Some Proof Theoretic Considerations in Intuitionistic Propositional Modal Logic

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Formalizations of different logics can serve as foundations for reasoning about various properties of both hardware and software systems. Intuitionistic modal logics, featuring operators encoding possibility and necessity, have recently found applications in hardware verification as well as proposed type systems for staged computation and distributed computing. We propose several novel sequent calculi for intuitionistic propositional modal logic, dealing with the problems of proof enumeration and theorem proving, and consider some of the proof theoretic properties of these formalisms. We also investigate some optimizations based on the inversion properties of these calculi. These considerations suggest a streamlined backwards decision procedure, a prototypical implementation of which has yielded promising results.