Automated Reasoning in Generating Exam Sheets for Automated Deduction

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Abstract. Amid the COVID-19 pandemic, distance teaching became default in world-wide higher education, urging teachers and researchers to revise course materials into a more accessible online content to a diverse audience. Probably one of the hardest challenge in this new form of education came with online assessments of course performance, especially organizing and grading online written exams. In this short paper we focus on our teaching experience during our "Automated Deduction" master course at the TU Wien, and report on the automated reasoning we developed for generating individual online exam sheets for students enrolled in the course. The algorithmic and rigorous logical reasoning developed within our course calls for exam sheets focused on problem solving and deductive proofs; as such exam sheees using tests grids are not a viable solution for written exams withing our course. We believe that the toolchain of automated reasoning tools we have developed for holding online written exams could be beneficial not only other distance learning platforms, but also to researchers in automated reasoning by providing our community with a large set of randomly generated benchmakrs in SAT/SMT solving and first-order theorem proving.

1 Motivation

online exams due to pandemic. we want to avoid collaboration between students during exam (or make it at least a bit harder), so each student gets their own exam sheet. etc...

2 todo

Challenge: problem instances should be different but of similar difficulty to make sure the exam is fair to students.

easiest method: provide templates, do small random perturbations that don't change the solution

more sophisticated: full random generation, filter out "too hard"/"too easy" instances. Note that we don't need very efficient implementation of filters since the instances are very small. so we can use naive satisfiability tests or model counting.