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Title: Referring Expressions in Knowledge Representation and Information Systems

Abstract: A referring expression in linguistics is any noun phrase identifying an object in a way that will be useful to interlocutors. In the context of knowledge representation and information systems, constant symbols occurring in an underlying knowledge base are the artifacts usually used to identify a subset of the objects for which the knowledge base captures knowledge.

This talk explores how objects that can be usefully identified can be extended by allowing more general expressions in the underlying language of the knowledge base, called singular referring expressions, to replace constants as syntactic identifiers of such objects. These referring expressions can then be used to communicate identities of otherwise abstract objects. Expanding the possibilities of identifying (possibly implicitly defined) objects serves numerous purposes, ranging from allowing query answers to contain additional tuples (which are typically eliminated due to lack of constant symbols denoting components of such tuples), to answers that are more informative, to decisions on how to communicate references to objects among various cooperating agents, and to identification issues related to physical data representation in computer storage (such as relying on addresses in main-memory databases). The idea of referring expressions itself aims on circumventing the need for artificially-invented identifiers that are commonly opaque to the user that interacts with the knowledge base. The formalism provides foundations for a successful and unambiguous exchange of information about individuals between agents sharing common knowledge about such individuals, a task that is indispensable in most modern applications of knowledge representation and semantic technologies.

Dr. David Toman is a professor of Computer Science at the University of Waterloo, Canada. He has published and presented results in the area of knowledge representation over the last 20 years at premier AI conferences. He received two Ray Reiter Prizes at KR 2010 and at KR 2016, the later for work related to the use of referring expressions in knowledge representation (jointly with Grant Weddell and Alex Borgida). This work was later extended to the area of conceptual modelling and was awarded the 2018 Bob Wielinga Best Paper Award for furthering the use of referring expressions in conceptual modelling. Dr. Toman has also given numerous tutorials in the area of temporal representation and reasoning and temporal databases (that has led to an invited chapter in the *Handbook of Temporal Reasoning in Artificial Intelligence*), on identification issues in knowledge representation systems, and on logic-based approaches to query compilation and optimization, all at premier AI conferences such as IJCAI, ECAI, and KR.