

# **Algorithms for first-order model checking**

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Meta-algorithms for deciding properties of combinatorial structures have recently attracted a significant amount of attention. For example, the famous theorem of Courcelle asserts that every property definable in monadic second order logic can be decided in linear time for graphs with bounded tree-width.

We focus on deciding simpler properties, those definable in first order (FO) logic. In the case of graphs, FO properties include the existence of a subgraph or a dominating set of a fixed size. Classical results include the almost linear time algorithm of Frick and Grohe which applies to graphs with locally bounded tree-width. In this talk, we first survey commonly applied techniques to design FPT algorithms for FO properties. We then focus on one class of graphs, intersection graphs of intervals with finitely many lengths, where these techniques do not seem to apply in a straightforward way, and we design an FPT algorithm for deciding FO properties for this class of graphs.

The talk contains results obtained during joint work with Ganian, Hlineny, Obdrzalek, Schwartz and Teska.