HUAJIAN XIN

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EDUCATION

Ph. D. Student | ***Artificial Intelligence*** — Sep. 2024 – Apr. 2027 (expected)
School of Informatics, the University of Edinburgh — Edinburgh, United Kingdom
- Supervisor: Wenda Li

Bachelor of Philosophy | ***Logic*** — Sep. 2019 – Jun. 2023
Department of Philosophy, Sun Yat-sen University — Guangzhou, China
- GPA: 91% (ranking 2/32)
- Selected Coursework:
  Logic: Mathematical Logic, Naive Set Theory, Proof Theory, Model Theory, Computation Theory, Modal Logic, Non-classical Logic, Formal Semantics, Informal Logic
  Mathematics: Mathematical Analysis, Linear Algebra, Abstract Algebra (Lattice Theory and Universal Algebra), Probability theory
  Computer Science: Data Structure and Algorithm, Artificial Intelligence (Logic Programming and Machine Learning)
  Philosophy: Metaphysics, Epistemology, Philosophy of Language, Philosophy of Mind
- Honor:
  National Scholarship (2021, top prize for university students in mainland China, funded by the central government)
  Honors Graduate of Sun Yat-sen University (2023)

Undergraduate (Minor) | ***Mathematics and Applied Mathematics*** — Feb. 2021 – Jun. 2021
School of Mathematics, Sun Yat-sen University — Guangzhou, China
- Selected Coursework:
  Real Variable Function, Complex Variable Function, Mathematical Statistics

RESEARCH AND WORKING EXPERIENCES

Intern | **DeepSeek AI** — Jan. 2024 – present
Supervisor: Chong Ruan and Daya Guo — Beijing, China

Research Assistant | **Sun Yat-sen University** — Sept. 2022 – Jan. 2024
Supervisor: Xiaodan Liang and Zhengying Liu — Shenzhen, China

SELECTED PUBLICATIONS AND PREPRINTS

DeepSeek-Prover-V1.5: Harnessing Proof Assistant Feedback for Reinforcement Learning and Monte-Carlo Tree Search — arXiv & GitHub & Huggingface & X.com
- Introduced informal chain-of-thought augmented whole-proof generation, reinforcement learning from proof assistant feedback (RLPAF), and the intrinsic-reward-driven Monte Carlo tree search algorithm (RMaxTS).
- Set a new state-of-the-art in theorem proving for Lean 4, achieving a 63.5% pass rate on the high school-level miniF2F benchmark and a 25.3% pass rate on the undergraduate-level ProofNet benchmark.

DeepSeek-Prover-V1: Advancing Theorem Proving in LLMs through Large-Scale Synthetic Data — arXiv
- Developed a data synthesis pipeline that automatically formalizes natural language math problems into 8 million formal statements with proofs in Lean 4.
- Set a new state-of-the-art in theorem proving for Lean 4, achieving a 50.0% pass rate on the miniF2F benchmark.

Proving Theorems Recursively — arXiv
- Introduced a recursive, level-by-level theorem proving method, improving on traditional step-by-step approaches by focusing on high-level proof sketches and deferring intermediate conjectures to later stages.

LEGO-Prover: Neural Theorem Proving with Growing Libraries — ICLR 2024 Oral
- Developed a modular theorem-proving approach with an integrated skill library, enabling large language models to propose, prove, and store lemmas for reuse in proving target theorems.
- Set a new state-of-the-art in theorem proving for Isabelle, achieving a 47.1% pass rate on the miniF2F benchmark.

MUSTARD: Mastering Uniform Synthesis of Theorem and Proof Data — ICLR 2024 Spotlight
- Developed a data synthesis framework that prompts the language model with specific keywords to generate and solve mathematical problems in natural language, followed by translating the problems and solutions into Lean 3 to verify their correctness.