What is Schema.org?

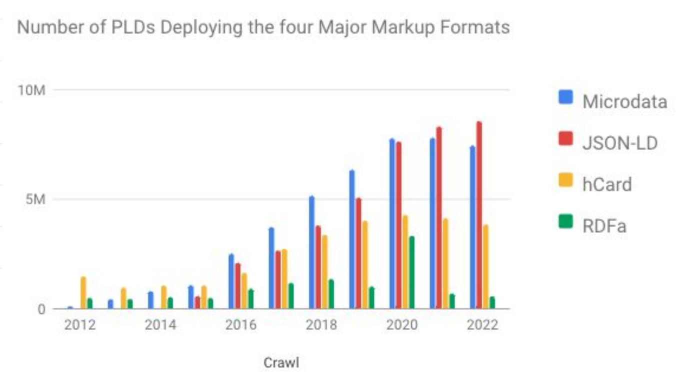
- Schema.org provides a standardized vocabulary for annotating web pages, describing entities and their relationships.
- Major search engines like Google, Bing, Yahoo, and Yandex have been encouraging webmasters to use Schema.org since 2011.



Schema.org is largely used

- By October 2021, 42% of websites were annotated [1].
- More and more webpages employ JSON-LD as a markup format [1].

Crawl Date	October 2021	
Total Data	85.11 Terabyte	(compressed)
Parsed HTML URLs	3,195,003,256	
URLs with Triples	1,516,194,663	
Domains in Crawl	35,377,372	
Domains with Triples	14,564,790	
Typed Entities	18,483,343,653	
Triples	82,142,918,869	
Size of Extracted Data	1.6 Terabyte	



[1] WebDataCommons: https://webdatacommons.org/structureddata/2020-12/stats/stats.html

How is it used?

- Schema.org defines vocabulary, but we don't know **how people actually use** it:
  - *The class* ***`Person`*** *is defined, but* ***how many instances*** *are there?*
  - *There are 60 properties for the class* ***`Person`****, but are they all used ?*
  - *Are web pages dedicated to* ***`Recipe` better annotated*** *than those dedicated to* ***`Drug`****?*

We do not know how people use Schema.org !

Objectives

- Get insights about the commonly used combinations of class-specific properties.
- Evaluate the quality of class descriptions.

Methodology

- Characteristic sets describe semantically similar entities by grouping them according to the set of shared properties.
- We consider a class well-described if many entities in that class share a large combination of properties.
- We computed characteristic sets (CSets) for the WebDataCommons JSON-LD dataset (October 2021)
  - 6.7B web entities
  - 4, 638, 824 CSets

(a) Cakes entities at four different websites

Entity	name	image	description	totalTime
Cake1	X	X		X
Cake2			X	X
Cake3	X	X		
Cake4	X	X		X

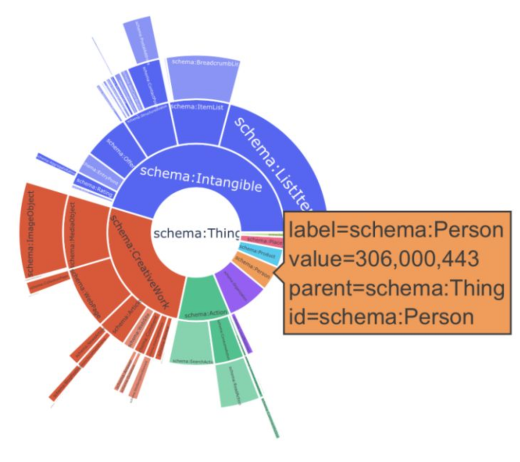
(b) Number of entities of characteristic sets

Combinaison of properties	Count
name + image + totalTime	2
description + totalTime	1
name + image	1

Conclusion

- Only a small number of properties have actually been instantiated.
- The combination of properties differs considerably from class to class.
- Upset plots enable webmasters and Schema.org maintainers to know which properties are commonly used.

Experimental study



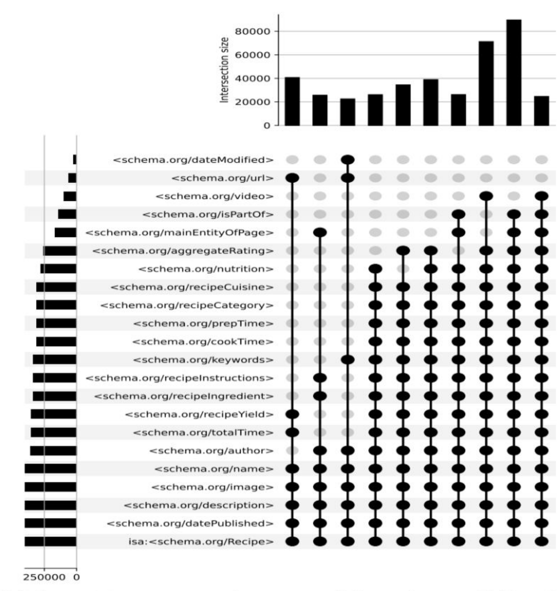
(a) Hierarchy of used classes

Rank	Type	Count
1	schema:ListItem	1.39 B
2	schema:ImageObject	591 M
3	schema:BreadcrumbList	460 M
4	schema:Organization	435 M
5	schema:WebPage	405 M
6	schema:SearchAction	372 M
7	schema:Offer	351 M
8	schema:Person	306 M
9	schema:ReadAction	245 M
10	schema:Product	219 M

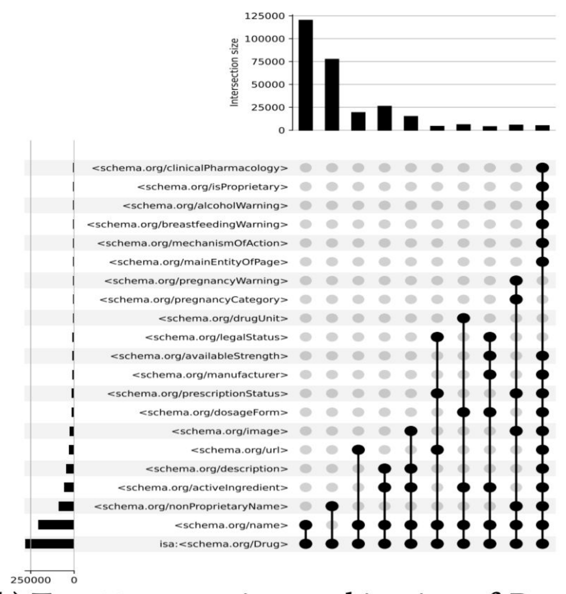
(b) Top-10 most used Schema.org classes

What are the most frequently used classes?

- The top 3 most common classes are automatically generated by SEO tools.
- Classes are not used uniformly e.g. there are twice as many **`Organizations`** as **`Products.`**



(a) Top-10 properties combination of *Recipe*



(b) Top-10 properties combination of *Drug*

What are the typical combinations of properties for each class?

- 776 available upset plots for each Schema.org class
- Very few instances of Drug use a large combination of properties, whereas a majority of Drugs solely annotate their name.

Rank	Class	Coverage
1	BorrowAction	0.99
2	DepartementStore	0.84
3	PlanAction	0.81
4	SportActivityLocation	0.79
5	Event	0.74
6	Product	0.73
7	LiveBlogPosting	0.72
8	Recipe	0.72
9	PostalAddress	0.72
10	SaleEvent	0.69

(a) Top-10 classes ranked by coverage

Rank	Class	AvP
1	ReviewNewsArticle	15.34
2	ReportageNewsArticle	14.21
3	Recipe	14.08
4	Car	13.96
5	AnalyseNewsArticle	13.22
6	AdvertiserContentArticle	13.15
7	SocialEvent	12.90
8	LearningResource	12.82
9	VideoGallery	12.79
10	TechArticle	12.49

(b) Classes ranked by average properties

Which classes have precise descriptions?

- The greater the use of properties, the greater the **coverage** of this class.
- The coverage metric favors classes with fewer properties.
- Average number of used properties (AvP):
  - **AvP(Recipe)** = 14.08 on 144 defined properties,
  - **AvP(Product)** = 7.3 on 68 defined properties.
- This reveals that some communities provide better quality semantic annotations than others.

Future works

- Continue exploring Schema.org data with the latest version of the WebDataCommon datasets.
- Observe how Schema.org adoption of has evolved over the years.

Read the poster

https://hal.science/hal-04250523

This work is funded by the French CominLabs project MikroloG (The Microdata Knowledge Graph) : https://project.inria.fr/mikrolog/

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Checkout the demonstration

https://schema-obs-demo.onrender.com/