

Henry (Hoang) Chu

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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), Combinatorics, Statistics, Machine Learning, Neural Network, Natural Language Processing, Statistical Linear Models, Mathematics of Data Science, Computational Theory, Advanced Linear Algebra, Programming Languages, Computer Systems.

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 Regression to predict 1-day Equities prices and developed a custom NLP-based feature selection from 20GB of alternative data to generate trading signals, **improving the 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 neglect 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 tuning by designing, discussing, and implementing independently a new Window Selection Optimization algorithm that **helped Vision Transformers compute 30% faster**.
- **Improved label accuracy by 2%** on **100,000,000+** Marketplace training data after researched, pre-trained in Python, and proposed Google's Contrastive Captioners encoder-decoder (arxiv.org/abs/2205.01917) in lieu of Meta's CLIP.

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**.