Charles Jin

Research Interests

I am broadly interested in robust machine learning. Currently, I am exploring techniques for learning systems whose knowledge is symbolic in nature.

Contact

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Education

Massachusetts Institute of Technology, September 2019 - Present
Ph.D. Student in Computer Science.
Advisor: Martin Rinard.

Yale University, Aug 2012 - May 2016.
Combined B.S./M.S. in Computer Science.
B.S. in Mathematics, *with distinction.*
GPA: 3.96/4.00.

Awards and Honors

Schulz Prize, 2016. Awarded to a Silliman College senior for academic excellence in the physical sciences or mathematics.
summa cum laude, Yale, 2016.
Phi Beta Kappa, Yale, 2015.
Moulton Ely Grant, 2014. Small grants that provide support for students in entrepreneurial endeavors.
Sherwood E. Silliman Fellowship, 2013. Covered a 2-week collaboration at Case Western Reserve University.
Yale College First-Year Summer Research Fellowship in the Sciences & Engineering, 2013. Awarded to approximately 70 students per year. Funded a summer of research on project "Image Segmentation of Dense Capillary Meshes."

Preprints

Charles Jin and Martin Rinard, "Learning From Context-Agnostic Synthetic Data," arXiv:2005.14707. 2020.

Charles Jin and Martin Rinard, "Manifold Regularization for Adversarial Robustness," arXiv:2003.04286. 2020.

Refereed Publications

Muthu Baskaran, **Charles Jin**, Benoit Meister, and Jonathan Springer, **"Automatic Mapping and Optimization to Kokkos with Polyhedral Compilation,"** 2020 IEEE High Performance Extreme Computing Conference (**HPEC20**), Waltham, MA, USA, 2020.

Charles Jin, Muthu Baskaran, Benoit Meister, and Jonathan Springer, **"Automatic Parallelization to Asynchronous Task-Based Runtimes Through a Generic Runtime Layer,"** 2019 IEEE High Performance Extreme Computing Conference (**HPEC19**), Waltham, MA, USA, 2019.

Charles Jin, Muthu Baskaran, and Benoit Meister, **"POSTER: Automatic Parallelization Targeting Asynchronous Task-Based Runtimes,"** 2019 28th International Conference on Parallel Architectures and Compilation Techniques (**PACT19**), Seattle, WA, USA, 2019, pp. 465-466.

Charles Jin and Muthu Baskaran, **"Analysis of Explicit vs. Implicit Tasking in OpenMP Using Kripke,"** 2018 IEEE/ACM 4th International Workshop on Extreme Scale Programming Models and Middleware (**ESPM2**), held in conjunction with **SC18**, Dallas, TX, USA, 2018, pp. 62-70.

Invited Talks

"Automatic Code Generation to Dynamic Task-Based Runtimes: Recent Results." 10th Annual Concurrent Collections Workshop (**CnC 2018**).

Projects and Manuscripts

More Annihilating Attacks: an extension of MSZ16, Fall 2015 - Spring 2016.
M.S. thesis advised by Prof. M. Raykova at Yale University.
- Studied algebraic approaches to cryptographic obfuscation with a focus on constructions instantiated from multilinear maps.
- Extended an annihilating attack (MSZ16) on indistinguishable obfuscation instantiated using candidate multilinear maps (GGH13) from a trivial branching program to a more general class.

Code Generation Utility for Finite Field Arithmetic, Fall 2014 - Fall 2015.
Independent project advised by Prof. B. Ford at Yale University.
- Built a code generation utility in Haskell for finite field arithmetic over Curve25519.
- Demonstrated proof-of-concept for automatically generating primitives for elliptic curve cryptography over arbitrary primes without the need for hand-tuned optimizations.

Image Segmentation of Dense Capillary Meshes, Spring 2013 - Spring 2014.
Independent project advised by Prof. M. Choma, MD, at Yale School of Medicine.
- Used video and image segmentation techniques to isolate the capillary mesh of quail cell embryos in Matlab.

Teaching

Undergraduate Science and Quantitative Reasoning tutor at Yale University, Spring 2015 - Spring 2016.

Relevant Work Experience

Reservoir Labs, Research Engineer, June 2018 - August 2019.
- Implemented new backends for a polyhedral optimizing compiler for targeting task-based runtimes (Legion and OpenMP).
- Designed a new lightweight runtime layer to enable automatic extraction of dynamic task-based parallelism. Extended compiler backend to support heterogeneous dynamic task-based parallelism using GPUs (CUDA).
- Evaluated performance of parallel programming models targeting exascale systems with heterogeneous architectures (e.g., OpenMP, Legion, Charm++, Kokkos, OCR).
- Contribute to reports and papers, including grant proposals and reports.

Weiss Asset Management, Developer / Analyst, July 2016 - May 2018.
- Built Monte Carlo simulations that model financial derivatives; used in over $100MM of decisions per year. Improved speed of existing Python PDE solver by 500x.
- Reimplemented critical trade reconciliation engine and application in a layered architecture, improving testability, robustness, and speed. Wrote test suite that exposed several major bugs from previous iteration.
- Managed coordination between software and investment teams, as the sole hybrid developer / analyst.

Selected Other Activities

3rd Place, CSI CyberSEED Social Engineering Challenge, Oct 2015.
Capture-the-flag challenge to penetrate a fictitious company using techniques like social engineering, SQL injection, and buffer overflow attacks.

YHack, President and Cofounder, Fall 2013 - Spring 2015.
Annual hackathon at Yale with over 1000 attendees. `yhack.org`

SeeMail, HackPrinceton 2013.
Used an automatically generated signature image to provide email read receipts. Featured in TechCrunch.