Introducing the Carneades Web Application

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ABSTRACT

This ICAIL system demonstration introduces the Web version of the Carneades argumentation system, which provides software tools based on a common computational model of argument graphs useful for policy deliberations and claims processing.

Categories and Subject Descriptors

I.2.1 [**Artificial Intelligence**]: Applications and Expert Systems—*Law*; I.2.3 [**Artificial Intelligence**]: Deduction and Theorem Proving

General Terms

Languages, Legal Aspects

Keywords

Argumentation

1. DESCRIPTION

Legislative bodies want to use the Internet to obtain feedback from citizens and other stakeholders about policy issues and legislative proposals but need better tools for conducting constructive, substantive dialogues on the issues and reconstructing, structuring and summarizing the arguments put forward, especially when conducting large-scale consultations at the national or supra-national (e.g. European Union) level.

Determinations of rights and obligations by large public agencies administering social services are too often legally incorrect and even when correct poorly justified and the result of inefficient and unnecessarily burdensome bureaucratic procedures, often leading to expensive and lengthy law suits. Legal knowledge-based systems promise to improve the efficiency, quality and transparency of the process, but existing systems are based on a deductive, rule-based conception of legal reasoning which fails to take into account the fundamental nature of legal reasoning as a theory construction and evaluation process, in which arguments pro and con interpretations of legal sources and evidence are balanced to reach just decisions in a process of "reflective equilibrium" [8].

The Carneades argument system provides a number of tools, all based on a common formal and computational model of **argument graphs** [6], designed to overcome these problems and provide more substantial and adequate support both for policy deliberations on the Internet and the processing of claims by social service and other pubic agencies. Carneades builds on state-of-the-art results from Artificial Intelligence and Law and related fields, integrating computational models of argument, knowledge-based systems and "sense-making" methods for argument visualization. To our knowledge, no other system yet exists with this combination of features or level of integration.

This ICAIL demonstration introduces the latest version of the Carneades argumentation system, which now provides web-based, collaborative software tools for:

- modeling legal norms and argumentation schemes
- (re)constructing arguments in an argument graph
- visualizing, browsing and navigating argument graphs
- critically evaluating arguments
- forming opinions, participating in polls and ranking stakeholders by degrees of agreement
- obtaining clear explanations, using argument graphs, of the differential effects of alternative policies or legal theories in particular cases

Carneades includes a high-level, declarative rule language for modeling argumentation schemes, norms and policies [3]. It can be used to develop legal expert systems, with a Web front-end for entering the facts of cases in interactive dialogues. The results of the legal analysis of a case are visualized in argument maps. This will be demonstrated with a pilot application for analyzing open source license compatibility issues [2], currently being developed further in the European Markos project.[1]

The Carneades system is particularly suitable for legal applications. Its rule language has been designed specifically for modeling legal norms and argumentation schemes, [5, 7] and provides support for isomorphic modeling of legal sources, reification of rules, defeasibility, avoidance of contrapositive inferences, and arguing about the validity of legal rules. Multiple policies or legal theories can be included

[1] http://markosproject.berlios.de/

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in a single model. Carneades provides support for finding policies or legal theories which support a desired legal conclusion, using a kind of abduction.

This new version of Carneades is a Web application with a three-tiered architecture consisting of a relational database backend layer, an application layer, realized as RESTful Web service [4], and a graphical user interface layer, implemented as a Rich Internet Application using only Web standards. New features of Carneades since the version described in [1] include:

- Now a multiuser Web application, with a three-tier architecture, including a relational database backend
- Zero configuration and zero administration, with a built-in database engine and web server
- Can be used locally by a single user, without an Internet connection
- New argument evaluator, based on ASPIC+ and Dung abstract argumentation frameworks. Cyclic argument graphs are now handled
- Argument maps are now represented for the Web using Structured Vector Graphics (SVG)
- New XML format for exporting and interchanging argument graphs, called the Carneades Argument Format (CAF)
- New rule language, based on Lisp s-expressions, for representing policies and argumentation schemes.

CAF and the new rule language replace the use in Carneades of the Legal Knowledge Interchange Format (LKIF) from the ESTRELLA project.

Carneades is Open Source software licensed under the European Union Public License (EUPLv1.1), which is compatible with the GNU GPL (version 2), and the Eclipse Public License (version 1.0), among others.

2. DOWNLOADING

The Carneades software, along with a user manual, can be downloaded from the Github repository.[2]

For programmers, online documentation of the Carneades APIs is also available.[3]

[2]http://carneades.github.com
[3]http://carneades.github.com/doc/api

3. ACKNOWLEDGEMENTS

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