Joshua Chen

Curriculum Vitae

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I'm a soon-to-be Masters graduate in mathematics. My work is in mathematical logic and automated proof, as well as machine learning, text mining, and natural language processing. Previously, I studied category theory and quantum algebra.

EDUCATION

Masters in Mathematics — University of Bonn
(in grading) — 2015–2018
Advisor: Prof. Dr. Peter Koepke

B.Sc. (Honours) Mathematics — The Australian National University
with First Class Honours — 2013–2014
Advisor: Assoc. Prof. Scott Morrison

B.Sc. Mathematics — University of Canterbury
Dean's Congratulations — 2010–2012

RESEARCH & WORK

Homotopy type theory in Isabelle/Pure — University of Bonn
Masters thesis project — 2017–present

Masters thesis project in type theory and automated proof. I implemented a homotopy type theory object logic for the interactive proof assistant Isabelle, capable of formalizing large portions of standard presentations of homotopy type theory. I continue to actively develop the code at https://github.com/jaycech3n/Isabelle-HoTT.

Targeted topic modeling for the E2mC emergency response system — Fraunhofer IAIS
Research assistant — 2017–2018

I worked in the Knowledge Discovery group of the Fraunhofer Institute for Intelligent Analysis and Information Systems, applying probabilistic models to analyze and classify topics in tweet corpora. I implemented targeted topic models in Java and also used Python for natural language processing of Twitter data. This work was part of the European Union's E2mC project, a pilot project aiming to use social media data to enhance the EU's emergency management and response system.

Visualization and enumeration of planar trivalent graphs — Australian National University
Research assistant — 2015

I developed and implemented algorithms in Scala to enumerate and automatically draw certain classes of planar graphs. This was part of research in quantum algebra investigating subfactors and planar algebras. My code was incorporated into the repository at https://bitbucket.org/scottmorrison/toolkit/.

The Temperley-Lieb categories and skein modules — Australian National University
Honours thesis — 2013–2014

Final year Bachelors research thesis in category theory, quantum algebra, and an application to low-dimensional topological invariants. Available online at arXiv:1502.06845[math.QA].

Integer houses in cyclotomic fields Australian National University
Summer research program Nov 2012–Jan 2013

International undergraduate research program, where I investigated questions concerning the dimensions of objects in fusion categories with the aid of Wolfram Mathematica.

AWARDS & ACHIEVEMENTS

ANU Mathematical Sciences Institute Honours Scholarship	2013
ANU Summer Research Scholarhip	2012
University of Canterbury Peter Bryant Prize for pure mathematics	2011

TEACHING ASSISTANCE

Intelligent Learning and Analysis Systems: Machine Learning
(MA-INF 4111)
University of Bonn, Winter 2017/18

Intelligent Learning and Analysis Systems: Data Mining and Knowledge Discovery
(MA-INF 4112)
University of Bonn, Summer 2017

Engineering Mathematics 1B
(EMTH119)
University of Canterbury, Fall 2015

Mathematics and Applications 1
(MATH103)
University of Canterbury, Fall 2014

Discrete Mathematics
(MATH120)
University of Canterbury, Fall 2013

TECHNICAL SKILLS & EXPERIENCE

Programming languages	Python, Java, Scala, Standard ML, C++, SQL, Wolfram Mathematica
Python packages	pandas, spaCy, NLTK, Jupyter, Matplotlib, NumPy, Tweepy, Psycopg2, ...
Software & tools	Git, LaTeX, Isabelle, HTML/CSS, Javascript