Jianlin Li

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EDUCATION

UNIVERSITY OF WATERLOO
PH.D. IN COMPUTER SCIENCE
Supervisor: Yizhou Zhang and Ondřej Lhoták | Cumulative GPA:98.33
Sep. 2021 - present | Waterloo

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

UNIVERSITY OF 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

C++ • Java • LaTeX • Shell • Python
For Developing Mobile Apps:
iOS • Objective-C • Swift
For Course Projects:
Coq • OCaml • Haskell • LLVM • Soot • Verilog • MIPS Assembly • Tensorflow

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.
*45th ACM SIGPLAN Conference on Programming Language Design and Implementation (**PLDI 2024**), to appear.*

[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**):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.*

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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

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