



THE HONG KONG UNIVERSITY OF SCIENCE & TECHNOLOGY

Department of Mathematics

**SEMINAR ON DATA SCIENCE
AND APPLIED MATHEMATICS**

**Introducing Goedel-Prover: A Frontier Model for
Open-Source Automated Theorem Proving**

By

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Abstract

In this talk, I will introduce Goedel-Prover (<https://goedel-lm.github.io/>), an open-source large language model (LLM) that achieves the state-of-the-art (SOTA) performance in automated formal proof generation for mathematical problems. The key challenge in this field is the scarcity of formalized math statements and proofs, which we tackle in the following ways. We train statement formalizers to translate the natural language math problems from Numina into formal language (Lean 4). We then iteratively build a large dataset of formal proofs by training a series of provers. Each prover succeeds in proving many statements that the previous ones could not, and these new proofs are added to the training set for the next prover. The final prover outperforms all existing open-source models in whole-proof generation. On the miniF2F benchmark, it achieves a 57.6% success rate (Pass@32), exceeding the previous best open-source model by 7.6%. On PutnamBench, Goedel-Prover successfully solves 7 problems (Pass@512), ranking first on the leaderboard. Furthermore, it generates 29.7K formal proofs for Lean Workbook problems, nearly doubling the 15.7K produced by earlier works.

Short Bio: *Yong is a postdoctoral fellow at Princeton Language and Intelligence (PLI), collaborating with Chi Jin, Sanjeev Arora, and Danqi Chen. He completed his PhD in Tong Zhang's group at the Hong Kong University of Science and Technology (HKUST). His research focuses on the trustworthiness and applications of machine learning, with particular emphasis on verifiable generation, LLM alignment, and out-of-distribution generalization. Currently, he leads the Goedel-Prover project at Princeton, where he trains LLMs for automated theorem proving in LEAN. Prior to his PhD, Yong worked as a Senior Machine Learning Engineer at Alibaba for 4 years, a leading tech company in China. He has published over 30 papers in top-tier ML, CV, and NLP conferences and received the Outstanding Paper Award at NAACL 2024. Additionally, he was awarded the Apple AI/ML PhD Fellowship in 2023 and the Hong Kong PhD Fellowship in 2020.*

Date : 14 April 2025 (Monday)

Time : 8:00p.m. (HKTime)

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