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Advancing Mathematical Formalization: Tools and Techniques for Lean

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This talk explores cutting-edge tools and techniques for mathematical formalization in Lean, beginning with optlib, a Lean library for mathematical optimization (github.com/optsuite/optlib), and ReasLab, an online collaborative IDE for Lean (alpha.reaslab.io). We then present two methodological advances: (1) tree-based premise selection, which uses the core representation of Lean for automate proof premise discovery, and (2) a framework for translating informal proofs into formal proofs via a chain of states, systematically transforming human-written arguments into machine-verifiable proofs. Together, we aim to accelerate formalization workflows and broaden the accessibility of mathematical proof.