

MULTI-AGENT AND TEMPORAL LOGICS, PROJECTIVE SUBSTITUTIONS

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Usage of non-classical multi-agent and temporal logics is a popular area in mathematical logic and computer science and artificial intelligence. First of all such logic provides with mathematical tools for description models expressing events connected with discussion of problems by distinct agents, resolving various confidence in correction or truth provided information, influence running time on truth value of events.

Besides this tools also allows to evolve pure mathematical models for calculation of truth and value of confidence. Such tools are often used in automated deduction, optimization programs and pure mathematical logic (cf. e.g. Robinson, Knuth et al, Baader and Snyder, Baader and Ghilardi) Now it is very popular as elements of mathematics in artificial intelligence Time as environment of events or measure information transmission, may be seen as linear or branching. For example, linear modal logic may be seen as linear temporal logic (logic with linear time). Studying it Dzik and Wojtylak proved that any formula unifiable in the linear modal logic S4:3 is projective, which gives direct solution of admissibility problem for S4:3. (Ideas similar to projectivity for linear modal and intuitionistic logics were suggested already in A. Wronski.

In this our work we consider multi-agent non-classical logics which may be seen as multi-modal as well as temporal logics with various time running. Basic mathematical questions in our research, as very often, are questions of decidability satisfiability problems, and problems of admissibility problem for inference rules. Using an unusual interpretation of notion of projectivity for substitutions, we solve admissibility problem for inference rules in all temporal bounded logics. We consider as well the mentioned approach for multi-agent temporal logic represented by sequences of running time clusters. Here, using a trick with hidden states, we may modify projective formulas technique and as well solve these decidability problems in such logics. This allows very shorten proofs and also helps to solve the problem.

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