Temporal Query Answering in DL-Lite over Inconsistent Data (Extended Abstract)*

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This extended abstract presents our work on inconsistency-tolerant temporal query answering [3] which is motivated by ontology-based situation recognition for context-aware systems. In such applications complex systems are observed over time and critical situations are recognized based on information gathered from different sources. We consider the setting of *temporal query answering* presented in [2] where a *temporal knowledge base (TKB)* consists of a global TBox and a sequence of ABoxes that represents the data at different time points, and a *temporal conjunctive query (TCQ)* combines conjunctive queries with operators of propositional linear temporal logic (without negation). We extend to this setting three inconsistency-tolerant semantics that have been introduced for querying inconsistent description logic knowledge bases [4, 1]. These three semantics are based upon the notion of a *repair*, which is a maximal consistent subset of the data. For TKBs, we define repairs as component-wise maximal consistent sequences of subsets of the ABoxes. The *AR semantics* considers the queries that hold in *every repair*, the more cautious *IAR semantics* queries the *intersection of the repairs*, and the less cautious *brave semantics* returns every answer that holds in *some repair*. We show that when there is no rigid predicate, existing algorithms for TCQ answering and for IAR query answering can be combined to perform IAR temporal query answering and that this method can sometimes be used for AR and provides in any case an approximation of the AR answers. We investigate the computational properties of the three semantics for DL-Lite$_\mathcal{R}$ TKBs, considering both *data complexity* and *combined complexity*, and distinguishing three different cases regarding the rigid symbols that are allowed (no rigid predicates, only rigid concepts, or rigid concepts and roles). We show that only brave semantics in the cases where rigid predicates are allowed has a higher data complexity than in the atemporal case (NP-complete instead of polynomial). We also complete the complexity picture for the classical semantics by showing that the cases with rigid predicates can often be reduced to the case without rigid predicates by adding a set of assertions computable in polynomial time to every ABox of the TKB.

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