ERIC M SCHMID

ML/Quantitative Analytics Research Associate

eric.schmid@nyu.edu | GitHub: https://github.com/ericschmid-uchicago | Chicago | Site: https://ericschmid-uchicago.github.io/

SUMMARY

I am a ML/Quantitative Analytics Research Associate with expertise in developing machine learning models for cryptocurrency forecasting, utilizing tools such as PyTorch and scikit-learn, while also being skilled in functional programming languages including Haskell and dependently typed languages like Agda, Coq, and Idris. My diverse background spans quantitative finance, software development, and academic research, with a particular focus on applying topological data analysis and category theory to financial markets while pursuing a PhD in Mathematical Sciences on applied algebraic topology and AI.

EDUCATION

02/2025 - Present
Dublin, Ireland

PhD in Mathematical Sciences
GCAS College

- Topic: AI and Applied Algebraic Topology
- Title: "Sheaves for Decentralized Control"
- Completing remotely
- Co-advisors: Prof. Fernando Tohmé, Prof. Neil Ghani (Strathclyde), Dr. Toby St. Clere Smithe (Topos Institute)

09/2021 - 03/2025
Chicago, IL

MS in Applied Mathematics
DePaul University

- GPA: 4.0
- Effron Family Scholarship for Pure Mathematics
- The Joseph Sugre Endowed Graduate Scholarship in Mathematics
- Research Assistantship, Fall 2024
- Teaching Assistant for Linear Algebra

09/2023 - 12/2023
Chicago, IL

Graduate Coursework in Computer Science
University of Chicago

- Coursework: Introduction to Python Programming (GPA: 4.0)

09/2008 - 12/2013
New York, NY

BA in Individualized Study (Interdisciplinary Studies)
New York University

- Dean's List for Fall 2008 & Spring 2009
- Concentration: Continental Philosophy and Visual Art
- Minor: Mathematics
- GPA: 3.589

EXPERIENCE

10/2024 - Present
Chicago, IL

ML/Quantitative Analytics Research Associate
Navier

- Develop and implement machine learning models for cryptocurrency price forecasting using PyTorch and scikit-learn
- Design and optimize deep learning architectures for time series prediction
- Implement backtesting frameworks to evaluate model performance
- Conduct statistical analysis of market data using Python's data science stack
- Create automated data pipeline for real-time model updates and predictions

06/2023 - 10/2024
Chicago, IL

Co-founder
Bourbaki Capital

- Led a team of developers and analysts, setting team priorities
- Developed software using Python and interacted with Amazon AWS API
- Designed and implemented a websocket listener for market data
- Utilized Python library HFTbacktest for backtesting quantitative financial models

10/2016 - 06/2023
Chicago, IL

Professional Artist

- Exhibited at prestigious galleries and museums across Europe and North America, including Kunsthalle Zürich, Vilma Gold (London), Neue Alte Brücke (Frankfurt), Croy Nielsen (Berlin), Svetlana (New York), Centralbanken (Oslo), Emily Harvey Foundation (New York), M. LeBlanc (Chicago) and Galleria Federico Vavassori (Milan)

09/2016 - 10/2016
Chicago, IL

Temporary Web Development Consultant
Chicago.com

- Created a responsive navigation bar for website using HTML, CSS, Javascript, and JQuery
- Implemented improvements for social media integration and mobile experience

02/2016 - 08/2016
Chicago, IL

Software Engineering Intern
Raise.com

- Completed software engineering coursework in Java, UNIX and SQL
- Developed various applications including a hangman game, karaoke jukebox and random sentence generator

01/2014 - 10/2015
New York, NY

Production Manager
Ben Schumacher Studio

05/2013 - 08/2013
Chicago, IL

Web Development Intern
Chicago Sun-Times

SKILLS

AWS | CSS | Deep Learning | ECommerce | GitHub | Grunt | Haskell | HTML | Java | Java Spring | JavaScript | jQuery | Linear Algebra | Unix Shell Scripting | Numpy | Pandas | Python | PyTorch | Scikit-Learn | Scipy | SQL | Time Series | XGBoost | PostgreSQL | Agda | Coq | Idris | OCaml | Azure | Functional Programming

COURSES

Introduction to Python Programming, Numerical Analysis I, Real Analysis I, Finite-Dimensional Vector Spaces, Probability & Statistics I, Abstract Algebra I & II, Point-Set Topology, Mathematical Modeling, Complex Analysis, Group Theory, Number Theory, Commutative Algebra, Category Theory, Mathematical Logic (Model Theory), Algebraic Topology, Calculus I-III, Statistics, Linear Algebra, Discrete Mathematics, Non-Euclidean Geometry

PROJECTS

Macroeconomic Effects on Bitcoin Price Using Topological Data Analysis and Distance-to-Default Metrics

10/2024 - 12/2024 Chicago, IL

Developed a machine learning model integrating topological data analysis, financial risk metrics, and macroeconomic indicators to predict Bitcoin price movements with performance exceeding random chance.

- Developed ML model predicting Bitcoin trends using Topological Data Analysis and Distance-to-Default metrics, achieving 21% better-than-random AUC (0.6089 in a three-category classification problem)
- Created novel validation approach using shifted 30-day moving averages to reduce volatility impact while avoiding look-ahead bias
- Built XGBoost classifier with time series cross-validation for 3 price categories, achieving 5.9% better accuracy than random chance
- Applied SHAP analysis to identify predictive features, combining TDA metrics with Treasury yields and federal debt data from Yahoo Finance and FRED API

The value of innovation: the economics of targeted drugs for cancer

2007 Chicago, IL

I analyzed the economic implications of targeted cancer drugs, examining their substantial costs ($13,000-$100,000 annually) relative to their clinical benefits and addressing concerns about healthcare resource allocation in an era of breakthrough but expensive oncology therapeutics.

- Co-authored research paper published in Targeted Oncology examining the economic considerations of 16 FDA-approved targeted cancer therapies
- Analyzed cost-effectiveness ratios and insurance reimbursement considerations for novel cancer drugs ranging from $13,000-$100,000 per patient annually
- Evaluated economic sustainability challenges of targeted therapies in oncology while acknowledging their breakthrough clinical value
- Recommended methodology improvements for cost-effectiveness studies to better inform healthcare resource allocation decisions
- Explored the complex relationship between drug pricing, patient access, and the value of medical innovation in cancer care

TypeLoopS1 – Educational Haskell Program Demonstrating Algebraic Topology

03/2025 Chicago, IL

TypeLoopS1 – A Haskell-based educational project illustrating algebraic topology concepts by modeling the fundamental group of a circle at the type level.

- Developed a Haskell-based educational tool illustrating the fundamental group of the circle π_1(S^1), leveraging type-level programming to model algebraic topology concepts.
- Encoded mathematical properties using advanced type system features, providing compile-time verification and enhancing code reliability.
- Created a resource bridging functional programming and algebraic topology, facilitating intuitive understanding of abstract mathematical concepts through executable examples.

SELECTED PUBLICATIONS

The value of innovation: the economics of targeted drugs for cancer

Targeted Oncology

Cara C. Tigue, Karen A. Fitzner, Motasem Alkhatib, Eric Schmid & Charles L. Bennett

03/2007 https://link.springer.com/article/10.1007/s11523-007-0043-8

See above in Projects

A Very Short Introduction to Topos Theory (adapted from Prof. Pettigrew's notes)

Preprint

Eric Schmid

2024 https://philarchive.org/archive/SCHAVS-8

A quick overview of category theory and topos theory including slice categories, monics, epics, isos, diagrams, cones, cocones, limits, colimits, products and coproducts, pushouts and pullbacks, equalizers and coequalizers, initial and terminal objects, exponential objects, subobjects, subobject classifiers, the definition of a topos, algebras of subobjects, functors, natural transformations and adjoint functors.
This paper is refashioned and adopted from Richard Pettigrew's university notes.

SELECTED PUBLICATIONS

Prolegomenon to a Treatise

Bauer Verlag

Eric Schmid

2022 https://www.semcoop.com/prolegomenon-treatise

Co-edited by Ben Green, with forewords by Rocco Gangle, Will Fraser, Michael Stumpf, Connor Tomaka, Fernando Zalamea, afterwords by Alexander Boland, Laszlo Horvath, Hunter Hunt-Hendrix, Inigo Wilkins, Tim Pierson and postscript by Mattin.

The apparent primary goal of Eric's treatise is to define something called 'the Real', with the help of a patchwork of theoretical materials drawn from contemporary mathematics, mathematical physics, 'neurophysics' and continental theory. Other topics in the text, especially those dealing with genesis and manifestation, seem relevant to Eric's conception of total art, which refines the spirit of Fluxus for the contemporary moment under the heading of 'minor rationalism'. ––Ravenna Hunt-Hendrix

How could one reconcile the proposition of univalent foundations in mathematics and the traces of activity marked by the proper name of Dieter Roth? Could the formal inventions of the former help elaborate the field of the latter? The Prolegomenon begins to establish some compelling coordinates by which one could begin to approach such a question. Could one carry such formalizing work forward? As a text with foundational aspirations, what would the status of such work be? ––Tim Pierson

In my view, what is most important in Schmid's treatise is how it exercises a panoply of important sections from contemporary philosophy, science and mathematics in order to suggest how the epistemic relation between 'abstract' and 'concrete' that is manifest, in particular, in type theory (especially its timely homotopic incarnation) may be constructively employed and made effective without having to ground itself in correspondence to any correlative ontological relation between 'form' and 'matter'. ––Rocco Gangle