UNIVERSITY OF SOUTH FLORIDA

Defense of a Master's Thesis

A Flexible, Natural Deduction, Automated Reasoner for Quick Deployment of Non-Classical Logic
by
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For the MSCP degree in Computer Science & Engineering

Automated Theorem Provers (ATP) are software programs which carry out inferences over logico-mathematical systems, often with the goal of finding proofs to some given theorem. ATP systems are enormously powerful computer programs, capable of solving immensely difficult problems. Currently, many automated theorem provers exist like E, vampire, SPASS, ACL2, Coq etc. However, all the available theorem provers have some common problems: (1) Current ATP systems tend not to try to find proofs entirely on their own. They need help from human experts to supply lemmas, guide the proof, etc. (2) There is not a single proof system available which provides fully automated platforms for both First Order Logic (FOL) and other Higher Order Logic (HOL). (3) Finally, current proof systems do not have an easy way to quickly deploy and reason over new logical systems which a logic researcher may want to test. In response to these problems, I introduce the MATR framework. MATR is a platform-independent, codelet-based (independently operating processes) proof system with an easy-to-use Graphical User Interface (GUI), where multiple codelets can be selected based on the formal system desired. MATR provides a platform for different proof strategies like deduction and backward reasoning, along with different formal systems such as nonclassical logics. It enables users to design their own proof system by selecting from the list of codelets without needing to write an ATP from scratch.

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