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The Coq library as a theory graph. (English) Zbl 1428.68344


Summary: Representing proof assistant libraries in a way that allows further processing in other systems is becoming increasingly important. It is a critical missing link for integrating proof assistants both with each other or with peripheral tools such as IDEs or proof checkers. Such representations cannot be generated from library source files because they lack semantic enrichment (inferred types, etc.) and only the original proof assistant is able to process them. But even when using the proof assistant’s internal data structures, the complexities of logic, implementation, and library still make this very difficult.

We describe one such representation, namely for the library of Coq, using OMDoc theory graphs as the target format. Coq is arguably the most formidable of all proof assistant libraries to tackle, and our work makes a significant step forward.

On the theoretical side, our main contribution is a translation of the Coq module system into theory graphs. This greatly reduces the complexity of the library as the more arcane module system features are eliminated while preserving most of the structure. On the practical side, our main contribution is an implementation of this translation. It takes the entire Coq library, which is split over hundreds of decentralized repositories, and produces easily-reusable OMDoc files as output.

For the entire collection see [Zbl 1428.68028].

MSC:

68V15 Theorem proving (automated and interactive theorem provers, deduction, resolution, etc.)
68V30 Mathematical knowledge management

Software:
PVS; HOL Light; Matita; CoqHammer; Isabelle/HOL; CoqInE; Coq; Mizar

Full Text: DOI