

# Two Approaches to Automatic Recognition of Tabular Property in Superintuitionistic Logics

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We present two experimental approaches to automatic recognition of (pre)tabular property of superintuitionistic logics.

**Definition 1** A superintuitionistic logic has *tabular property*, if it can be characterized by a finite set of finite Kripke frames. A logic is said to be *pretabular* if it is maximal among non tabular logics.

A principle opportunity for automatization is based on theoretical results L.L. Maksimova [1] and their recent algorithmic interpretation [2]. The algorithmic interpretation is presented in brief below. The experimental approaches are PROLOG straightforward implementation of the algorithmic interpretation and a polynomial reduction to Boolean satisfiability. Our experiments have demonstrated efficiency and flexibility of the second approach.

For every  $k \geq 1$  let  $lin_k$  be linear order with  $k$  elements, let  $fan_k$  be a partial order that consists of  $k$  incompatible elements and the least element,  $top_k$  – be a partial order that consists of  $k$  incompatible elements, the least element, and the greatest one.

**Statement 1** Let  $A$  be a propositional formula and let  $L = Int + A$  the extension of intuitionistic logic  $Int$  by an extra axiom scheme  $A$ . Let  $N$  be the number of variables in  $A$ ,  $r$  – be the number of instances of ‘ $\rightarrow$ ’ and ‘ $\neg$ ’ in  $A$ , and let  $m = \min(2^N, r)$ . Logic  $L = Int + A$  has a pretabular iff one of the following three conditions holds:

1.  $A$  is valid in  $lin_{(N+1)}$ , but  $fan_2$  and  $top_2$  both refute  $A$ .
2.  $A$  is valid in  $fan_m$ , but  $lin_3$  refutes  $A$ .
3.  $A$  is valid in  $top_m$ , but  $fan_2$  and  $lin_4$  both refute  $A$ .

This statement implies that logic  $L = Int + A$  has tabular property iff three frames  $lin_{(N+1)}$ ,  $fan_m$ , and  $top_m$  altogether refute  $A$ .

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## References

- [1] Maksimova L.L. Pretabular superintuitionistic logics, *Algebra and Logic* 11, pp. 558–570, 1972.
- [2] Maksimova L.L., Schreiner P.A. The algorithms of the recognition of the tabularity and pretabularity in the extensions of the intuitionistic calculus, *Vestnik of Novosibirsk State University*, to appear.