

# Successor-invariant FO Model Checking on Graphs of Bounded Expansion

Dr. Roman Rabinovich

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Order-invariant first-order logic extends the usual FO by a binary predicate  $\leq$  that is interpreted as a linear order and restricts it then to formulas whose truth values do not depend on the particular linear ordering chosen. The motivation for this modification lies in the area of data bases where the elements are internally ordered, e.g., by the order in which they are stored. The result of a query should not depend on the order however. Successor-invariant FO ( $\text{FO}[\text{succ}_{\text{inv}}]$ ) is a variant of the order-invariant FO where we use just a successor relation instead of an linear order.

Eickmeyer, Kawarabayashi and Kreutzer (2013) show that the model checking problem for  $\text{FO}[\text{succ}_{\text{inv}}]$  is fixed parameter tractable on structures whose Gaifman graph excludes a fixed graph as a minor. Eickmeyer and Kawarabayashi extend this result (2016) to classes that exclude a graph as a topological minor. We prove the same statement for an even more general class of structures, namely, those of bounded expansion.