Kuang-Chen Lu

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Education

PhD, *Computer Science* Sept. 2020 – May 2025
Brown University, Providence, RI
Advisor: Shriram Krishnamurthi
Research Area(s): Computing Education × Programming Languages, Formal Methods

MS, *Computer Science* Sept. 2018 – May 2020
Indiana University, Bloomington, IN
Advisor: Jeremy Siek
Research Area(s): Programming Languages (Gradual Typing, Relational Programming)

BS, *Bioinformatics* Sept. 2014 – May 2018
Shanghai Jiao Tong University, Shanghai, China
Advisor: Chaochun Wei
Research Area(s): Bioinformatics (Sequence analysis)

Software and Systems

SMoL Tutor: https://smol-tutor.xyz (*Source code private to prevent cheating; available on request*)
A tutoring system built for teaching misconceptions about the behavior of conventional programming languages. It has been used at 8 institutions (4 domestic and 4 abroad).
Stacker: https://smol-tutor.xyz/stacker/ (*GitHub: https://github.com/LuKuangChen/stacker-2023*)
A visualization tool built for explaining how conventional programming languages behave.
Brown Benchmark for Table Types (B2T2): https://github.com/brownplt/B2T2
A benchmark for programming languages/systems that process tabular data. It assembles table operators that are common in major tabular programming frameworks: R Tidyverse, Python pandas, Julia, LINQ, and SQL.
SMoL Misinterpreters: https://github.com/LuKuangChen/smol-misinterpreters
A collection of interpreters, each of which represent a misconception about programming language behavior.
RPAN: Rice Pan-genome Browser: https://cgm.sjtu.edu.cn/3kricedb/visualization
Visualize the pan-genome of ~3000 rice species. My major contribution is the phylogenetic tree visualizer on the left and its connection with the gene browser on the right.
InstaModel: https://github.com/brownplt/insta-model
A model of the semantics of Static Python, a gradually typed Python supported by Meta's variant of CPython (cinder). The model is shown to match cinder by producing the same results on cinder's test suite.
BUGS VSCode Support: https://github.com/LuKuangChen/vscode-language-bugs
A VSCode extension for the language BUGS (Bayesian inference Using Gibbs Sampling). It implements the Language Service Protocol.
Equivalent of Cast Calculus: https://github.com/LuKuangChen/Equivalence-of-Cast-Calculi
A framework for formally proving the equivalence of cast calculi (e.g., coercions, hypercoercions, and threesomes).

Skills

General Computing: Rust, OCaml, Julia, TypeScript, Java, Python, Racket, C, ReScript
Domain-specific Computing: Quantitative Data Processing (R, MATLAB, Google Sheets), Web (React, Elm, Google Apps Script), Tabular/Relational Programming (SQL, REL, Prolog, miniKanren, LINQ), SVG, (La)TeX, PyTorch, Proof Assistants (Coq, Isabelle, Agda), Formal Methods (Alloy/Forge, PLT Redex)
CS Subfields: Natural Language Processing, Machine Learning, Human-Computer Interaction, Bioinformatics
Other Fields: Biology, Statistics, Math, Cognitive Science, Psychology
Languages: English (Fluent), Mandarin (Native), Taiwanese Hokkien (Native), Cantonese (Native)

Work Experience

R&D Intern May 2023 – Aug. 2023
Compiler/Language Team, Relational AI

- Prevented the compiler from executing ill-formed higher-order relations.
- Compared several ways of defining variadic functions in Julia on their readability and performance.
- Refactored several units of the compiler so that variadic functions are always defined in the best way. The refactoring improves the compiler's performance by several magnitudes on large programs.
- Proposed a solution (which is liked and accepted by the team) to a bug in the handling of generic relations.
- Fixed a bug in the handling of some recursive generic relations.
- Created a tutorial for the rest of the company on how generic relations work.

Teaching Experience

- Teaching Assistant for CSCI 1730 Programming Languages: Fall 2021, Fall 2022, Fall 2023
- Teaching Assistant for CSCI 1260 Compilers: Spring 2021
- Teaching Assistant for C311/B521 Programming Languages: Spring 2019, Fall 2019

Publications

- **Lu, Kuang-Chen**, and Shriram Krishnamurthi. "Identifying and Correcting Programming Language Behavior Misconceptions." OOPSLA, 2024.
- **Lu, Kuang-Chen**, Shriram Krishnamurthi, Kathi Fisler, and Ethel Tshukudu. "What Happens When Students Switch (Functional) Languages (Experience Report)." *Proceedings of the ACM on Programming Languages* 7, no. ICFP (2023): 796-812.
- **Lu, Kuang-Chen**, Ben Greenman, Carl Meyer, Dino Viehland, Aniket Panse, and Shriram Krishnamurthi. "Gradual Soundness: Lessons from Static Python." *The Art, Science, and Engineering of Programming* 7, no. 1 (2022).
- **Lu, Kuang-Chen**, Ben Greenman, and Shriram Krishnamurthi. "Types for Tables: A Language Design Benchmark. *The Art, Science, and Engineering of Programming* 6, no. 2 (2022).
- **Lu, Kuang-Chen**. "Equivalence of Cast Representations in Gradual Typing." Master's thesis, Indiana University, 2020.
- **Lu, Kuang-Chen**, Jeremy G. Siek, and Andre Kuhlenschmidt. "Hypercoercions and a framework for equivalence of cast calculi." In *Workshop on Gradual Typing*. 2020.
- **Lu, Kuang-Chen**, Weixi Ma, and Daniel P. Friedman. "Towards a miniKanren with fair search strategies." In *Proceedings of the 2019 miniKanren and Relational Programming Workshop*, pp. 1-15. 2019.
- Hu, Zhiqiang, Chen Sun, **Kuang-chen Lu**, Xixia Chu, Yue Zhao, Jinyuan Lu, Jianxin Shi, and Chaochun Wei. "EUPAN enables pan-genome studies of a large number of eukaryotic genomes." *Bioinformatics* 33, no. 15 (2017): 2408-2409.
- Sun, Chen, Zhiqiang Hu, Tianqing Zheng, **Kuangchen Lu**, Yue Zhao, Wensheng Wang, Jianxin Shi et al. "RPAN: rice pan-genome browser for~ 3000 rice genomes." *Nucleic acids research* 45, no. 2 (2017): 597-605.

Awards

- The paper "Types for Tables" was awarded the Editor's Choice in 2022 at the Programming Journal