TROvE: a Graphical Tool to Evaluate OWL Reasoners

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Abstract. In this paper we present TROvE (Tool for Rapid OWL Reasoner Evaluation), a tool aimed to offer to a non-expert user the possibility to evaluate OWL reasoners on several reasoning tasks by means of a simple "push-button" solution.

1 Introduction

Reasoning with ontologies is one of the core tasks of research in Description Logics (see, e.g., [1]). This is also witnessed by the large number of reasoners currently available, see, e.g., the results of the last OWL Reasoner Evaluation (ORE) [2]. Given the wide range of potential practical applications in the Semantic Web [3], practitioners leveraging semantic reasoners in their applications have to answer the question "Which system should I use?". To answer such a question, several projects and events have been implemented, e.g., the SEALS project `http://www.seals-project.eu` and the ORE. Also if in such kind of events reasoners are evaluated using transparent and fair methods, in a practical application context a practitioner could be interested in understanding the current state of the art related to a particular reasoning task for which data could not be available to the research community. This can lead a non-expert user to deal with several issues, both technical and theoretical.

In this paper we present TROvE (Tool for Rapid OWL Reasoner Evaluation), a tool aimed to offer to a non-expert user the possibility to evaluate OWL reasoners on several reasoning tasks. In the spirit of tools such as WEKA [4] for the experimental evaluation of machine learning algorithms, TROvE offers to the user a "push-button" solution aimed to help the user answer the question above, focusing only on input data at the user execution stage, and showing data in order to evaluate both correctness and performance at the user validation stage.

2 Architecture of TROvE

The architecture of TROvE[1] builds on and extends the one of FRaQuE [5], a command line tool aimed to offer to a non-expert user easy solutions aimed to help her to evaluate query processors for Ontology Based Data Access.

Figure 1 presents the architecture of TROvE. It is composed of six modules:

[1] TROvE is available for download at `http://sites.google.com/site/trove14`.

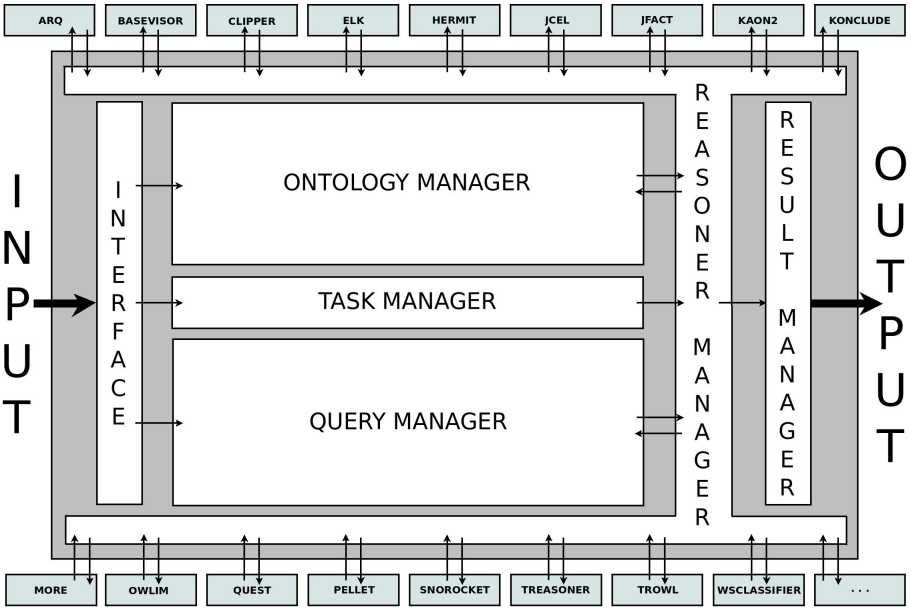

Fig. 1: The architecture of TROvE.

`INTERFACE` manages the input received by the user by means of the Graphical User Interface (GUI) depicted in Figure 2. It also dispatches the input data to `TASK MANAGER`, `ONTOLOGY MANAGER`, and `QUERY MANAGER` (if it is the case).

`ONTOLOGY MANAGER` is devoted to manage the OWL input file(s).

`TASK MANAGER` is aimed to manage the reasoning task selected by the user. At the time of writing, TROvE supports classification, consistency checking and query answering.

`QUERY MANAGER` is devoted to process the query input file. It checks the compliance of the query with the SPARQL 1.0 syntax, and, considering the selected reasoner(s), it applies syntactic modifications to the input query file or returns to `INTERFACE` an error message if the input query is not supported by the selected reasoner(s).

`REASONER MANAGER` is aimed to manage the interaction of TROvE with the supported reasoners. Selected reasoners are executed in a sequential way with default parameters.

`RESULT MANAGER` takes in charge outputs: (*i*) as performance metrics managing shell and log files, (*ii*) as text file(s) containing the query result(s) in case of query answering task.

The reasoners currently supported by TROvE are listed below:

– ARQ [6] (version 2.9.4) is the built-in query processor of the Jena library. In TROvE it is used with owl-dl semantics.

- BaseVISor (version 2.0)[2] a reasoner for OWL2 RL.
- Clipper [7] (version 0.1) is a reasoner for conjunctive query answering via query rewriting. The core of Clipper is a novel query rewriting technique which transforms an input conjunctive query into a union of queries that a Datalog program performs over the Abox completed by some rules.
- ELK [8] (version 0.4.1), a reasoner for ontologies in OWL2 EL.
- HermiT [9] (version 1.3.6) is a DL reasoner based on hypertableau calculus [10]. It can be used to answer SPARQL 1.0 queries by means of the SPARQL 1.0 wrapper OWL-BGP [11].
- jcel [12] (version 0.19.1), a reasoner for OWL2 EL.
- Jfact(version 1.2.1) is a Java implementation of the C++ reasoner Fact++ [13] which supports the OWL2 DL fragment with extended datatype support.
- Kaon2 [14, 15] (version 2008-06-29) implements reasoning algorithms aimed to reduce a knowledge base to a disjunctive datalog program, allowing the usage of deductive database techniques. So, with respect to other DL reasoners like HermiT, Pellet and TrOWL, it does not implement a tableau-like calculus.
- Konclude [16] (version 0.5.0-275) is a reasoner supporting ontologies in OWL2 DL fragment.
- MORe [17] (version 0.1.6) is a reasoner using HermiT, with the specificity to perform extraction techniques by identifying ontology subsets that can be completely classified by ELK.
- Owlim [18] (version lite 5.3) is a family of semantic repositories, or RDF database management systems, with the original characteristics to be a robust support for the semantics of OWL2 RL and OWL2 QL profiles.
- Pellet [19] (version 2.3.0) is a description logic reasoner supporting OWL-DL.
- Quest [20] (version 1.9) is a reasoner for OBDA with databases, and it is restricted to OWL2 QL. In TROvE it is used in "virtual mode".
- SnoRocket [21] (version 2.4.4) is a reasoner initially developed to classify the SNOMED CT ontology. It is restricted to the OWL2 EL profile.
- TReasoner (version 2014-01-28) [22] is a reasoner which supports the OWL2 DL fragment with extended datatype support.
- TrOWL [23] (version 1.3) is an infrastructure aimed to reasoning, and querying OWL 2 ontologies by means of several techniques, e.g., quality guaranteed approximations and forgetting (see [23] for details).
- WSClassifier [24] (version 2013) is a reasoner using a hybrid of the reasoners ConDOR [25] and HermiT.

Concerning the GUI, looking at Figure 2, we can see that it is composed of several blocks. In Reasoning Tasks, users can select a reasoning task and, accordingly, in Reasoners, users can choose a set of suitable reasoners by checking them (reasoners not available to cope with the selected task are not checkable).

[2] See the BaseVISor web site at `http://visiology.com/basevisor/basevisor.html`

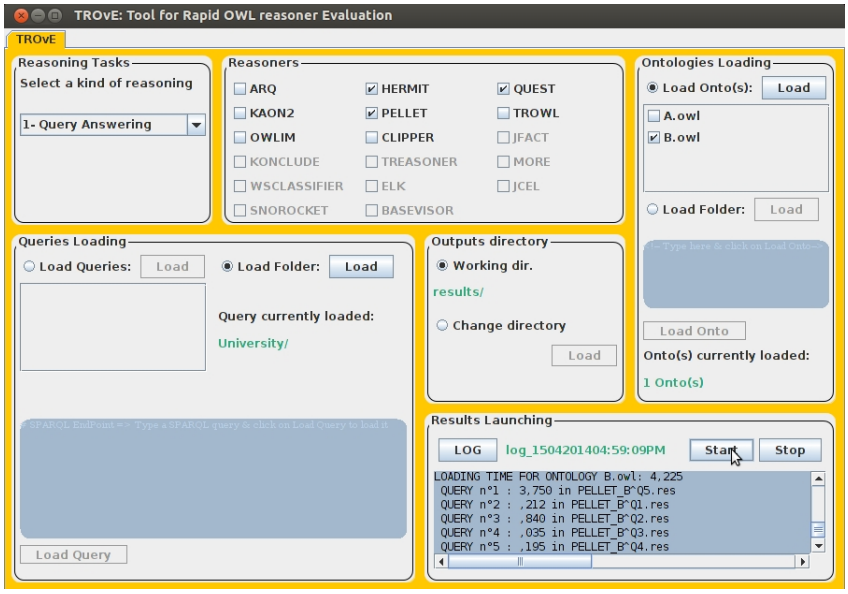

Fig. 2: Graphical User Interface of TROvE.

In Ontologies Loading, users can load a (set of) OWL file(s) in the following ways: (*i*) single file selection; (*ii*) folder selection; and (*iii*) copy & paste using a text area. In Queries Loading, users can load a (set of) query files with the same options available in Ontologies Loading. In Output directory, users can select a folder to gather the results. Finally, in Results user can launch the experiment pushing the "Start" button.

3 Conclusions

In this paper, we presented TROvE, a graphical tool that allows a non-expert user to perform a rapid evaluation of state-of-the-art reasoners on different reasoning tasks, e.g., classification, consistency checking, and query answering.

Currently, we are working to extend TROvE in two main directions. The first one concerns the usability of the GUI, especially considering the visualization of the results related to a given experiment. The second one is related to the modularity of TROvE, in order to simplify the mechanism used to add a new reasoner to the pool supported by TROvE.

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decisioni riguardanti lottimizzazione delle attività in un terminal container", the DESCTOP project (`http://visionlab.uniss.it/desctop`).

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