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. (Dean's List)
- **Coursework:** Data Structures (**Teaching Assistant, 1 year**), Intermediate Probability, Intermediate Linear Algebra, Algorithms, Linear Models, Data Mining, Abstract Algebra, Computational Theory and Logic, Computer Graphics.

AWARDS

- **Math**: 1st Prize: Vietnam Mathematical Olympiad, Silver Medal: Asian Pacific Mathematical Olympiad, 3x AIME.
- **Programming** (college started): Winner - SIG Coding Challenge, Meta Hacker Cup and Google Code Jam Round 2.

RESEARCH EXPERIENCE

University of Southern California - Research Scholar in Operations Research & Data Science June 2023 - Current
Topic: *"Nonlinear Optimization of Return on Investment for Facility Costs under Probabilistic Utility Models"* *Statistics*

- Proved that adding a deterministic and a random error makes the model non-convex and often fails to yield a solution.
- Devised, proved, and tested my proposition: changing from adding to multiplying a deterministic and a random error term transformed the cost optimization function from non-convex to solvable under any uniformly generated datasets.
- Proposed, customized, and implemented a Multi-Cut Approximation algorithm that well-approximated the solution of this NP-Hard problem while performing 5 to 10 times faster than a solver's traditional local search heuristic algorithm.

Harvey Mudd College - Independent Research January 2022 - May 2022
Topic: *"Explore Constraints on Unitary Recurrent Neural Networks"* (**paper**) *Mathematics of Topic Modeling*

- Proved that weight matrices within the unitary group can prevent uRNN's vanishing and exploding gradients problem.
- Developed a sample Unitary Recurrent Neural Network in Python with self-designed update rule based on the previous proof which demonstrated the model's practicality in Language Modeling tasks.

WORK EXPERIENCE

Meta May 2022 - August 2022
Engineering Intern (received return offer) *Python, Numpy, Scikit-learn, PyTorch, MapReduce. Applied Machine Learning*

- Proposed and delivered a topology-preserving dimension reduction algorithm achieving a 93% parameter reduction and improving 2% in accuracy for labeling 100,000,000+ Marketplace images using Meta AI's CommerceMM model.
- Designed a model-agnostic window selection algorithm partially addressed Vision Transformer's exponential scaling issue and facilitated a comprehensive performance analysis and comparison of the model with Meta AI's ResNet50.
- Utilized properties of directed acyclic graphs to accelerate the automation of generational data workflows in batches.

CoHost.ai (Seed-stage Startup) June 2021 - August 2021
Engineering Intern (only intern in the company) *C++, Full-Stack Development, MongoDB, gRPC, Kubernetes*

- Architected the system design for the company's web chatbot suggesting rental houses and serving 2000+ daily users.
- Deployed a fault-tolerant message queue for Inter-Thread Communication which prevents message loss if the program crashes, supports any data types as a message payload, streamlines ownership, and leaves no copies of messages sent.
- Designed test suites reaching 100% branch code coverage and enhanced CI/CD with Travis CI's cloud solution.

PROJECTS

LendingClub Risk Assessment | Citadel Summer Datathon Winner *Python, Numpy, Scikit-learn, Big Data Analytics*

- Performed statistical analysis on selected datasets totaling 26,000,000 data points and discovered that LendingClub had failed to detect new borrowers who'd defaulted and altered their personal information to manipulate interest rates.
- Developed a k-NN forecasting model with 94% accuracy for classifying and predicting new borrowers' interest rates.

Python to Java Compiler for Android Development | **MLH Fellowship** Open-Source Contributor *Java, Python, C*

- Wrote helper functions that detect and remove redundant bytecodes and avoid crashes when variables jump addresses.
- Refactored the team's embedded virtual machine that tracks and benchmarks performance improvement of OS' power, thermals, and latency and streams performance metrics across execution environments to an analytics dashboard.