

A fundamental element of Automated Theorem Proving: The Science of Brute Force

Oliver Kullmann¹,

¹ Swansea University

Interactive and Automated Theorem Proving have made strong progress, and are expected to transform mathematics and the mathematical sciences in the coming decades. In my talk I will concentrate on a driving force behind this, a fundamental underlying engine, namely I want to tell about the great advances which took place in the realm of algorithms for propositional logic, which some call the "SAT Revolution" (and which actually is not widely known). Here "SAT" stands for the Satisfiability Problem, the core NP-complete problem. A feature of SAT is its very elementary technical level (for the basic aspects), since SAT is just about propositional (boolean) variables and the logical connectives and, or, not. With some basic programming experience (say in a computer algebra system) and some elementary mathematical education, one can easily transform appropriate problems into SAT problems, and feed them into a SAT solver. SAT solvers indeed apply powerful algorithms, which are very far from being understood – a great challenge for mathematics itself.