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Terminating Calculi for Propositional Dummett Logic with Subformula Property

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Abstract In this paper we present two terminating tableau calculi for propositional Dummett logic obeying the subformula property. The ideas of our calculi rely on the linearly ordered Kripke semantics of Dummett logic. The first calculus works on two semantical levels: the present and the next possible world. The second calculus employs the semantical levels of known or not known at the present state of knowledge, that are usual in tableau systems, and exploits a property of the construction of the completeness theorem to introduce a check which is an alternative to loop check mechanisms.

Keywords Dummett logic · Tableau calculi · Automated theorem proving · Subformula property

1 Introduction

In this paper we present two terminating tableau calculi for propositional Dummett logic obeying the subformula property. The depth of the deductions of the first calculus $\boldsymbol{Q}$ is quadratic and allow to extract a counter model whose depth is $n+1$ at most, with n the number of propositional variables in the formula to be decided. The depth of the deductions of the second calculus $\boldsymbol{L}$ is linear w.r.t the formula to be proved. To avoid the introduction of loop check mechanisms, our calculi exploit the linearly ordered Kripke semantics of Dummett logic. Calculus $\boldsymbol{Q}$ uses the ideas presented in paper [13], and works on two states of knowledge: the present and the next possible world. Calculus $\boldsymbol{L}$ uses the semantical levels known and unknown at

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