Graduate School of Mathematics, Nagoya University
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Xuanrui Qi

Education

Oct 2019 — Aug 2021 (expected)
M.S. in Mathematical Science, *Graduate School of Mathematics, Nagoya University*, Nagoya, Aichi, Japan.
Thesis: "Type theory and the logic of toposes"
Advisor: Jacques Garrigue

May 2019
M.S. in Computer Science, *Tufts University*, Medford, MA, USA.
Advisors: Samuel Z. Guyer, Cyrus Omar (University of Michigan, unofficial)

May 2018
B.S. in Computer Science, *Tufts University*, Medford, MA, USA.
Second major: international relations. **Minor**: mathematics.
Advisor: Samuel Z. Guyer

Research Interests

in computer science
applied category theory, logic in computer science, type theory, functional programming languages, program verification

in mathematics
category theory (particularly categorical logic), synthetic differential geometry, algebraic topology

Research Positions

July 2020 –
Research Assistant, *Graduate School of Mathematics, Nagoya University*, Nagoya, Japan.
Research assistant position funded under the COCTI (Certifiable OCaml Type Inference) project of the Tezos Foundation, and supervised by Professor Jacques Garrigue.

June 2018 – August 2018
Research Visitor, *Graduate School of Mathematics, Nagoya University*, Nagoya, Japan.
Hosted by and worked with Professor Jacques Garrigue.

March 2017 – May 2018
Research Assistant, *Department of Computer Science, Tufts University*, Medford, MA, USA.
Research assistant under Professor Samuel Z. Guyer, working in the RedLine Systems Research Group.

Other Positions

2019 – 2020
Intern/Contractor, *SiFive*, San Mateo, CA, USA.
An intern engineer at, then a contractor with SiFive, working with Murali Vijayaraghavan on verifying RISC-V processors in Coq.

2016
Intern, *Institute of Automation, Chinese Academy of Sciences*, Beijing, China.
Interned at the State Key Laboratory of Control and Management of Complex Systems, working on computer vision.

Research Publications

Research Papers

1. Reynald Affeldt, Jacques Garrigue, **Xuanrui Qi**, and Kazunari Tanaka. Proving Tree Algorithms for Succinct Data Structures. The 10th International Conference

on Interactive Theorem Proving (ITP 2019).

Theses

1. **Xuanrui Qi**. Type theory and the logic of toposes. Master's thesis, Nagoya University, 2021. Thesis advisor: Jacques Garrigue.
2. **Xuanrui (Ray) Qi**. Elephant Tracks II: Practical, Extensible Memory Tracing. Senior Honors Thesis, Tufts University, 2018. Thesis committee: Sam Guyer (chair), Kathleen Fisher.

Refereed Talks & Presentations

1. Jacques Garrigue, **Xuanrui Qi**. Formalizing OCaml GADT Typing in Coq. ML Family Workshop 2021 (ML 2021).
2. **Xuanrui Qi**, Jacques Garrigue. Towards a Coq Specification for Generalized Algebraic Datatypes in OCaml. The 7$^{\text{th}}$ International Workshop on Coq for Programming Languages (CoqPL 2021).
3. Reynald Affeldt, Jacques Garrigue, **Xuanrui Qi**, and Kazunari Tanaka. Experience Report: Type-Driven Development of Certified Tree Algorithms in Coq. The Coq Workshop 2019.
4. **Xuanrui (Ray) Qi**. From Tactics to Structure Editors for Proofs. Off the Beaten Track 2019 (OBT 2019).
5. **Xuanrui (Ray) Qi**. A Practical and Extensible Framework for Garbage Collection Tracing. SPLASH 2018 Student Research Competition.

Teaching Experience

Teaching Assistant

- Mathematics of Machine Learning, Global 30 Program Special Mathematics Lecture, Fall 2020, Nagoya University (Instructor: Prof. Henrik Bachmann)
- Calculus II, Global 30 Program, Spring 2020, Nagoya University (Instructor: Prof. Serge Richard)
- Calculus I, Global 30 Program, Fall 2019, Nagoya University (Instructor: Prof. Serge Richard)
- Concurrent Programming (COMP 50CP), Fall 2017 & 2018, Tufts University (Instructor: Prof. Mark Sheldon)

Other Courses

- Peer instructor (instructor of record), Spring 2018, Experimental College, Tufts University