FAKULTÄT FÜR !NFORMATIK
Faculty of Informatics

Diplomarbeitspräsentation

Space & Congruence Compression of Proofs

Andreas Fellner

Technische Universität Wien
Institut für Computersprachen
Arbeitsbereich: Programmiersprachen und Übersetzer
BetreuerIn: Univ. Prof. Dr.phil. Alexander Leitsch
Mitwirking: Bruno Woltzenlogel Paleo, Dr.

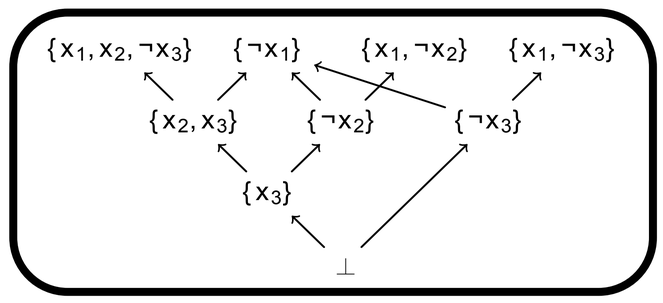
Master- /Diplomstudium:
European Master in Computational Logic

Proof Compression

We present two methods for compression of formal proofs. Formal proofs are of great importance to modern computer scienece. They can be used to combine deductive systems, e.g. via the use of SAT Solvers.
Problems tackled by automated systems are huge and so are the produced proofs. Proof files easily reach many gigabytes in size. Processing such proofs even takes algorithms with low complexity in time and space to their limits. Usually there are many different proofs of one problem and the goal of proof compression is to construct proofs from existing ones that are better w.r.t. measures like length or space.
The Resolution Calclulus is a simple calculus with a single inference rule that is very popular in automated deduction. Its simplicity comes at the price that proofs tend to become large. These two properties make it a good target for proof compression.

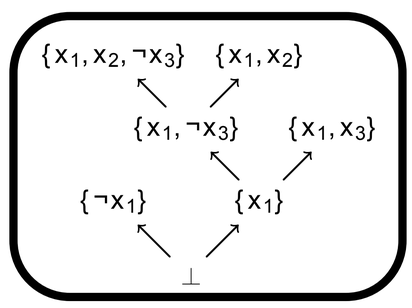
Resolution Rule

$$\frac{C \vee x \quad D \vee \neg x}{C \vee D}$$

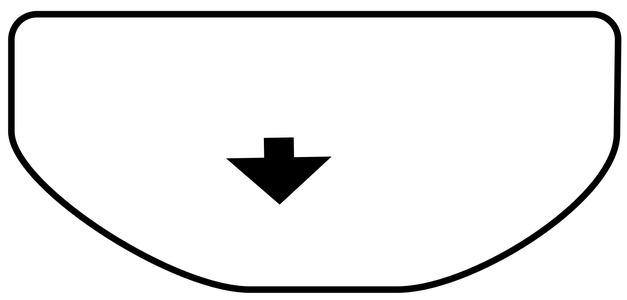


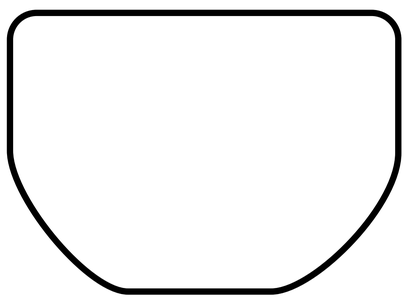
Two proofs of unsatisfiability of

$$(x_1 \vee x_2 \vee \neg x_3) \wedge (x_1 \vee x_2) \wedge (x_1 \vee x_3) \wedge (\neg x_1)$$



Congruence





Space

Main References

Kontakt: viktor.vorzeigestudent@schreibmir.at