

An overview of order-invariant first-order logic and extensions thereof

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Abstract

In this talk I consider first-order formulas (FO, for short) where, apart from the symbols in the given vocabulary, also predicates for linear order and arithmetic may be used. For example, order-invariant formulas are formulas for which the following is true: If a structure satisfies the formula with one particular linear order of the structure's universe, then it satisfies the formula with any linear order of the structure's universe. Arithmetic-invariant formulas are defined analogously, where apart from the linear order other arithmetic predicates may be used in an invariant way. When restricting attention to finite structures, it is known that order-invariant FO is strictly more expressive than plain FO, and arithmetic-invariant FO can express exactly the properties that belong to the circuit complexity class AC0. On the other hand, by Trakthenbrot's theorem we know that order-invariance (on the class of finite structures) is undecidable. In this talk I want to give an overview of the state-of-the-art concerning the expressive power of order-invariant FO and arithmetic-invariant FO.