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Summary

A highly motivated individual with strong background in mathematics and nearly five years of experience in formal verification of software using theorem provers such as Lean and Coq in both academia and industry.

Work experience

- **R&D Engineer** — Imandra
  San Francisco Bay Area, USA — *2022 - Present*
  - Formally verifying a trading venue's matching logic from the system specification in an **automated reasoning engine/theorem prover**.
  - Re-using the formally verified model to optimize order placement via Reinforcement Learning using OCaml.

- **Quantitative Analyst** — CRISIL, an S&P Global Company
  Chennai, India — *2016 - 2017*
  - Validation of Anti-Money Laundering models deployed on **payments/transaction databases**.

Education

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

- **University of Western Ontario** — London, Ontario
  MSc. Mathematics — *2017 - 2018*
  - Coursework on Type Systems, Homotopy Type Theory and Formalization of Mathematics.

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

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

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

Technical Skills

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

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 Jean-Baptiste Tristan) presented at **CPP 2021**.

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

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

Internships

1. Research Internship at the **MIT-IBM Watson AI Lab, IBM Research**, 2020.
   - Formal verification of Reinforcement Learning algorithms in the Coq theorem prover. **Mentor**: Nathan Fulton.

2. Research Internship in **Oracle Labs**, 2019.
   - Formal verification of Statistical Learning Theory in the Lean theorem prover. **Mentor**: Jean-Baptiste Tristan

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. Selected to participate in the **2021 Galois Summer School for Trustworthy Machine Learning, Artificial Intelligence, and Data Science**, June 2021.