Ryan Engel

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Education

Master of Science in Computer Science *Sept 2024 - May 2026 (Expected)*
Stony Brook University
Thesis on Reinforcement Learning in Quantitative Finance

Bachelor of Science in Computer Science *Sept 2020 - May 2024*
Stony Brook University
Specialization in Artificial Intelligence and Data Science

Relevant Coursework: Machine Learning in Quantitative Finance, Machine Learning Fundamentals, Natural Language Processing, Artificial Intelligence, Analysis of Algorithms, Applied Linear Algebra, Probability and Statistics, Data Structures and Algorithms, Software Engineering, Systems Fundamentals, Computer Networks, Graph Theory

Research Publications

Ryan Engel and Gilchan Park. 2024. Evaluating Large Language Models for Predicting Protein Behavior under Radiation Exposure and Disease Conditions. In Proceedings of the 23rd Workshop on Biomedical Natural Language Processing, pages 427–439, Bangkok, Thailand. Association for Computational Linguistics.

Work Experience

Alphabeta Hedge Fund: Quantitative Research Intern *August 2024 - Present*

- Developing a deep reinforcement learning framework for financial portfolio optimization, designed for monthly portfolio allocation across a universe of more than 60 ETFs.
- Converted various SAS macros to Python functions, streamlining the generation of 73 price-based factors and improving the efficiency of data preprocessing for machine learning models.
- Collaborating with researchers to integrate data with existing models, and exploring different reinforcement learning algorithms such as Deep Q-Networks and Policy Gradient Methods.

Brookhaven National Laboratory: Machine Learning Intern *June 2023 - August 2024*

- Evaluated the Mistral, Llama-2, and Llama-3 Large Language Models (LLMs) for predicting protein behavior, achieving state-of-the-art results in multiple experiments, with accuracy improvements of up to 10%. This work was presented at the BioNLP workshop during the ACL 2024 conference.
- Researched prompt engineering and Parameter Efficient Fine-Tuning (PEFT) of LLMs. Compared PEFT strategies like LoRA, Prompt-Tuning, and Prefix-Tuning using the Galactica LLM on the PubMedQA Dataset.
- Developed a Retrieval-Augmented Generation (RAG) system for LLMs, designed for text-graph question answering with a trainable subgraph retrieval mechanism using a graph convolutional neural network.

Projects

Search Engine for National Electric Codebook

- Built a search engine web application using React, Flask, Nginx, and Docker, along with the OpenAI API and the FAISS vector database in a RAG framework, deployed on Linode cloud services.
- The system efficiently answers queries and retrieves information from the NFPA 2017 Edition National Electric Codebook, used by electricians and electrical engineers nationwide. Application can be found at spark-e.ai

Financial Portfolio Optimization using Time-Series LLM

- Developed a portfolio optimization strategy using the Chronos-T5 LLM, fine-tuned on technical analysis indicators data with LoRA using an online learning algorithm.
- This project placed as a finalist in the SQA Alphathon 2024 competition out of 77 teams (148 participants) for its innovation and unique application of LLMs in finance.

Technical Skills

- **Programming Languages:** Python, Java, Javascript, C, C++, LaTeX, Go, Haskell, MIPS
- **Libraries:** PyTorch, Pandas, Numpy, Transformers, PEFT, Langchain, Scikit-learn, Matplotlib
- **Tools & Platforms:** Docker, Nginx, Git, Linux/Unix, SLURM, QuantConnect