Hans Farrell Soegeng

Mathematics PhD Student at Nanyang Technological University, Singapore

hans0048@e.ntu.edu.sg | hansfarrell | hansfarrell | hansfarrell

INTERESTS

- Designing learnable truth table-based neural networks that compile to lookup tables for FPGA/low-resource deployment and minimize to Boolean logic for exact interpretability and formal verification.
- Quantitative finance: market microstructure for systematic trading, alternative data for alpha generation, prediction markets.
- Efficient local inference and serving of large language models for agentic coding and personal assistant applications.

EDUCATION

Nanyang Technological University (NTU) — Singapore

- ***PhD in Mathematics*** — Aug 2024 – Present
  Funding: **Provost Graduate Award** | Advisor: Prof Thomas Peyrin | GPA: 4.74 / 5.00
  Teaching: PS0001 Intro to Computational Thinking (2025), MH3400 Algorithms for the Real World (2026)
- ***BSc in Mathematical Sciences - Statistics Track*** — Aug 2020 – Jun 2024
  First Class Honours (Highest Distinction) | Funding: MoE Tuition Grant | GPA: 4.64 / 5.00
  Teaching: PS0001 Intro to Computational Thinking (2023), PS0002 Intro to Data Science & AI (2024)

WORK EXPERIENCE

- **Optiver** — Singapore
  Quantitative Researcher Intern — Summer 2026
  Incoming QR intern in Optiver commodity semi-systematic trading desk.
- **TT-logic.ai** — Singapore
  Machine Learning Engineer (Part-time) — Nov 2024 – Present
  Commercially deploy interpretable ML models (TT-Sparse) into production via MLflow for enterprise clients.
- **Micron** — Singapore
  Capital Planning Intern — Jan 2023 – Jun 2023

RESEARCH

- **TT-Sparse: Learning Sparse Rule Models with Differentiable Truth Tables.**
  H. F. Soegeng, S. K. Modi, T. Peyrin. *ICML 2026* [arXiv]
  Sparse truth table-based ML architecture with discrete TopK differentiable relaxation convertible to low complexity Boolean rules
- **Towards Global and Exact Interpretability for Few-Shot Tabular Learning via Generative Data Distillation from Foundation Models.**
  H. F. Soegeng, T. Guérand, T. Peyrin. *Under Review.*
  Statistical analysis of performance and exact complexity of foundation model distillation through synthetic generative networks
- **Beyond Filter Pruning: Top-K Spatial Selection for Efficient Neural Networks.**
  S. K. Modi, H. F. Soegeng, T. Peyrin. *Under Review.*
  Intra kernel structural pruning with TopK selection for low-resource vision inference
- **Leveraging Foundation Models in Healthcare: A Distillation Approach to Interpretable Clinical Prediction.**
  H. F. Soegeng, T. Guérand, T. Peyrin. *XAI4Science Workshop at AAAI 2026.* [Paper]
  Interpretable classification through distillation of foundation models in data-scarce clinical setting
- **Neural Network-Based Rule Models with Truth Tables.**
  A. Benamira, T. Guérand, T. Peyrin, H. F. Soegeng. *ECAI 2023.* [Paper]
  A CNN-based ML architecture convertible to Boolean logic for interpretability and formal SAT verification
- **Probabilistic Methods of Deterministic Theorems in Mathematics.**
  H. F. Soegeng, G. Wu. *URECA, NTU. 2022.* [Paper]
  Ramsey's and van der Waerden's Theory on orderly mathematical structures in graph and arithmetic colorings

SKILLS

Programming	Python (PyTorch, TensorFlow, Scikit-Learn, Transformers, HuggingFace, SQLAlchemy), TypeScript, R, SQL
Tools	Git, Linux, Docker, CUDA, MLflow, llama.cpp, Next.js, LaTeX
Languages	English, Bahasa Indonesia, Chinese (Beginner)