Zachery Fogg

802.505.8277 z.fogg1234@gmail.com zacheryfogg.github.io github.com/ZacheryFogg

My research interests lie at the intersection of **NLP** and **ML** with the goal of **creating language models (LMs) that can effectively understand and communicate with humans in natural language**. The current topics that I am most drawn to are the following: (1) **Memory Augmentation and External Knowledge Retrieval** – I believe that augmenting LMs with updateable long-term memory (parametric or non-parametric) or external knowledge retrieval will be essential in continuing to improve their abilities by decoupling the scaling of knowledge that they have access to from their training data and model size, as well as improving their interpretability and factuality. (2) **Multimodal Learning** – I think that models that have the ability to learn from and interpret multiple modalities of data will be able to build much richer representations of language than models that rely on textual data alone. (3) **Representation Learning** – Improving the mechanisms available to LMs for automatically learning semantically and contextually aware representations (whether those representations be of words, phrases, or even concepts) will be crucial in bolstering their understanding of natural language.

Education

University Of Vermont **Aug. 2018 – Dec. 2021**

Bachelor of Science in Computer Science – Major GPA 3.98 – Overall GPA 3.94 – Magna Cum Laude *Burlington, VT*

Relevant Coursework

- Deep Learning (grad level)
- Machine Learning
- Reinforcement Learning
- Computer Vision
- Evolutionary Robotics
- Data Science
- Calculus III
- Applied Linear Algebra
- Human-Computer Interaction
- Statistics for Engineering
- Applied Probability

Machine Learning Research Experience

Undergraduate ML Research Assistant **Apr. 2021 – Dec. 2021**

University of Vermont *Burlington, VT*

- **Project**: Implementing ML-powered systems for automated cleaning of complex hydrological multivariate time-series data (detecting and correcting anomalies) generated from Critical Zone Observatory watersheds.
- **Contributions**: Built internal data pipelines and storage infrastructure for processing raw sensor data into usable datasets. Worked with domain scientists to define various unique anomaly classes and annotate seven years of data. Built and trained a knowledge-engineered rule-based classifier that was optimized via grid-search. Designed and implemented custom temporal convolutional network and bidirectional LSTM with attention layer to classify anomalies in data with 92% mean test F1 score. **3rd author poster that was accepted into AGU 2021.**
- **Advisor**: Prof. Byung Suk Lee

Undergraduate ML Research Assistant **Aug. 2021 – Dec. 2021**

University of Vermont *Burlington, VT*

- **Project**: Applying ML techniques for analyzing and detecting structure in plant biochemical emissions multivariate time-series data in conjunction with domain scientists at CRREL with the goal of building automated tools to detect recent plant wounding events.
- **Contributions**: Mentored and led 2 other undergraduate researchers in ML-based analysis of data. Constructed internal data pipeline tools for processing and compiling raw sensor data into informative datasets. Trained various ML models, such as Bidirectional LSTM, to predict environmental conditions from biochemical data.
- **Advisor**: Prof. Christian Skalka

Publications

- Automated Cleaning of Multiple Time Series Data from the Sleepers Research River Watershed
  Byung Suk Lee, James B Shanley, **Zachery Fogg**, Jonah Rubin, Scott D Hamshaw, Donna M Rizzo and Julia N Perdrial
  AGU Fall Meeting 2021, held in New Orleans, LA, 13-17 December 2021, id. H45F-1245

Industry Experience

Backend Software Engineer **Dec. 2021 – Present**

Cox Automotive *Burlington, VT*

- Designed and implemented website consumer event tracking syndication app in AWS (ECS, SNS, SQS, Lambda, S3) to ETL 2,000/sec consumer tracking events to Meta, Google, and Epsilon's tracking APIs in real-time.
- Performed migration of 4 mission-critical Java Spring apps from on-premises infrastructure to AWS (ECS, SQS, RDS, ElastiCache, Direct Connect), greatly increasing reliability and scalability, and saving 300% on infrastructure costs.
- Achieved 1200% increase in efficiency of AWS Lambda functions (Python) by implementing message batching and asynchronous requests, and optimizing memory configuration, decreasing costs by 92.5%.
- Decreased memory requirements for Java Spring app EC2 instances 50% by developing custom models for cached client data that reduced cached data from 40KB to 1KB per client, saving 37% on infrastructure costs.
- Implemented custom locking solution using AWS ElastiCache Redis for client order processing application to enable multiple queue workers to process orders in parallel, allowing the service to scale based on order volume.

Software Engineer Intern **May 2021 – Aug. 2021**

Vermont Information Processing *Colchester, VT*

- Spearheaded frontend development of multiple customer-facing dashboards to fetch, configure, and display business sales data and analytics to 1000+ clients using ASP.NET MVC, C#, JavaScript, SQL.
- Redesigned multiple frontend components in customer-facing web application, using Git & SVN source control.
- Participated in daily Scrum and weekly Agile sprint planning, completed 25+ and code reviewed 50+ Kanban tickets.

Technical Skills

Languages: Python – Java (Spring) – JavaScript (React, NodeJS) – SQL – HTML/CSS – C++ – Swift
Skills: Cloud Computing – Systems Design – CI/CD – Machine Learning – iOS App Development
Technologies: AWS (Lambda, DynamoDB, S3, RDS, ECS, EC2) – Terraform – Tensorflow – Pytorch – Git
Certifications: AWS Solutions Architect Associate (Valid Sept. 2022 - Sept. 2025)

Awards & Honors

- UVM Deans List (All Semesters)
- Graduated B.S. Magna Cum Laude (Top 4%) (2021)
- UVM Patrick Scholarship ($7000 Annual 2018 - 2021)