

- VALENTIN GORANKO, *Interval temporal logics: straddling the decidability border*.  
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Interval temporal logics are modal logics with modal operators that correspond to various relations between intervals in (usually, linearly) ordered relational structures, where truth of formulae is defined relative to time intervals, rather than time instants. Thus, formulae of interval logics are interpreted by sets of intervals, or equivalently, by binary relations, in ordered structures. Consequently, interval logics translate with respect to validity and satisfiability to fragments of dyadic, rather than monadic, second-order logic.

In particular, a very expressive and natural interval logic, introduced by Halpern and Shoham in 1991 (hereafter called HS), involves modal operators that correspond to all binary relations between intervals in a linear ordering (aka Allens interval relations), viz., ‘precedes’, ‘begins’, ‘ends’, ‘overlaps’, ‘contains’, ‘meets on the right’, and their inverses. Not surprisingly, the logic HS was proved by Halpern and Shoham to be undecidable over all natural classes of linear orderings satisfying very weak assumptions. The undecidability remains the case amongst most, but not all, fragments of HS, as well as all other modal logics with essentially interval-based semantics. Thus, one of the central problems in that area is to delineate the border of undecidability and to identify the maximally expressive decidable cases of interval logics.

In this talk I will give a brief introduction to interval logics; then I will survey the most important and interesting decidability and undecidability results, and will discuss and illustrate the main techniques used so far to obtain such results. Finally, I will present some open problems and outline further perspectives in the area.

Most of the talk is based on a joint work with Angelo Montanari, Guido Sciavicco, Davide Bresolin, and several other collaborators on that topic over the past eight years.