

## Graduiertenkolloquium Angewandte Informatik

# Epistemic Reasoning in OWL 2 DL

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### Abstract

The standard semantics employed for description logics (DLs) adheres to the open world assumption (OWA). On the one hand, such an assumption facilitates a modeler to formally represent problem domains without explicitly expressing full information, which sometimes is even not possible. This is probably one of the main reasons of founding the Web Ontology Language (OWL) based on DLs. On the other hand, OWA proves to be the main cause of the impotence of DLs of capturing non-monotonic reasoning: where new information invalidates the previously concluded information. Non-monotonic reasoning has several applications in real life scenarios. For example, logic programming community, parallel to the OWL community, in general focuses in non-monotonic reasoning. These shortcomings of DLs lead to the quest for a formalism as suitable as DLs meanwhile capable of capturing some 'kind' of non-monotonic reasoning.

Several work has been done on extending DLs with some non-monotonic feature. Epistemic extensions of DLs (called epistemic DLs sometimes) is probably one of the earliest work in this direction. Such extensions enhance expressivity and querying capabilities of these DLs by knowledge base introspection. The existing approaches in this respect are limited to less expressive DLs like ALC, whereas in real life applications, modeling problems require expressivity beyond ALC

The aim of this work is to extend epistemically the most expressive DL SROIQ which is the foundation of OWL 2 DL. We argue that unintended effects occur when imposing the semantics traditionally employed on very expressive DLs like SROIQ. Consequently, we identify the most expressive DL for which the current approach can still be adapted. For the epistemic extension of SROIQ and alike expressive DLs, we suggest a revised semantics that behaves more intuitively in these cases and coincides with the traditional semantics on less expressive DLs.

Different languages can be used for formalizing knowledge bases and queries. The use of an epistemically extended formalisms as query language has been highly advocated in literature. Motivated by several use cases of using an epistemic DL as a query language we introduce a method for answering epistemic queries to DL knowledge bases via reduction to standard DL reasoning. Hence, we can use off-the-shelf highly optimized DL reasoners for answering epistemic queries.

Finally, to evaluate our method of answering epistemic queries, we implement a tool that utilizes the introduced technique of reducing epistemic query answering to the standard DL reasoning tasks. We perform several experiments that suggests the practical feasibility of the tool.

Termin: Freitag, 06. Dezember 2013, 14.00 Uhr

Ort: Englerstraße 11, 76131 Karlsruhe  
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Veranstalter: Institut AIFB, Forschungsgruppe Wissensmanagement

Zu diesem Vortrag lädt das Institut für Angewandte Informatik und Formale Beschreibungsverfahren alle Interessierten herzlich ein.

Andreas Oberweis Hartmut, Schmeck Detlef Seese, Wolffried Stucky, Rudi Studer (Org.), Stefan Tai