

Topics in Automated Theorem Proving

Course (236714, Spring 2015)

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Course homepage

<http://www.cs.technion.ac.il/~janos/COURSES/THPR-2015>

Lecture 1 (March 18, 2015)

Outline of the course

- Mathematical theorem proving
- Theorem proving vs automated reasoning
- Interactive theorem provers
- Certifying mathematical theorems
- Geometric theorem proving

Course requirements

- **Attend all**(or most) the lectures and tutorials.
- **Do the homework** indicated at the end of each set of slides.
- Do a final **project**.

A **project** can be:

- **Take notes** of a lecture and **turn them into slides** (or revise and expand the existing slides).
- **Read** a research paper and **turn it into slides**.

Automated Theorem Proving on the WEB

- Wikipedia: Automated theorem proving
- Wikipedia: Automated reasoning
- Tel Aviv University: Automated Theorem proving from 2006 given by [A. Avron and M. Sagiv](#).
- UCSD Course 291: Applied Automated Theorem Proving from 2006, 2008 version, 2010 version, given by [S. Lerner](#).

My favorite references

- [J. Harrison](#),
[Handbook of Practical Logic and Automated Reasoning](#), Cambridge University Press, 2009
- [A. Robinson and A. Voronkov](#), eds
[Handbook of Automated Reasoning](#), vol. 1 and 2, The MIT Press and North Holland, 2001
- [Shang-Ching Chou](#),
Mechanical Geometry Theorem Proving, Reidel, 1988
- [Wen-Tsuen Wu](#),
Mechanical Theorem proving in Geometries, Springer 1994
- [B.F. Caviness and J.R. Johnson](#) (eds),
Quantifier Elimination and Cylindrical Algebraic Decomposition, Springer 1998

Formalizing Mathematics

John Harrison's Lecture

On the Cruelty of Really Doing Formal Proofs.

Principia Mathematica anniversary symposium,

Cambridge, 27 November 2010.

J. Harrison's Lectures

- J. Harrison's Marktoberdorf Lectures, 2007
Logical Decision Procedures in Practice (5 lectures).
Marktoberdorf Summer School, 10th August 2005.
- J. Harrison's Marktoberdorf Lectures, 2007
Automated and Interactive Theorem Proving (5 lectures).
Marktoberdorf Summer School, 2nd-7th August 2007.
- J. Harrison's Marktoberdorf Lectures, 2010
Theorem Proving for Verification.
4-lecture course at the Summer School in Marktoberdorf, Germany, 11-14 August 2010.
- J. Harrison's St. Petersburg Lecture, 2013
A Survey of Automated Theorem Proving 216 slides,
28-29 September 2013

Tutorial 1 (March 18, 2015)

Propositional logic

- Well formed formulas
- Validity, satisfiability and the consequence relation
- Conjunctive and disjunctive normal forms