Ethan (Hoang) Chu

1050 North Mills Avenue, Claremont, CA | ceric9817@gmail.com | 909-381-6851 | github.com/Renaxis-Math

EDUCATION

Pitzer College   Claremont, CA
Bachelor's Degree, Joint Computer Science and Mathematics (Honors)   Expected May 2024
- GPA: 3.7 / 4.0 (Math and CS classes cross-registered at Harvey Mudd College).
- **Classes**: Data Structures and Algorithms (**TA)**, Advanced Probability (**TA**), Abstract Algebra (**TA**), Linear Models, Machine Learning, Mathematics of Data Science and Topic Modeling, Computational Theory and Logic, Computer Systems, Advanced Linear Algebra, Computer Science Insights, Principles of Computer Science, Web Development.

AWARDS

- 9 / 82 teams - Southern California ICPC Contest
- Gold Medal (9 / 382): National Math Olympiad
- 3rd Ranked: National Math Modeling Olympiad
- Silver Medal: Asian Physics Olympiad

- [Codeforces Master (2147 rating - Top 3%)](#)
- [Top 1% (Round 3) Google Code Jam 2022](#)
- [4th Place - Citadel Terminal Algorithm Contest](#)
- [1st Place - Citadel Summer Invitational Datathon](#)

WORK EXPERIENCE

Periwinkle Trading ([periwinkletrading.com](#))   August 2023 - Present
Quantitative Researcher - Contract (report to the CEO)   *Technologies: **Pandas, Numpy, Scikit-learn, Apache Spark***
- Ideated using a Support Vector Regressor to estimate next-day equities prices, improving Sharpe ratio from 1.3 to 2.1.
- Analyzed generative properties of attention-based neural networks when applied to securities pricing data and reduced 10% hyperparameter tuning time with Bayesian Optimization compared to the baseline autoregressive algorithms.
- **Reduced model runtime by 60%** when training **gigabytes of data** by leveraging QR Decomposition to avoid matrix inversion when finding optimal coefficients and translating dataframe operations from Pandas searches to Spark joins.

University of Southern California   June 2023 - August 2023
Undergraduate Research Intern   *Technologies: **Pandas, Numpy, Scikit-learn, OR-Tools***
Topic: *"Solving the Vehicle Routing Problem with Recurrent Neural Network (RNN)"*
- **Tackled neglection of real-time factors** (e.g traffic jam) in the Traveling Salesman shortest-Path (TSP) algorithm by proposing and developing from scratch a customized attention-based Recurrent Neural Network model in C++.
- **Solved seq2seq's adaptability issue** with unordered sequences by convincing the team to use LSTM encoder-decoder (capture global instead of local information) with **a model built in Python** that **saved 15% time** on average than TSP.
- Proved convergence to suboptimal loss of incremental gradient method techniques in network optimization, and **utilized past research** in Group Theory to avoid RNN's vanishing and exploding gradients in model deployment.

Meta   May 2022 - August 2022
Engineering Intern   *Technologies: **PyTorch, Pandas, Numpy, Scikit-learn, Hadoop (MapReduce), kDB***
- Researched Vision Transformer (ViT) papers and delivered in Python a working model to replace Meta's ResNet50.
- Resolved ViT's Time Limit Issue in hyperparameter search by designing a Window Selection Optimization Algorithm.
- Implemented research papers with PyTorch that helped Vision Transformers compute 30% more efficiently - trained models showed a 25% decrease in inference time latency and flops, and additional 10% decrease in live production.
- **Improved label accuracy by 2%** on **100,000,000+** Marketplace training data: researched papers, proposed Google's Contrastive Captioners encoder-decoder in lieu of Meta's CLIP, and self-developed **a working prototype in Python**.

Cohost.ai ([cohost.ai](#))   June 2021 - August 2021
Engineering Intern   *Technologies: **gRPC, PostgreSQL, Apache Kafka, kDB***
- **Prevented message loss** by building **in C++** an IPC message queue (self-studied Systems) for the company's chat bot.

RESEARCH PROJECTS

Independent Research in Mathematics   January 2022 - May 2022
Topic: *"Explore Constraints on Unitary Recurrent Neural Networks (uRNN)"* (**[paper](#)**)   *Python*
- Proved that the norm of Unitary Matrices are bounded, thus they can prevent RNN vanishing and exploding gradients.
- Leveraged Hermitian matrices' orthogonality properties to **present a new gradient update rule**, ensuring subsequent weight matrices being unitary by complex spectral theorem and efficiently computed by eigen-decomposition.
- Proved model scalability by building a prototype that saw train time increase **only 2ms per 100 added hidden layers**.