Efficient and Off-The-Shelf Solver: jArgSemSAT

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Abstract. jArgSemSAT is a Java re-implementation of ArgSemSAT—a SAT-based solver for abstract argumentation problems—that can be easily integrated in existing argumentation systems (1) as an off-the-shelf, standalone, library; (2) as a Tweety compatible library; and (3) as a fast and robust web service freely available on the Web. Despite being written in Java, jArgSemSAT is very efficient.

Keywords. Dung's *AF*, semantics, solver

Introduction

Dung's argumentation framework (*AF*) consists of a set of arguments and an *attack* relation between them [3]. Different *argumentation semantics* introduce in a declarative way the criteria to determine which arguments emerge as "justified" from the conflict, by identifying a number of *extensions*, i.e. sets of arguments that can "survive the conflict together". In [3] three "traditional" semantics are introduced, namely *grounded*, *stable*, and *preferred* semantics, as well as the auxiliary notion of *complete* extension.

ArgSemSAT scored second at the first International Competition on Computational Models of Argumentation ICCMA2015 [6] and was ranked first or second in each track associated to the highest in complexity problems for stable and preferred semantics—except one due to an implementation bug discovered after the competition.[1]

Building on top of the success of ArgSemSAT, we re-coded it in Java designing jArgSemSAT [2], for being easily integrated within existing argumentation systems, such as Dung-O-Matic [4], the Tweety libraries [5], and ArgTech [1].

1. jArgSemSAT

jArgSemSAT is a mature application that now exists in four different versions:

1. Stand-alone application compatible with the Probo interface [6];
2. Dung-O-Matic (DoM) [4] compatible library: this ensures compatibility for works already using DoM;

[1] Details in `http://goo.gl/sRFaSi`

3. Tweety [5] compatible library: we proudly support the Tweety project whose aim is to provide a general framework for implementing and testing knowledge representation formalisms;
4. ArgTech [1] compatible web-service: we created a Tomcat web-service exporting jArgSemSAT with ArgTech-compatible RESTful interfaces.

jArgSemSAT is freely (MIT licence) available on SourceForge[2] and as Maven projects directly accessible from the central repository. It is composed by two `jar` files and a `war` file.

`jArgSemSAT-VERSION.jar` provides both the stand-alone application compatible with the Probo interface and the DoM compatible library: we chose not to distribute the library without the Probo interface to facilitate future experiments also from different research groups and to improve the awareness in the community of the ICCMA competition.

`jArgSemSATTweety-VERSION.jar` is a self-contained, Tweety-compatible, library: it includes `jArgSemSAT-VERSION.jar` and provides a Tweety-compatible interface.

`jArgSemSATWeb-VERSION.war` is a self-contained Tomcat web-service archive compatible with ArgTech specifications. This web-service is also freely available at `http://cicero.cs.cf.ac.uk/jArgSemSATWeb/restapi/argtech/` (best effort SLA.) Its source code is also freely available.

2. Conclusions

jArgSemSAT is an efficient off-the-shelf solver for abstract argumentation problems and in [2] we proved that it is only slightly less efficient than its ancestor ArgSemSAT, which is written in C++.

To give an hint of jArgSemSAT performance, in a re-run of ICCMA 2015, it made the podium in regard to credulous acceptance w.r.t. preferred semantics; enumeration of preferred extensions; skeptical acceptance w.r.t. stable semantics; and enumeration of stable extensions.

References

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