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LogMap 2: Towards Logic-based, Scalable and Interactive Ontology Matching

Ernesto Jiménez Ruiz - ernesto@cs.ox.ac.uk
Bernardo Cuenca Grau - berg@cs.ox.ac.uk
Yujiao Zhou - yujiao.zhou@cs.ox.ac.uk

LogMap project:
http://www.cs.ox.ac.uk/isg/projects/LogMap/

Motivation

- Ontology mappings are crucial to exchange or migrate data between ontology-based applications.
- Creating such mappings manually is often infeasible due to the size and complexity of modern ontologies.
- Automatic techniques are error prone.

Challenges

- Implement scalable techniques to deal with medium and large size ontologies (>500 classes).
- Detect and repair logical inconsistencies caused by the extracted mappings.
- Support the user in a semi-automatic curation of the mappings.

LogMap Matching Tool

- LogMap 1 addressed the first two challenges:
  - Only matching tool that has shown to scale with large ontologies such as NCI, FMA or SNOMED.
  - It also implements scalable algorithms for `on the fly' unsatisfiability detection and repair.
- Fastest tool and second best results in the Ontology Alignment Initiative Evaluation (OAEI) 2011.

New in LogMap 2

- LogMap 2 is even more scalable and robust, and
- presents an infrastructure to allow experts to interactively contribute in the matching process.

Preliminary Results

- LogMap 2 identifies 2692 candidates for FMA-NCI, and
- automatically discards 117 conflictive mappings.
- The expert would *only* need to assess 585 mappings.

LogMap 2 Interactive Method

Input: $\mathcal{O}_1$, $\mathcal{O}_2$: input ontologies; $\mathcal{M}$: input mappings
Output: $\mathcal{M}$: mappings; $\mathcal{O}_1'$, $\mathcal{O}_2'$: fragments.

1: $\langle \mathcal{O}_1', \mathcal{O}_2' \rangle := \mathsf{OverlappingEstimation}(\mathcal{O}_1, \mathcal{O}_2)$
2: Compute lexical indexation of $\mathcal{O}_1'$ and $\mathcal{O}_2'$
3: $\langle \mathcal{M}^{act}, \mathcal{M}^{?} \rangle := \mathsf{CandidateMappings}(\mathcal{O}_1', \mathcal{O}_2')$
4: $\mathcal{M} := \mathcal{M} \cup \mathsf{Repair}(\mathcal{M}, \mathcal{M}^{act})$
5: $\mathcal{M}^{act} := \emptyset$
6: Compute structural indexation for $\mathcal{O}_1'$, $\mathcal{O}_2'$ and $\mathcal{M}$
7: Extract mappings $\mathcal{M}^{\perp} \subseteq \mathcal{M}^{?}$ in conflict with $\mathcal{M}$
8: $\mathcal{M}^{?} := \mathcal{M}^{?} \setminus \mathcal{M}^{\perp}$
9: Compute partial order of $\mathcal{M}^{?}$
10: **if** ((✓) Interactive Process) and $\mathcal{M}^{?} \neq \emptyset$ **then**
11: (✓) Select $\mathcal{M}^{act} \subseteq$ top-k mappings in $\mathcal{M}^{?}$
12: $\mathcal{M}^{?} := \mathcal{M}^{?} \setminus \mathcal{M}^{act}$
13: Go to Step (4)
14: **else**
15: Automatically select $\mathcal{M}^{act} \subseteq \mathcal{M}^{?}$
16: $\mathcal{M} := \mathcal{M} \cup \mathsf{Repair}(\mathcal{M}, \mathcal{M}^{act})$
17: **end if**
18: **return** $\mathcal{M}$, $\mathcal{O}_1'$ and $\mathcal{O}_2'$

UNIVERSITY OF OXFORD
DEPARTMENT OF COMPUTER SCIENCE

We want you...

- ... to test LogMap and give us feedback.
- ... to suggest us new use cases and matching problems.

Selected References

- LogMap: Logic-based and scalable ontology matching. In:10th International Semantic Web Conference. 2011.
- LogMap results for OAEI 2011. In 6th International Workshop on Ontology Matching. 2011.