Koundinya Vajjha, Ph.D.

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Summary

A highly motivated individual with a very strong background in Mathematics, implementation of AI and software development. Graduated with a PhD in Mathematics specializing in Mathematical Optimization and Artificial Intelligence in 2022.

Work experience

- **Formal Verification Engineer** — Intel Corp.
  San Francisco Bay Area, USA — *2024 - present*
    - Arithmetic formal verification in CPUs using theorem provers/model checkers.

- **R&D Engineer** — Imandra
  San Francisco Bay Area, USA — *08/15/2022 - Present*
    - Data Structures and Algorithms, Parsers in OCaml and Python.
    - Re-using a formally verified model of a trading venue to generate suggestions for **optimized order placement** via Reinforcement Learning using OCaml.

- **Quantitative Analyst** — CRISIL, an S&P Global Company
  Chennai, India — *08/10/2016 - 07/10/2017*
    - **Data analysis** and **Model Verification** for institutional investment bank clients.
    - **Model calibration** of Anti-Money Laundering algorithms.

Education

- **University of Pittsburgh** — Pittsburgh, Pennsylvania
  Ph.D. Mathematics — *2018-2022*
    - Advisor : Thomas Hales
    - Received the **Andrew W. Mellon Predoctoral Research Fellowship** for 2021-22.
    - Reinforcement Learning algorithms, Optimal Control and Discrete Geometry.

- **University of Western Ontario** — London, Ontario
  MSc. Mathematics — *2017 - 2018*

- **Fitch Learning**
  Certificate in Quantitative Finance — *2017*

- **Indian Statistical Institute** — Kolkata
  Master of Mathematics — *2014 - 2016*

- **Indian Statistical Institute** — Bangalore
  Bachelor of Mathematics — *2011 - 2014*

Technical Skills

SAS, R, Python, Lean, Coq, Haskell, OCaml, Mathematica, Matlab, Octave, Unix/Linux.

Academic Publications and Preprints

1. *Formal Verification of a Stochastic Approximation Theorem* (with Barry Trager, Avi Shinnar and Vasily Pestun) accepted to **ITP 2022**.

2. *The Reinhardt Conjecture as an Optimal Control Problem* (with Thomas Hales), work-in-progress.

3. *CertRL: Formalizing Convergence Proofs for Value and Policy Iteration in Coq* (with Avi Shinnar, Barry Trager, Vasily Pestun and Nathan Fulton) presented at **CPP 2021**.

4. *A formal proof of PAC Learnability of Decision Stumps* (with Joseph Tassarotti and John Tristan) presented at **CPP 2021**.

5. *On a Definite Integral of the Fractional Part Function* in Resonance: Journal of Science Education,May 2012, Volume 17, Number 05.

6. *On Pythagorean Triples of the Form $(i, i+1, k)$* in Resonance: Journal of Science Education,September 2009, Volume 15, Number 09.

Internships

1. Research Internship at the **MIT-IBM Watson AI Lab, IBM Research**, 2020.

2. Research Internship in the ML-AI group at **Oracle Labs**, 2019.

3. Summer internship in **Essex Lake Group LLC**, 2013

4. Summer internship at the **Indian Institute for Science Education and Research, Mohali**, 2013.

5. Summer internship as a JNCASR Fellow, at the **Indian Institute for Science Education and Research, Kolkata** in 2012.

Conferences

1. Participant at the **DeepSpec Summer School, 2018**, July 2018 at Princeton University.

2. Participant at the **Vladimir Voevodsky Memorial Conference** at the Institute for Advanced Study, Princeton, September 2018.

3. Participant at the **Homotopy Type Theory Summer School** at Carnegie Mellon University, August 2019.

4. Participant at **Homotopy Type Theory - 2019** at Carnegie Mellon University, August 2019.

5. Participant at the **Category Theory Octoberfest**, October 2019 at Johns Hopkins University.

6. Patricipant at **Optimal Control, Optimal Transport, and Data Science - Institute for Mathematics and Applications – University of Minnesota**, November 09 - 13, 2020.

7. Participant at the **Certified Programs and Proofs, 2021**, January 2021.

8. Participant at the **2021 Galois Summer School for Trustworthy Machine Learning, Artificial Intelligence, and Data Science**, June 2021.

9. Participant at the **OCaml Hacking Day, 2023**, Oct 2023 at Tarides, India.