

# Michael Newman Fortunato

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## EDUCATION

### The University of Chicago

*Masters of Science, Computer Science*

Chicago, IL

Sep 2024 — Dec 2025

- Cumulative GPA: 3.925/4.00
- Pre-Doctoral Program<sup>1</sup>

### The University of Chicago

*Bachelors's of Science, Mathematics*

Chicago, IL

Sep 2016 — June 2020

- Major GPA: 3.51/4.00, Cumulative GPA: 3.33/4.00

## WORK EXPERIENCE

### University of California, San Diego

La Jolla, CA

Research Assistant to Professor Rose Yu

June 2025 — February 2026

- Created **SymD**, a new ML architecture+mathematical formalization for discovering local (region-specific) equivariances of function between vectors spaces under actions of finite groups.
- Designed a differentiable training approach using straight-through estimation to learn both where a symmetry applies (region/mask) and which group action explains it.
- Paper is implemented as a proper Python package backed by **uv**. The library is written in **Pytorch** along with **Polars**, **Numpy**, **MLflow**, and **Matplotlib**. Advanced Pytorch features are used, such as gradient detachment in our custom modules. Downstream, we provide a CLI using **Tyro**. **Google Cloud** was also used in conjunction with **Slurm** for larger experiments.

### InterSystems

Cambridge, MA

Senior Systems Developer - Kernel Group

July 2023 — July 2024

- Due to veritable performance in our company's healthcare department, I was transferred to become one of the youngest ever members of InterSystem's "Kernel group". This is the group of around 12 developers responsible for architecting, implementing, and researching the IRIS database, which is InterSystem's core technology and is the database powering companies such as Epic Systems and Morgan Stanley.
- *Compiler Work:*
  - Developed and improved the performance of ObjectScript, a strongly-typed byte-code language (most similar to Java) that is executed within the IRIS runtime
  - Improving the speed and modularity of the ObjectScript lexer and parser
  - Conceived of optimizing passes that the ObjectScript compiler could perform
- *Networking:*
  - I wrote the SSH daemon for the IRIS database from scratch in Rust. Subsystems dealt with and created included:
    - Read and implemented all the SSH RFCs faithfully for the IRIS daemon
    - Multithreaded, async I/O done with low level usage of **Mio** and higher level **Tokio** primitives.
    - Full Authentication Layer (Public Key, Password, Key phrase) with UI and distributed systems logic, which was done in consultation with security team.
    - All terminal escape sequences implemented (e.g. reverse incremental search), which was done via termios and ioctl.
- Wrote in primarily in **Rust**. Otherwise, I wrote in **C**, and **x86 assembly**.

### Senior Developer<sup>2</sup>

July 2020 — July 2023

- Conceived of, architected, and built the Data Profiling Tool, an enterprise grade application for analyzing millions of HL7v2 messages. The application included full-stack SSO user authentication, multi-threading, and complex scheduling and concurrency management features, along with advanced data analytics algorithms with a emphasis on performance acceptable to users needs. Technologies included:

<sup>1</sup>Research-track CS masters meant to prepare students for a PhD. As part of the program, *all* courses are PhD (CMSC 300) level courses, *not* masters-level courses (MPSC). **Highly selective** program (in 2024, 120 regular master admissions, 4 pre-doctoral admissions). See <https://masters.cs.uchicago.edu/academics/pre-doctoral-ms-computer-science> for more info.

<sup>2</sup>Promoted from Developer to Senior Developer, April 2022.

- Solely designed and built database (**SQL**), manufactured bitmap indexes, NLP indexes, and considered normalization layouts verses computation layouts.
- Built the REST API, working closely with a principal UI developer assigned to this project part-time.
- Created and wrote new *highly performant* algorithms for analyzing production grade amounts of HL7v2 data, in both real-time and offline settings.
- Put on special 1-person team to research the cost of on-boarding new hospitals into InterSystems' technology, in order to propose a software solution and build that solution. The Data Profiling Tool was the end-result of this work.
- Mentored 7 developers. Two of the developers are now technical leads of the Data Profiling Tool, the other 5 developers are now working for other various companies such as Samsung.

## **RESEARCH EXPERIENCE**

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### **Yale University**

*New Haven, CT*

Research Assistant to Professor John Lafferty

June 2019 — September 2019

- Helped design and build new techniques for estimating joint distributions on data with both discrete and continuous components.
- Helped theorize and implement a method that uses Score Matching (Siwei Lyu, 2009) for joint density estimation, and a second method that used Monotonic Neural Density Estimation (Pawel Chilimski & Ricardo Silva, 2018) for estimating the conditions and a Gaussian Copula for linking.
- Demonstrated our work by inferencing the estimating joint distribution to generate synthetic data.

### **University of Chicago Booth School of Business**

Lead Undergraduate Researcher to Professor William Cong and Tengyuan Liang

January 2018 — June 2020

- Lead undergraduate researcher for a team that developed an influential algorithm called Textual Factors (Cong, Liang, Lin, 2019), resulting in a published paper.
- Important contributor to the development and implementation of the algorithm, which uses natural language processing to measure the semantics of a large corpus of financial articles (30GB), and then uses statistics to associate that measurement with a given share price.
- Received honorable mention for significant contributions in the published paper, despite not being listed as an author due to the graduate author focus.

## **AWARDS**

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### **Pre-Doctoral Merit Scholarship**

University of Chicago (2024)

Recipient of \$40K merit scholarship as part of admission to the pre-doctoral program

### **Data Profiling Tool**

InterSystems (July 2023)

*Voted “Most Exciting and Likely To Use Technology” By Customers At InterSystems Global Summit*

### **Dean’s List**

University of Chicago (2019)

## **COURSES**

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- CMSC 31150, Mathematical Toolkit, A
- CMSC 35410, Machine Learning on Graph, Groups, and Manifolds (Risi Kondor), A-
- CMSC 35400, Deep Learning in 3D (Rana Hanocka), A
- CMSC 35300, Mathematical Foundations of Machine Learning, A-
- CMSC 31150, Introduction to Computer Security, A
- CMSC 33300, Advanced Operating Systems, A
- STAT 28000, Optimization, A,
- STAT 24500, Statistical Theory II, A
- MATH 28100, Introduction To Complexity Theory, A
- CMSC 27200, Algorithms, A
- MATH 25500, Basic Algebra II, A