MICHAEL L. GEIS

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SUMMARY

Mathematics PhD and data scientist with experience solving concrete business problems and novel mathematical research problems. I am motivated to solve problems with real world impact using data-driven approaches. Seeking machine learning engineer, data scientist, and data engineer roles.

SKILLS

General Tools Python, SQL, Bash, Git, Docker, Azure Cloud, DBeaver, Pandas, Plotly, Flask, Sklearn, Pytorch, Transformers, OpenAI
Machine Learning ETL, Data Cleaning, EDA, Feature Engineering, Hyperparameter Tuning, Regularization, Model Calibration, Deployment
Soft Skills Project Management, Client Communication, Technical Communication, Presentation Skills, Independent Research

WORK EXPERIENCE

RedMane Technology, R&D Team - Data Scientist **11/2023-Present**

- **Triage/Prioritization Algorithm Development For Child Welfare Reports**
  - Led the development of a binary classification model serving as the core of a larger prioritization algorithm.
  - Designed and implemented a robust data ingestion pipeline, sourcing data from PDF files and an Azure Synapse data warehouse; wrote custom code to securely download, parse PDFs, clean data, and join sources into views for EDA, model development, and evaluation.
  - Conducted EDA, identifying structured data limitations and focusing on unstructured text, performing word frequency, and demographic analysis to assess feasibility of modeling task.
  - Led model experimentation assessing feasibility of KNN, transformer-based classifiers, XGBoost, GLMs, SVMs on featurized text.
  - Trained final model with CV in Azure ML Studio; tuned hyperparameters; reduced overfitting with early stopping and L2 weight decay.
  - Deployed dockerized Flask API for inference; ensured fairness of model predictions across demographic groups using Fairlearn.
- **RFP Document Generation Tool**
  - Developed a RAG chat interface using Azure OpenAI and Cognitive Search to aid in the generation of RFI, RFQ, and RFP documents.
  - Designed the system to extract relevant information from a knowledge base containing generic product details, enabling users to tailor responses to specific sections of RFP documents through a conversational interface.
  - Delivered a successful live demonstration to executive leadership, leading to interest in productizing the solution for broader deployment.

Northwestern University, Mathematics Department - Graduate Researcher/Teaching Assistant **09/2015-09/2022**

- High-Frequency Eigenfunction Asymptotics Research Program
  - Led a research program in which we calculated new high-frequency asymptotic limits of ladder sequences on CROSS spaces.
  - Presented research findings and complex ideas to both technical and non-technical audiences. Attended interdisciplinary conferences.
  - Developed a routine of continuous, independent learning in order to adapt to new, state-of-the-art methods in a rapidly evolving field.
- Teaching Experience
  - Taught 18 math courses to students with diverse backgrounds including engineering, social sciences, biology, physics, and mathematics; ranked in the **top 20%** of all graduate TAs according to average student feedback scores from 2018-2022.
  - Wrote and published a set of expository notes on the geometry of Lie groups that has been downloaded **over 5,500** times.

SELECTED INDEPENDENT PROJECTS

arXiv Mathematics Subject Classifier **07/2023-08/2023**

- Built an end-to-end solution to a multi-label text classification problem, classifying mathematics paper abstracts by subject.
- Trained and deployed a huggingface transformer model with a front-end for inference written in Gradio.

Scientific Paper Recommender System **05/2023-06/2023**

- Pitched project concept, organized and led a group to create a CBF recommender system for arXiv articles based on their abstracts.
- Sourced and cleaned data; built a KNN-based system using transformer embeddings; added topic analysis with BERTopic.

Stanford CS229 Intro to Machine Learning Course **03/2023-05/2023**

- Skills Developed: Statistical Analysis, Classification, Regression, Tree-based Methods, Model Evaluation, Model Calibration, Deep Learning

LEADERSHIP & AWARDS

Mathematics Department, Northwestern University

- Organized Seminar on the Symbol Calculus of Fourier Integral Operators **09/2019-06/2020**
- Awarded *NSF RTG Fellowship* in Geometric Analysis **09/2015**

Rutgers University

- Graduated summa cum laude **05/2015**
- Mathematics Honors Track **09/2013-05/2015**

EDUCATION

Data Science Bootcamp, Erdős Institute **05/2023-06/2023**
Mathematics Ph.D., Northwestern University **09/2015-09/2022**
Thesis: Empirical Measures for Integrable Eigenfunctions Restricted to Invariant Curves
Advised by Steven M. Zelditch
B.S. Material Science, Rutgers University **09/2010-09/2015**
Double major in Mathematics