Abstract: Algebraic semantics for some hybrid logics, and a new Sahlqvist Theorem

Willem Conradie and Claudette Robinson

Hybrid logics extend basic modal logic with special variables, called nominals, which are evaluated to singletons in Kripke models, thus acting as names for states in models. These logics typically also include other operators which utilize the nominals and in so doing take us well beyond the expressive power of modal logic. Although hybrid logics in their current form have been around for twenty years [1], to the best of our knowledge, very little work using algebraic tools has been done on them. A notable exception is Tadeusz Litak's algebraization [2] of a (very expressive) hybrid logic with binders, using algebras closely akin to cylindric algebras. In the current work we consider some less expressive hybrid logics for which the adequate algebraic semantics is radically simpler and much closer to the familiar algebraic semantics of modal logic: indeed, we show that the logics we consider can be algebraized by classes of boolean algebras with operators (BOAs) in which every BAO contains at least one atom. The relational duals of the latter are the two-sorted descriptive frames, introduced by Ten Cate [4]. As an application, we use our algebraic semantics to prove a new Sahlqvist theorem for hybrid logic, which overcomes some of the difficulties one encounters when trying to combine traditional Sahlqvist formulas with ones containing nominals [3].

References

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