The Actual Weight of Lightweight Description Logics

Abstract for Invited Talk

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Since the mid-2000s, when the theoretical foundations of lightweight description logics (DLs) were established, the EL and DL-Lite families have become central to both foundational and applied research in the field. DL-Lite was designed aiming at FO-rewritability of ontology-mediated query answering, ensuring the same data complexity as plain query evaluation and enabling efficient query processing over large data sources. EL, on the other hand, supports consequence-based reasoning with polynomial-time complexity, a feature that has proven essential for handling large-scale ontologies such as SNOMED CT. Both families have triggered extensive investigations of the trade-off between expressive power and complexity of inference across a wide range of reasoning tasks beyond satisfiability and query answering, profoundly shaping the DL research landscape over the past two decades. Their impact extends far beyond theory: EL and DL-Lite underpin the EL and QL Profiles of OWL 2, respectively, and form the backbone of biomedical reasoning as well as ontology-based data access and integration in a variety of application domains. In this talk, we revisit the theoretical foundations of these logics, examine their role in defining the tractable fragments of DLs, and discuss how their principles continue to drive research in both theory and practice.