# AI for Math
# Autoformalization and Theorem Proving

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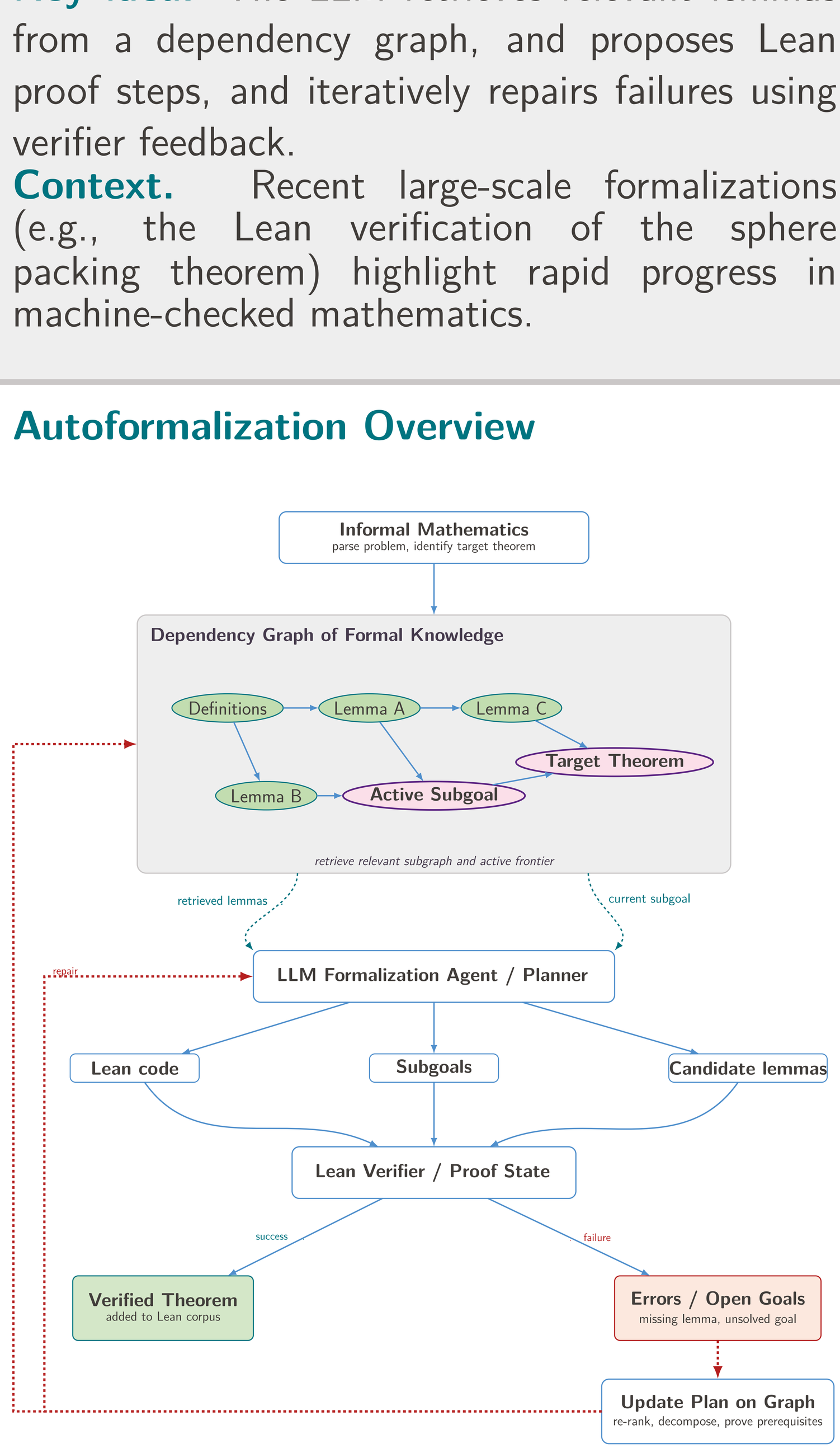
**Autoformalization:** from informal mathematics to verified Lean proofs through graph-guided generation and verifier feedback.

**Key idea.** The LLM retrieves relevant lemmas from a dependency graph, and proposes Lean proof steps, and iteratively repairs failures using verifier feedback.

**Context.** Recent large-scale formalizations (e.g., the Lean verification of the sphere packing theorem) highlight rapid progress in machine-checked mathematics.

## Autoformalization Overview




## Theorem Proving

### System overview

- A large LLM acts as a **global reasoning orchestrator**.
- The main theorem is **decomposed into intermediate lemmas**.
- A **dependency graph** tracks proof structure and prerequisites.
- Each lemma becomes an independent **formal proof task**.
- Tasks are delegated to a smaller, in-house-trained Lean-prover (**Apertus**).

### Iterative proof construction

- Successful lemmas are added to the dependency graph.
- Failed goals trigger **re-planning and lemma discovery**.
- The system progressively builds a verified proof of the theorem.

## Going Further

Scan for the project page: aiformath.epfl.ch