Enriching queries using argumentation: an industrial application of argumentation

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Abstract. Within the framework of the European project EcoBioCap (ECOefficient BIOdegradable Composite Advanced Packaging), aiming at conceiving the next generation of food packagings, we introduce an argumentation-based tool for management of conflicting viewpoints between preferences expressed by the involved parties (food and packaging industries, health and waste management etc.).

Keywords. Applications and Argumentation and Bipolar Query Answering

Argumentation tool in EcoBioCap

The requirements and user preferences in EcoBioCap are modeled by several ontological rules provided by the stakeholders expressing their viewpoints and expertise. The hereby presented argumentation tool implements the process which has been introduced in previous work [4,5] combining a description logic (DLR-Lite) within ASPIC framework for relational database querying purposes. In this paper, we recall briefly the main functionalities an argumentation process which aims at aggregating several stakeholders (researchers, consumers, food industry, packaging industry, waste management policy, etc.) requirements expressed as simple textual arguments, to enrich the querying process by stakeholders' justified preferences. Each argument supports/opposes a choice justified by the fact that it either meets or not a requirement according to packaging aspects (biodegradability, transparency, ...). The proposed tool has the following functionalities:

(1) It provides users with a user-friendly interface allowing them to express their arguments as text and then formalizing them as concepts and rules. Here, concepts are defined upon some attributes describing the packaging for which values (numerical, intervals or boolean) can also be specified. The system is also equipped with a function of import/export formalized arguments from/into an XML format.

(2) The system automatically computes the logical arguments obtained from the set of concepts and rules. The arguments can be gathered into pros and cons with regard to some packaging alternative characteristics. Once logical arguments are built, the system computes also all conflicts or attacks among them and draw the argument graph.

(3) The system implements different kinds of extension semantics. The user can compute one particular semantics or all defined semantics.

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(4) Based on the extensions, the system extracts the criteria leading to either the rejection or the acceptance of some packaging types. These criteria and eventually associated values become predicates (conditions) which can be used latter as constraints or wishes to enrich the bipolar query which can be processed by the querying system.

(5) The system must allow a real-time discussion among stakeholders. Every stakeholder has an account and a password. After login, a stakeholder can browse the current project, open a project or join the discussion by adding or updating arguments.

(6) The system stores in a database the ongoing or old projects (concept and rules) and already expressed concepts and rules and makes them available and accessible to the stakeholders to define quickly their own arguments.

Last, regarding to the amount of information the user can face during an argumentation session, (7) the system can be run in either *expert* or *user* mode. The former allows to display all information about the process (argument graph, attack graph, conflicts, extensions, etc.) and the later limits the information to the most relevant.

Feedback obtained from testing the system with real users points out the difficulties to consider a rule as either strict or defeasible and expressed the need to be able to specify a sort of importance encompassing the notions of strictness and defeasibility. We extend the proposed approach to fuzziness to make it possible to deal with vague and uncertain concepts and rules [3,2]. Last, the tool also allows to export the rules in the Datalog+ format. This will help bridge the link with inconsistent knowledge query answering as showed in [1].

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