

Patrick M. TIMONS

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EDUCATION

Artificial Intelligence And Decision Making — *Bachelor of Science* AUG 2021 - MAY 2025
Massachusetts Institute of Technology GPA: 4.7/5.0
Minor: Mathematics; *Concentration:* Economics
Relevant Coursework: Software Performance Engineering, Information Policy, Statistics, Machine Learning (Graduate), Algorithms II, Algorithms I, Mathematics for Comp Sci, Probability, Linear Algebra and Optimization, Deep Learning (Graduate), Deep Learning, Representation, Inference, and Reasoning in AI, Machine Learning, Networks, Microeconomics, Computation Structures, Low-Level Programming, Quantitative NLP, Computer Vision, Computer Programming, Linguistics

WORK EXPERIENCE

Amazon Web Services — *SDE Intern* JUN 2024 - AUG 2024

- Designed and implemented an end-to-end data pipeline to process real-time billing data of 550,000 enterprise AWS customers
- Built an ML-powered forecasting service for AWS cost-savings data analysis, served through an query-based API and a front-end dashboard
- Used AWS, Athena, IaC, CDK, SageMaker, S3, API Gateway, Data Catalog, Java, TypeScript, Python

Laboratory for Information and Decision Systems — *Research Assistant* AUG 2022 - FEB 2023

- Spearheaded data collection initiative for fuel emission modeling project
- Generated simulated drive cycle data through use of MOVES
- Used Python, SQL and pandas to deposit simulated data in a MySQL database for downstream analysis

Baraja — *Research and Development Intern* JUN 2022 - AUG 2022

- Built testing infrastructure for Baraja’s LiDAR engine by programming Raspberry Pis to run a suite of robustness tests
- Refactored DSP chain to enable improvements to the LiDAR engine’s point cloud generation
- Facilitated technical collaboration with third party point cloud segmentation company

TECHNICAL PROJECTS

Improving Deep Learning Based Molecular Fingerprints Through Informed Resampling

- Researched improvements to pretraining methods for molecular encoders and coauthored 5-page ACL-submission-style write-up
- Created model with 9.1% improvement in Spearman’s rank correlation coefficient on downstream tasks compared to the base model
- Used the transformers and ChemBERTa software packages to finetune models on downstream regression tasks

Recovering Latent Variables with Variational Autoencoders despite Training Bias

- Researched how beta-regularization robustifies VAEs to training bias when attempting to recover latent variables
- Analyzed reconstruction error quantitatively and the correspondance between latent variable and observed features qualitatively
- Trained models with PyTorch Lightning and used scientific computing libraries to generate training data and visualize results

Attentional Search

- Search engine interface web-app that presents a graphical representation of knowedge instead of a traditional 1D list representation
- Uses LLMs and word embeddings for query expansion and to filter content scraped from the internet
- Represents knowledge as vectors in a compressed 2D embedding space for human interpretability

EXTRACURRICULAR ACTIVITIES AND HONORS

MIT Men’s Lacrosse — *Team Member* AUG 2021 - PRESENT

- Voted Most Improved for 2023 season, NEWMAC All-Academic Award (2023), 2022 NEWMAC Champion

AI@MIT — *Club Member* SEP 2022 - MAY 2023

- Worked in a team of 3 to build a document summarizer and present at the AIM Labs Demo Day

Global Teaching Labs — *Applied Math Teacher* JAN 2024 - JAN 2024

- Teaching selected topics in Operations Research with a focus on Bayesian Inference to high school students in Cremona, Italy

SKILLS

Foundational Data Structures & Algorithms, Programming (Python, Java, TypeScript, C)
Design Patterns and Programming Paradigms Model-first development, Dependency Injection, Object-Oriented-Programming, Procedural Programming, Concurrency, Multithreading, Parallel Programming, Reactive Frontend
Dev Ops Git Source Control, Build Tools, Dependency Management, CI/CD
Databases & Batch Computing SQL, AWS Data Catalog, Slurm Workload Manager
Libraries and Ecosystems AWS, SageMaker, PyTorch, Pytorch Lightning, Numpy, Pandas, SciKit Learn, Transformers, Transformers Reinforcement Library, Matplotlib, Plotly, Dash, Vue
Soft Skills Technical Due Diligence, Technical Writing