# Hayden (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 (Major GPA: 3.9 -- Math and CS classes cross-registered at **Harvey Mudd College**)
- **Classes**: Machine Learning, Mathematics of Topic Modeling, Neural Network, Computer Systems, Linear Models.
- **Teaching Assistant -- 1 year**: Data Structures and Algorithms (in C++), Intermediate Probability, Abstract Algebra.

## AWARDS

- **Math**: 1st Prize: Vietnam Mathematical Olympiad, Silver Medal: Asian Pacific Mathematical Olympiad, 3x AIME
- **Coding** (no high school experience): Round 3: Google Code Jam, Winner: SIG Challenge

## RESEARCH AND DATA SCIENCE EXPERIENCE

**Periwinkle Trading** August 2023 - Present
Quantitative Researcher - Contract *Python*

- Working on the optimal execution under uncertain volume and linear propagator model using dynamic programming.
- Developing a market impact model that penalizes the testing of trade execution strategies in simulation environments.
- Consulted a Naive Bayes-LASSO-SVR feature filter which reduced overfitting of Periwinkle's 3-day forecast model.

**University of Southern California** June 2023 - August 2023
Undergraduate Research Intern *Python, MATLAB*
Topic: *"Last-mile Delivery Optimization with Recurrent Neural Network"*

- Designed a comprehensive feature selection that **reduced from 20 to 5** input predictors while keeping R^2 ~ 0.652.
- Proposed a greedy Path Generation Algorithm in Python that **improves disparity score by 10-20%**.
- Improved the team's RNN model accuracy **by 20%** in predicting a driver path by proposing a pairwise instead of a single pointer network, and optimized it **to real-time prediction**, allowing re-suggesting routes when drivers deviate.

**Independent Research** January 2023 - May 2023
Topic: *"Explore Constraints on Unitary Recurrent Neural Networks"* (**paper**) *Python*

- Proved that weight matrices in an Unitary Group can prevent the RNN vanishing and exploding gradient problems.
- Implemented **from scratch** a Unitary Recurrent Neural Network, adapting Arjovsky's paper while introducing a novel update rule constraint from prior proof to demonstrate the new model's practicality across Language Modeling tasks.

**Citadel Datathon - LendingClub Risk Assessment (26,000,000 data)** *Python*

- Ideated and built a customized Mahalanobis distance metric for K-Means algorithm, leading to the final discovery.
- Proposed feature selection and suitable test statistics to prove that LendingClub can't detect borrowers who defaulted.

## SOFTWARE ENGINEERING EXPERIENCE

**Meta** May 2022 - August 2022
Engineering Intern *Python, Hack*

- Proposed adaptation of two Microsoft Research papers on Vision Transformer (ViT) to Meta's ResNet50 model and customized a Window Selection algorithm addressing the ViT's scaling issue with **100,000,000+** Marketplace images.
- Independently built a prototype of the ViT model resulting in a **2% accuracy improvement** on 2,000,000 images.
- Initiated to implement and train Contrastive Captioners model, helping the team test new text generative algorithms.

**Cohost.ai (cohost.ai)** June 2021 - August 2021
Engineering Intern *Python, C++*

- Ideated a full-stack design and built from scratch an NLU-based conversational chatbot that serves 2000+ daily users.
- Collaborated with full-time engineers to build an IPC message queue to avoid message loss if chatbot crashes.
- Designed Tree Serialization algorithms reducing company web PageSpeed **from 30 secs to a consistent 0.8 second**.

## SKILLS

- **Technologies:** Pandas, Numpy, Scikit-learn, PyTorch, Keras, Linux Bash, Kafka, Hadoop, Kubernetes, Flask, NoSQL