DatalogMTL: Datalog with Metric Temporal Logic Operators (Abstract)

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Abstract

DatalogMTL is a powerful extension of Datalog, designed to handle complex temporal reasoning. In this framework, a temporal dataset consists of facts that hold over intervals along a rational timeline. A DatalogMTL program enables recursive reasoning over these facts, by incorporating metric temporal operators—a metric extension of linear temporal logic (LTL) operators. This results in an expressive language that enhances Datalog's capabilities and opens the door to a range of potential applications.

While the temporal aspect introduces significant computational challenges, several reasoning approaches for DatalogMTL have been proposed, with some already seeing implementation. DatalogMTL has also been further extended with features such as non-monotonic negation, existential rules, and temporal aggregation, introducing even more complex behaviour.

During the talk, I will introduce the line of research on DatalogMTL. I will discuss properties of DatalogMTL, focussing on the reasoning algorithms and analysis of computational complexity.