

Mathematical Model Checking for Computer Science Education

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Abstract

We report on the design and use of RISCAL, a formal language and associated software rooted in first-order logic for modeling mathematical theories and algorithms over finite domains; the RISCAL model checker can automatically decide theorems, check the correctness of algorithms, and verify the validity of verification conditions as the basis of later proof-based verifications. In particular, we discuss the application of RISCAL in university courses on logic, formal methods, and formal modeling for students of computer science and mathematics. The goal is that course participants actively engage with the presented material by solving concrete problems where the correctness of a solution is automatically checked; furthermore, if a solution is not correct or the student gets stuck, the software shall provide additional insight and hints that aid the student towards the desired result.