Report on the 1999 International Workshop on Description Logics

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The 1999 International Workshop on Description Logics was held in Linköping, Sweden from July 30 to August 1. It was an affiliate event with the Sixteenth International Joint Conference on Artificial Intelligence (IJCAI'99, Stockholm, July 31 - August 6) and with the Sixth International Workshop on Knowledge Representation meets Databases (KRDB'99, Linköping, July 29-30). The workshop committee was composed of Patrick Lambrix, Alex Borgida, Maurizio Lenzerini, Ralf Möller and Peter Patel-Schneider. Attendance at the workshop was by invitation only. Most of the attendees were selected based on research papers or position papers submitted to the workshop. In total about 60 people attended.

The workshop was organized in sessions on theoretical advances in description logics (2 sessions), applications of description logics (2 sessions), description logic systems (2 sessions) and extensions of description logics (1 session). Further, there was a joint session with KRDB'99, an invited talk and an invited tutorial.

The invited tutorial by Natasha Alechina contained an overview of work on semi-structured data as well as a more specific part on the use of modal fragments of transitive closure logic as a formal basis for query and description languages for semi-structured data. This tutorial was scheduled in the joint session with KRDB'99. Robert MacGregor and Deborah McGuinness held an invited talk on DARPA's High Performance Knowledge Base Program. The goal of this program is to demonstrate that constructing and reasoning with very large knowledge bases is practical and useful.

The joint session with KRDB'99 was chaired by Diego Calvanese. Four papers were presented in the session. Riccardo Rosati gave a talk on extending hybrid knowledge-based systems integrating rules and structured representation of information. He presented the language $\mathcal{AL}$-LOG which combines disjunctive DATALOG and $\mathcal{ALC}$. Marie-Christine Rousset proposed to use backward-chaining query evaluation based on query expansion to address the problem of answering conjunctive queries on Aboxes. Gerd Stumme presented the notion of conceptual scaling in conceptual information systems and argued that description logics provide advantages for theory-driven logical scaling. Finally, Mira Balaban reported on a system that integrates a description logic and an F-Logic rule reasoner.

There were two application sessions, chaired by Volker Haarslev and Ralf Möller. The application papers can be divided into two categories: papers reporting on actual implemented systems and papers on techniques that may be useful for application systems based on description logic systems. A first paper was presented by Francesco Donini. He proposed a description logic targeted for image recognition. A key factor is the introduction of the notion of shapes. He also presented work on the ICARUS system. ICARUS is a tool for creating, classifying and retrieving VRML scenes. The scenes are represented as description logic concepts. Marco Aiello presented a system that is aimed at enhancing image retrieval with the ability to perform spatial reasoning. He described a formalism for describing and querying pictures. Maarten de Rijke presented a formal model for the specification of telephone features by means of a description logic. A feature in this context is an addition of functionality for the users or administrators of the telephone system. Feature interaction occurs when the behavior of one feature influences the behavior of another feature. An algorithm for feature interaction detection is given. Aida Vitoria proposed a basic set of composition operators. These operators are used for combining separate knowledge bases. In his talk, Daniel Kudenko proposed a way to apply feature-based learners to description logic learning tasks. A number of empirical results were shown. Martina Grathwohl showed how description logics can be used to represent disaster management plans. The example that she used was the high water protection plan of the city of Heidelberg in Germany. The aim of the work presented by Pedro González-Calero is to define a general and domain-independent approach that takes advantage of the description logic capabilities to assess similarity and to retrieve cases in a case-based reasoning context. Enrico Franconi presented an effort in explaining subsumption in the description logic $\mathcal{ALC}$. The proposed solution is to define a sequent calculus based on an easily explained set of rules and generate a sequent proof for subsumption as explanation. Sergio Tessaris reported on work concerning an interface for description logic systems where the API is defined in a standard formalism and a mechanism is provided for applications to communicate with the description logic system. The proposed solution makes use of CORBA. XML is used for data exchange. The last application session ended with a discussion where the people who presented papers on actual implemented systems commented on the usefulness of the techniques presented by the other people for their applications.

The two theory sessions were chaired by Maurizio Lenzerini. A total of eight papers were presented. Complexity results related to different kinds of counting were presented by Stephan Tobies. The results concerned reasoning with qualified number restrictions and cardinality restrictions. Sergio Tessaris presented an algorithm for reasoning in a description logic that allows for transitive roles as well as Abox assertions. A description logic that allows for n-ary predicates as well as a tableaux algorithm for deciding satisfiability of formulae in the language was presented by Ulrike Sattler. Hans Jürgen Ohlbach presented a methodology which allows for the use of arithmetical algorithms for reasoning about numerical features of sets where the sets are represented by concepts in a description logic. Ralf Küsters presented an approach for matching of concepts with variables in description logics allowing for existential quantifiers. Algorithms and complexity results were given. Franz Baader reported on work concerning rewriting in description logics using terminologies. He presented a general framework for the problem as well as complexity results for an instantiation of the problem. Work on computing least common subsumers in expressive description logics was presented by Thomas Mantay. The topic of the talk by Francois de Beuvron was reasoning in a closed terminology. Different types of closures were introduced and it was shown how reasoning in closed terminologies can be used for solving configuration problems.

Before the workshop developers of description logic systems were invited to provide a short description of their system. This description included information on the implemented logic, the interesting features of the system, performance aspects, interesting implementation aspects, availability of the system and future plans. Developers of six systems provided responses and the results are summarized in the 'Systems Comparison' paper by Peter Patel-Schneider in the proceedings.

The systems part at the workshop, chaired by Peter Patel-Schneider, was divided into three parts. In the first part three papers were presented concerning performance of description logic systems. Armando Tacchella presented a comparative analysis between the performances of the systems *SAT, KSATC, DLP and TA with respect to satisfiability testing. Peter Patel-Schneider reported on the performance of DLP on random modal formulae. Volker Haarslev and Ralf Möller presented an empirical evaluation of optimization strategies for Abox reasoning in an expressive description logic.
In the second part the following systems were presented: *SAT (by Armando Tacchella), CICLOP (by Francois de Beuvron), DLP (by Peter Patel-Schneider), FaCT and iFaCT (by Ian Horrocks), MSPASS (by Renate Schmidt), RACE (by Volker Haarslev and Ralf Möller) and PowerLoom (by Robert MacGregor).
In the third part the different description logics systems were demonstrated.

The last session, the session on extensions of description logics was chaired by Patrick Lambrix. The first talk in the session was held by Uta Priss. She talked about the notion of facets in the field of library classification systems and the relationship with description logics. Carsten Lutz reported on a correspondence between two temporal description logics. The first description logic is an interval-based temporal description logic, while the second is a description logic with a temporal concrete domain. It was shown that satisfiability of concepts in the first description logic can be reduced to satisfiability of concepts in the second description logic. Alessandro Artale talked about a temporal description logic which is able to express enhanced temporal Entity-Relationship schemata as well as integrity constraints in the form of complex inclusion dependencies. Michael Wessel described an extension of a description logic with default reasoning about spatial information. The last talk was on answering queries using views in description logics and was presented by Maurizio Lenzerini. The presented work distinguishes between closed and open domain assumptions with respect to object knowledge and sound, complete and exact view assumptions with respect to view knowledge and gives complexity results for query answering in the different cases.

References

The proceedings are electronically available at CEUR Workshop Proceedings as Volume 22 (http://SunSITE.Informatik.RWTH-Aachen.DE/Publications/CEUR-WS/Vol-22/).

The home page of the description logic community is at http://dl.kr.org/.

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