Translating Libraries of Definitions and Theorems Between Proof Systems

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──── **Abstract** ────

There exist many proof systems, interactive or automated. However, most of them are not interoperable, which leads to an important work duplication. This is unfortunate as it slows down the formalization of more advanced mathematical results, and the democratization of proof systems in education, industry and research. This state of affairs is not just a matter of file formats. Each proof system has its own axioms and deduction rules, and those axioms and deduction rules can sometimes be incompatible. To translate a proof from one system to the other, and be able to handle so many different systems, it is important to find out a logical framework in which a logical feature used in two different systems is represented by the same construction.

Research on proof system interoperability started about 30 years ago, and received some increased attention with the formalization of Hales proof of Kepler conjecture in the years 2000, because parts of this proof were initially formalized in different systems. Then, it received some new interest in the years 2010 with the increasing use of automated theorem provers in proof assistants. At about the same time appeared a new logical framework, Dedukti, which extends Edinburgh's logical framework LF by allowing the identification of types modulo some equational theory. It has been shown that various proof systems can be nicely encoded in Dedukti, and various tools have been developed to actually represent the proofs of those systems and translate them to other systems.

In this talk, I will review some of these works and tools, and present recent efforts to translate entire libraries of definitions and theorems.