

Henry Yu

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EDUCATION

Bachelor of Science - Computer Science

University of Wisconsin - Madison | GPA: 3.92/4.00

Expected May 2027

Madison, WI

SKILLS

Languages: Python, Java, C, C++, R

Tools and Libraries: Git, Docker, Kubernetes, Tableau, Excel, Qiskit, AWS, PyTorch, e3nn

Expertise: Financial Modeling, Risk Analysis, Statistical Analysis, Backtesting, Model Design

EXPERIENCE

Computational Chemistry Research Intern

June 2024 – Aug 2024

St. Jude Children's Research Hospital | Qiskit, PyTorch, AWS

Memphis, TN

- Designed hybrid quantum-classical architecture for protein density functional theory (DFT) calculations, integrating quantum computing with machine learning
- Developed a point cloud representation for atomic structures to handle geometric data for systems with millions of atoms or densities
- Trained a GPT-2 model to generate SMILES and SELFIES strings for viable molecular structures
- Presented potential applications of quantum computing to the research team, focusing on enhancing molecular simulations through novel model architectures

Quantum Computing Research

Sept 2023 – May 2024

Indiana University | Qiskit, Scikit-learn

Bloomington, IN

- Analyzed 7-qubit and 127-qubit systems, uncovering correlations between coherence times and gate error rates, achieving an R-squared of 0.105
- Designed quantum classifiers and artificial noise models, improving noise-resilient prediction accuracy by 10% and optimizing quantum system performance
- Performed regression modeling and time series analysis on multi-year datasets to predict error probabilities and enhance quantum error mitigation techniques
- Identified performance improvements by introducing amplitude dampening error, driving further exploration into quantum system efficiency enhancements

PROJECTS

Hybrid Quantum-Classical Model for Protein Density Calculations

June 2024 – present

Qiskit, PyTorch, e3nn, AWS

- Continuing work on novel computational model, inspired by object classification techniques in computer vision
- Designing and developing a E(3)-equivariant 3D convolutional architecture to predict electronic densities, capturing both local atomic interactions and global molecular structures with rotational and translational symmetry
- Investigating methods to incorporate quantum computing features to encode quantum mechanical properties into molecular systems

Music Generation Using Performer

Mar 2024 – present

Scikit-learn, PyTorch

- Developing a Performer-based model for music generation, leveraging kernelized attention mechanisms to capture long-range dependencies
- Implementing a custom dataset class to handle MIDI sequences, ensuring proper data formatting and preprocessing for model training
- Conducting model evaluation by comparing results against a trained GPT-2 model and a GRU-based model, focusing on musical quality and expressiveness

Breaking the Cycle: Reducing Recidivism in Iowa State Prisons

Sept 2022 – Apr 2023

Pandas, Keras, Matplotlib

- Analyzed probability of prisoners re-offending by developing a feedforward neural network.
- Tested FNN using AUC-ROC score, SHAP analysis, multiple regressions, and Monte Carlo simulations, linking analytical outcomes to policy impact.
- Discovered that Class A felons, on average, cost the prison approximately \$170,000.
- Placed 2nd nationwide with a publication; \$15,000 team reward.

PUBLICATIONS

- Lou Zhou, Henry Yu, Amar Kanakamedala, Jeffrey Liu, and Evan Wu, "Breaking the Cycle: Reducing Recidivism in Iowa State Prisons," 2023.2 ARCH, Education and Research Section of the Society of Actuaries.