Koundinya Vajjha, CQF

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27 years
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Current position

Graduate student in Mathematics at the University of Pittsburgh.

- **Advisor** : Thomas Hales.
- **Thesis** : On the Reinhardt Conjecture and Formal Foundations of Optimal Control.
- Received the **Andrew W. Mellon Predoctoral Fellowship** for 2021-22.

Previous work experience

- **Quantitative Analyst** — CRISIL, an S&P Global Company
  Chennai, India — *2016 - 2017*

Education

- **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*

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 II* (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.

Areas of Interest

Formal Verification, Discrete Geometry, Geometric Optimal Control.

Internships

1. Research Internship at the **MIT-IBM Watson AI Lab, IBM Research**, 2020.
2. Research Internship in **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. Selected to participate in the **2021 Galois Summer School for Trustworthy Machine Learning, Artificial Intelligence, and Data Science**, June 2021.

Talks

1. Oral presentation "On Pythagorean Triples of the Form $(i, i+1, k)$" at the **International Congress of Mathematicians**, Hyderabad, August 2010.
2. Talk on "Voevodsky's Simplicial Modal of HoTT" at the **CMU HoTT Seminar**, November 2018.
3. Talk on the "Documentation of Formal Abstracts" at **Hanoi Lean** on June 2019.
4. Talk on "Metaprogramming in Lean" at **Hanoi Lean** on June 2019.

5. Talk on "Formal Proof of PAC Learnability of Decision Stumps" at the **CMU-Pitt Lean Working Group** on November 2019 and also at **Lean Together 2020**, January 2020.

6. Talk on "CertRL: Formalizing Convergence Proofs of Value and Policy Iteration in Coq" at **Lean Together 2021** and also at **CPP 2021**, January 2021 and also at **CISAT Seminar - ITU Copenhagen**, May 2021.

7. Instructor for **Monsoon Math Camp**, teaching Formal Proofs using the Lean Theorem Prover – July 2021

8. Talk on "A Mathematical Analysis of Pāṇini's Śivasūtras in the Aṣṭadhyāyī" at the **CMU-Pitt Lean Working Group** in November 2021.

Technical Skills

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