Towards Conflict-Driven Learning for Virtual Substitution

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Abstract

We consider SMT-solving for linear real arithmetic. Inspired by related work for the Fourier–Motzkin method, we combine virtual substitution with learning strategies. For the first time, we present virtual substitution—including our learning strategies—as a formal calculus. We prove soundness and completeness for that calculus. Some standard linear programming benchmarks computed with an experimental implementation of our calculus show that the integration of learning techniques into virtual substitution gives rise to considerable speedups. Our implementation is open-source and freely available.