Jianlin Li

 BBoZG7gAAAAJ   @jianlin-herman-li   @ljlin

 jianlin-herman-li.github.io   jianlin.li@uwaterloo.ca

EDUCATION

UNIVERSITY OF WATERLOO
PH.D. IN COMPUTER SCIENCE
Supervisor: Yizhou Zhang and Ondřej Lhoták
Cumulative GPA:98.33
Sep. 2021 - Expected Sep. 2025 Waterloo, Canada

SAARLAND UNIVERSITY (EXCHANGE)
MASTER IN COMPUTER SCIENCE
Supervisor: Holger Hermanns
Grade: 1.3 (germany grading system)
Sep. 2019 - Aug. 2020
Saarbruecken, Germany

INSTITUTE OF SOFTWARE, CHINESE ACADEMY OF SCIENCES
MASTER IN COMPUTER SCIENCE
Supervisor: Lijun Zhang | GPA: 3.88/4.0
Sep. 2018 - Aug. 2021 | Beijing

NANJING UNIVERSITY OF AERONAUTICS AND ASTRONAUTICS
BACHELOR OF COMPUTER SCIENCE
Supervisor: Zhe Chen
GPA: 4.3/5.0 | Ranking: No.1 / 102
Jun. 2018 | Nanjing, China

COURSEWORK

COURSE PROJECTS
• Variational inference reinforcement learning implemented in Pyro
• Generalized Minsky machine halting $\preccurlyeq_m$ 2 counter machine halting in Coq.
• C(resp. Java)interprocedural points-to analysis in LLVM(resp. Soot).
• xv6 programming projects for OS.
• 5 stage pipelined MIPS-32 processor.

SKILLS

PROGRAMMING SKILLS
Coq, Agda, Model Checkers, OCaml, Rust, Haskell, LLVM, Soot, Verilog, MIPS Assembly, Tensorflow, C++, Java, LaTeX, Shell, Python, Objective-C, Swift
LANGUAGES
Chinese native speaker
English TOEFL: Listening 27 • Speaking 27

HIGHLIGHTS

- Self-motivated Phd student in computer science with strong research experience in probabilistic programming [1, 2], abstract interpretation [3–5], probabilistic model checking [6], linear temporal logic, ω-regular languages, and software verification [7].

- Good academic writing and presentation skills. Served as a student volunteer at CONCUR'18, SSFM'18, SSFM'19, and LICS'20, as a subviewer at LICS'18, TASE'19, FM'19, FMAC'19, and TACAS'21.

PUBLICATIONS

[1] **Jianlin Li**, Eric Wang, and Yizhou Zhang.
Compiling Probabilistic Programs for Variable Elimination with Information Flow.
Proc. ACM Program. Lang., 8(**PLDI 2024**):1755–1780, 2024.

[2] **Jianlin Li**, Leni Ven, Pengyuan Shi, and Yizhou Zhang.
Type-Preserving, Dependence-Aware Guide Generation for Sound, Effective Amortized Probabilistic Inference.
Proc. ACM Program. Lang., 7(**POPL 2023**):1454–1482, 2023.

[3] **Jianlin Li**, Jiangchao Liu, Pengfei Yang, Liqian Chen, Xiaowei Huang, and Lijun Zhang.
Analyzing Deep Neural Networks with Symbolic Propagation: Towards Higher Precision and Faster Verification. In *26th Static Analysis Symposium,*
SAS 2019, *Porto, Portugal, October 8-11, 2019.*

[4] Renjue Li, **Jianlin Li**, Cheng-Chao Huang, Pengfei Yang, Xiaowei Huang, Lijun Zhang, Bai Xue, and Holger Hermanns.
PRODeep: A Platform for Robustness Verification of Deep Neural Networks. In **ESEC/FSE 2020** : *28th ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, USA, November 8-13, 2020.*

[5] Pengfei Yang, Renjue Li, **Jianlin Li**, Cheng-Chao Huang, Jingyi Wang, Jun Sun, Bai Xue, and Lijun Zhang.
Improving neural network verification through spurious region guided refinement. In *Tools and Algorithms for the Construction and Analysis of Systems - 27th International Conference,* **TACAS 2021**, *as Part of* **ETAPS 2021**, *Luxembourg City, Luxembourg, March 27 - April 1, 2021.*

[6] Hongfei Fu, Yi Li, and **Jianlin Li**.
Verifying Probabilistic Timed Automata Against Omega-Regular Dense-Time Properties. In *15th International Conference on Quantitative Evaluation of SysTems* **QEST 2018**, *Beijing, China, September 4-7, 2018.*

[7] Maria Christakis, Hasan Ferit Eniser, Holger Hermanns, Jörg Hoffmann, Yugesh Kothari, **Jianlin Li**, Jorge A. Navas, and Valentin Wüstholz.
Automated safety verification of programs invoking neural networks. In *Computer Aided Verification - 33rd International Conference,* **CAV 2021**, *July 20-23, 2021.*

Jianlin Li

BBoZG7gAAAAJ · @jianlin-herman-li · @ljlin
jianlin-herman-li.github.io · jianlin.li@uwaterloo.ca

SELECTED RESEARCH PROJECTS

COMPILING PROBABILISTIC PROGRAMS FOR VARIABLE ELIMINATION WITH INFORMATION FLOW PLDI 2024

- We present an approach to variable elimination and marginal inference for probabilistic programs featuring bounded recursion, discrete distributions, and sometimes even continuous ones. A compiler eliminates probabilistic side effects, using a novel information-flow type system to factorize probabilistic computations and hoist independent subcomputations out of sums or integrals.
- Experiments show that the compiled programs subsume widely used PTIME algorithms for recursive models and that the compilation time scales with the size of the inference problems.
- As a separate contribution, we develop a denotational, logical-relations model of information-flow types in the novel measure-theoretic setting of probabilistic programming; we use it to prove noninterference and consequently the correctness of variable elimination.

TYPE-PRESERVING, DEPENDENCE-AWARE GUIDE GENERATION FOR SOUND, EFFECTIVE AMORTIZED PROBABILISTIC INFERENCE POPL 2023

- Automatically generating *guide programs* for deep amortized inference in a universal PPL.
- *Guide programs* are generated using a type-directed translation while extracting and exploiting independence structures
- Introduce a novel behavioral type system, that supports out-of-order sampling, as a static guarantee of absolute continuity for automatically generated *guides*.
- Consistently improves training and inference over state-of-the-art baselines for a suite of benchmarks.

ANALYZING DEEP NEURAL NETWORKS WITH SYMBOLIC PROPAGATION:
TOWARDS HIGHER PRECISION AND FASTER VERIFICATION SAS 2019

- Improve on a recent proposal of analyzing DNNs through the abstract interpretation technique, by a novel symbolic propagation technique.
- Achieve significantly higher precision and thus can prove more properties than using only abstract domains.
- The bounds derived from our approach on the hidden neurons bring significant benefits to a state-of-the-art SMT based verification tool with an overall **549.43%** speedup (9.16 hours compared to 1.41 hours).

INDUSTRY EXPERIENCE

NUAAX.COM | Co-Founder + iOS Developer
Apr. 2015 – Sep. 2017 | Nanjing, China
Apps avaliable on Apple App Store (served 55,000+ users in the first three years):

- YanHuPan: The Missing NUAA Lecture Timetable Utility for iOS.
- NUAA portal in Hand: One App for All Information You Need in NUAA.

I co-founded this non-official student team and developed Apps to help students register for courses, get information (timetables, grades, etc.) and socialize online.

AWARDS

Year	Award	Description
2020	National	China National Scholarship (Top 0.2%)
2020	First-Class	Academic Scholarships of Institute of Software Chinese Academy of Sciences (Top 10%)
2019	First-Class	Academic Scholarships of Institute of Software Chinese Academy of Sciences (Top 10%)
2015	**Silver Medal**	ACM-ICPC Shanghai Metropolitan Programming Contest
2014	**Silver Medal**	ACM-ICPC Asia Regional Contest AnShan Site
2014	National	China National Scholarship (Top 0.2%)
2014	Winning Prize	RoboCup China Open Soccer Simulation 2D