LogMap Family welcomes LogMapLLM in the OAEI 2025

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Abstract

We present the participation of LogMap and its variants in the OAEI 2025 campaign. The LogMap project started in January 2011 with the objective of developing a scalable and logic-based ontology matching system. This year we have introduced a new variant called LogMap-LLM that uses a large language model as an Oracle for the cases where LogMap is uncertain.

1. Presentation of the system

LogMap [1, 2] is an ontology matching system that *(i)* can efficiently match semantically rich ontologies containing tens (and even hundreds) of thousands of classes, *(ii)* incorporates sophisticated reasoning and repair techniques to minimise the number of logical inconsistencies [3], and *(iii)* provides support for user intervention during the matching process [4]. LogMap ISWC 2011 paper [1] was awarded the SWSA Ten-Year Award.[1] Figure 1 shows an overview of LogMap's architecture.

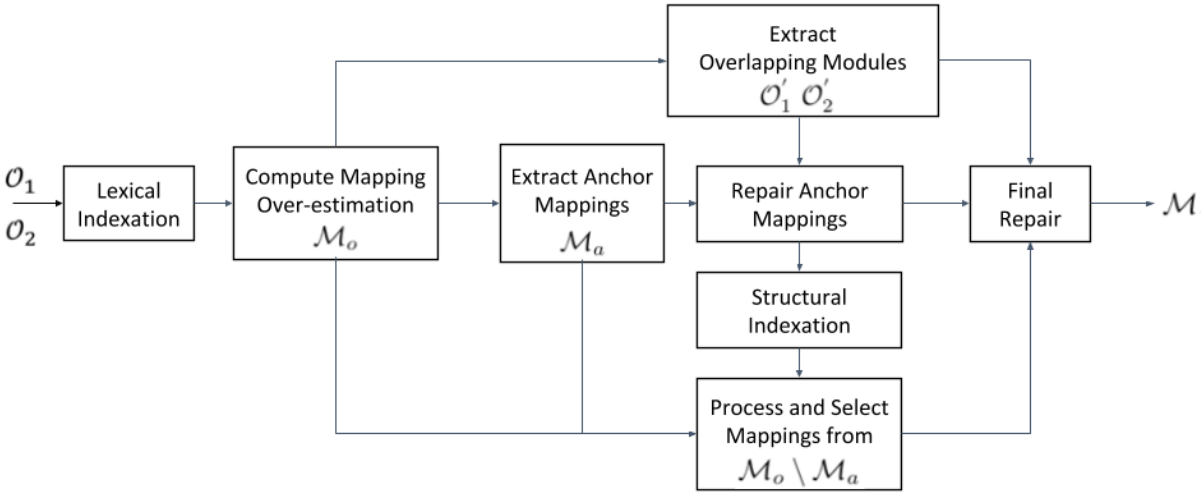

Figure 1: LogMap overview. In the mapping selection process step, LogMap can optionally involve user interaction or perform calls to an Oracle.

1.1. LogMap variants in the 2025 campaign

As in previous campaigns, we have participated in the OAEI 2025 with several variants in addition to LogMap: LogMapLLM (newly introduced in the OAEI 2025), LogMapBio, and LogMapLt. The OAEI

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[1]http://swsa.semanticweb.org/content/swsa-ten-year-award

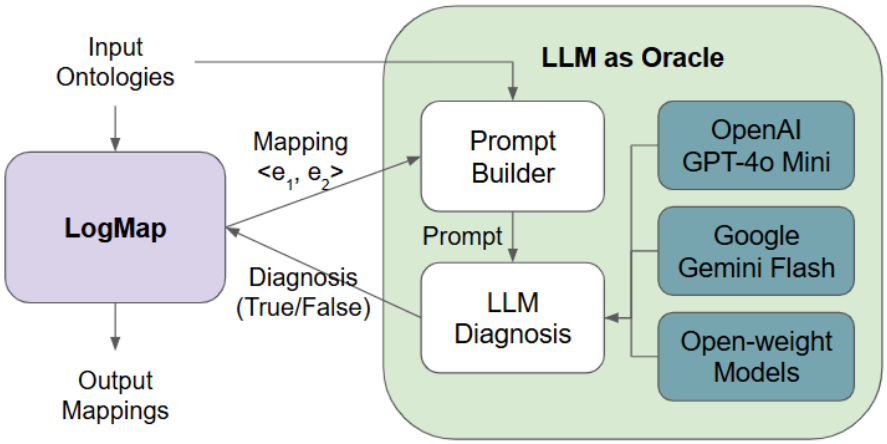

Figure 2: LLM-in-the-loop as Oracle.

results also report on LogMapKG, which is the same as LogMap but with the flag to output instance mappings activated. In some tasks, as expected, LogMap and LogMapKG produce the same results.

LogMapLLM We have extended LogMap to perform calls to an LLM-based Oracle [5] (see overview in Figure 2). The LLM-based Oracle is used to validate a subset of the correspondences where LogMap is uncertain. Thus, the power of the LLM is centred on complex cases where traditional ontology alignment techniques are not sufficient. We have experimented with GPT-4o Mini model[2] (OpenAI), a range of Google Gemini Flash models[3] (v1.5, 2.0, 2.0 Lite, and 2.5 Preview), and the open-weight models Mistral Small-2402, Llama 3-70b, Qwen3-1.7b, and Qwen3-8b. In the OAEI 2025 campaign, we participated with Gemini 2.5 as Oracle. Note that the F-scores reported in [5] are different from those in the OAEI Bio-ML track, as this track does not consider the whole ground truth for the (global matching) evaluation.[4]

LogMapLt is a "lightweight" variant of LogMap, which essentially only applies (efficient) string matching techniques.

LogMapBio includes an extension to use BioPortal [6] as a (dynamic) provider of mediating ontologies instead of relying on a few preselected ontologies [7]. LogMapBio architecture is depicted in Figure 3.

1.2. Link to the system and parameters file

LogMap is open-source and released under the Apache-2.0 License.[5] LogMap components and source code are available from the LogMap's GitHub page: https://github.com/ernestojimenezruiz/logmap-matcher/. LogMap distributions can be easily customised through a configuration file containing the matching parameters. LogMapLLM codes to call the LLM-based Oracle are available in GitHub: https://github.com/city-artificial-intelligence/rai-ukraine-kga-llm

1.3. Results

The complete results of the LogMap family in the OAEI 2025 [8] campaign are reported in http://oaei.ontologymatching.org/2025/results/. It is worth mentioning that LogMapBio and LogMapLLM

[2]https://openai.com/index/gpt-4o-mini-advancing-cost-efficient-intelligence/
[3]https://deepmind.google/technologies/gemini/
[4]See details in the Bio-ML track: https://liseda-lab.github.io/OAEI-Bio-ML/2025/index.html
[5]http://www.apache.org/licenses/

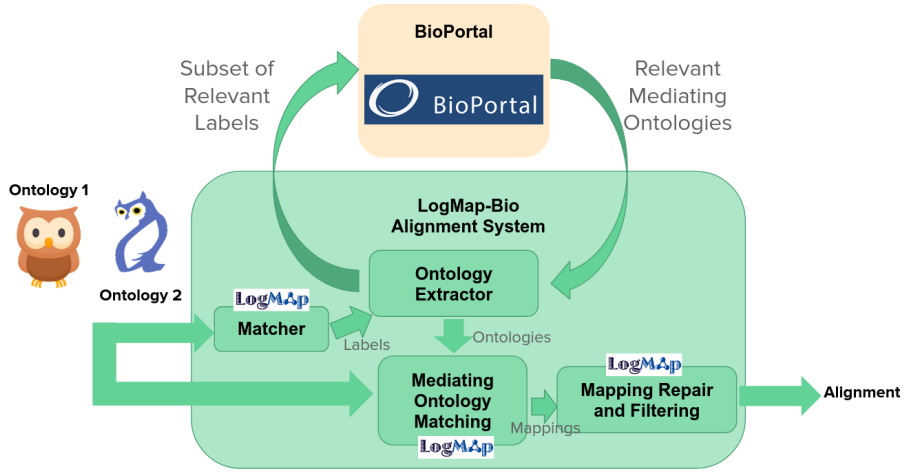

Figure 3: LogMapBio architecture built on top of LogMap.

Matching task	LogMap				LogMapBio				LogMapLLM			
	Pr	Re	F	Rank	Pr	Re	F	Rank	Pr	Re	F	Rank
Mouse-Human	0.917	0.848	0.881	#7	0.885	0.911	0.898	#5	0.964	0.842	0.899	#4
NCIT-DOID	0.843	0.893	0.867	#4	0.860	0.962	0.908	#1	0.932	0.883	0.907	#2
OMIM-ORDO	0.834	0.456	0.589	#7	0.866	0.609	0.715	#1	0.916	0.476	0.626	#4
SNOMED-FMA.body	0.760	0.569	0.651	#6	0.827	0.577	0.680	#5	0.869	0.561	0.682	#4
SNOMED-NCIT.neoplas	0.763	0.772	0.736	#4	0.748	0.795	0.771	#2	0.821	0.747	0.782	#1
SNOMED-NCIT.pharm	0.932	0.620	0.745	#4	0.928	0.611	0.737	#5	0.979	0.621	0.760	#1

Table 1
LogMap, LogMapBio and LogMapLLM in the Bio tracks of the OAEI 2025. Pr=Precision, Re=Recall, F=F-score. Rank represents the overall position in the OAEI task. There were 10 participants in both the Anatomy and Bio-ML tracks.

Matching task	LogMap					Top system in the task				
	Pr	Re	F	Repair?	Rank	Pr	Re	F	Repair?	System
Conference	0.76	0.56	0.64	Yes	#2 (8)	0.62	0.68	0.65	No	ALIN [12]
Digital Humanities	0.68	0.65	0.66	Yes	#2 (6)	0.67	0.71	0.69	No	Matcha [13]
Circular Economy	0.5	0.91	0.65	Yes	#1 (4)	-	-	-	-	-
Knowledge Graph	0.90	0.68	0.77	Yes	#3 (6)	0.92	0.85	0.88	No	TIM [14]
Beyond Equivalence	0.22	0.19	0.20	Yes	#1 (3)	-	-	-	-	-

Table 2
LogMap in the non-Bio tracks of the OAEI 2025. Pr=Precision, Re=Recall, F=F-score. Rank represents the overall position in the OAEI task. In brackets, the total number of systems producing results in that task.

were the top systems in the Bio-ML track [9, 10]. LogMapBio, using traditional mediating ontology matching, surpasses more sophisticated systems relying on machine learning and large language model techniques. Table 1 shows the results and ranking of LogMap, LogMapBio and LogMapLLM in the OAEI's Anatomy and Bio-ML tracks. In the Bio-ML track, on average, LogMapBio and LogMapLLM ranked first and second, respectively, while LogMap ranked fifth, right after BertMapLt and BertMap [11]. Table 2 shows the results of LogMap in other OAEI tracks.

Declaration on Generative AI

During the preparation of this work, the authors used Grammarly to check grammar, spelling, and readability. After using the tool, the authors reviewed and edited the content as needed to take full responsibility for the publication's content.

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