Logics for Some Dynamic Spaces

Md. Aquil Khan

Discipline of Mathematics,
Indian Institute of Technology Indore,
Indore 452017, India

Abstract. We study a collection of logics $L(T, I)$ with models based on 'dynamic I spaces', which are finite sequences of Kripke I frames with a common domain, I being any of the normal modal systems K, $K4$, T, B, $S4$, KTB, $KB4$, $S5$. The language of $L(T, I)$ has modal connectives for 'possibility' and 'necessity', as well as temporal connectives. This article presents, in a schematic manner, tableau-based proof procedures for this class of logics. Comparisons with closely related systems are made. The study, in fact, generalizes the work on the logic TRL by Banerjee and Khan for Pawlak's rough set theory, models of which are based on dynamic $S5$ spaces. The motivation behind TRL was to capture reasoning with rough sets in the scenario of a knowledge base evolving with time, when the latter is represented by a partition on the domain of discourse. Rough set theory has been generalized in many ways over the years, in particular to situations when the knowledge base is not necessarily represented by an equivalence relation, but, for instance, by tolerances or pre-orders. The logics presented here enable one to address reasoning with concepts in the context of such generalized knowledge bases evolving with time.