

Education

2021–2025 : **Bachelor of Science; Computer Science, Mathematics, University of Washington, Seattle,** Relevant Coursework: .

- **Math:** Quantum Probability Theory, Combinatorial Optimization, Modern Algebra, Accelerated Advanced Honors Calculus, Advanced Linear Algebra
- **Computer Science:** Markov Chains, Graduate Algorithms, Graduate Natural Language Processing, Quantum Computing, Toolkit for Modern Algorithms, Introduction to Algorithms, Complexity Theory, Machine Learning, Data Structures.

Research experience

Publications and Pre-prints

2024 **Alex Albors, Hisham Bhatti, Lukshya Ganjoo, Raymond Guo, Dmitry Kunisky, Rohan Mukherjee, Alicia Stepin and Tony Zeng,** On the Structure of Bad Science Matrices, In: *arXiv preprint arXiv 2408.00933*.

Talks

May 2024 **Error estimates and asymptotic analysis for exact qudit universality**, Undergraduate Research Symposium 2024, University of Washington.

Ongoing research

Jun 2024 – **Approximation algorithms for solving quantum max cut.**

Aug 2024 I am presently working with Professor Andrea Coladangelo, where we're focused on developing approximation algorithms to find a high energy state of the QMC Hamiltonian. This Hamiltonian while serving as a generalization to the computational problem of finding a maximum cut, is also physically motivated since it models anti-ferromagnetic Hamiltonians.

Advisor : **Dr. Andrea Coldangelo**, Assistant Professor, Department of Computer Science & Engineering, ([Personal Web-page](#))

Teaching

Fall 2023, **CSE 534: Graduate Quantum Computing**, UW CSE.

- 2024:
- Taught a special topics graduate class on quantum computing and algorithms.
 - Graded homework assignments and conducted office hours.

Spring, 2024: **CSE 434Q: Introduction to Quantum Computatation**, UW CSE.

- Taught a special topics undergraduate class on quantum computing and algorithms.
- Initiated weekly sections for 30+ students, grading 100+ assignments weekly and conducting office hours

Winter, 2024: **CSE 417: Algorithms and Computational Complexity**, UW CSE.

- Taught a class on designing and analyzing algorithms and data structures, along with efficient models of computation intended for a general undergraduate audience.
- Initiated weekly sections for 20+ students, grading 100+ assignments weekly and conducting office hours

Spring, 2023: **CSE 311: Foundations of Computing I**, UW CSE.

- Taught a class focusing on the fundamentals of logic and computation intended for a general undergraduate CS audience.
- Initiated weekly sections for 25+ students, grading 200+ assignments weekly and conducting office hours.

- Winter, 2023: **CSE 446: Introduction to Machine Learning**, UW CSE.
- Taught an introductory class on machine learning intended for an advanced undergraduate CS audience.
 - Initiated weekly sections for 15+ students, grading 100+ assignments weekly and conducting office hours.
- Fall, Summer 2022: **CSE 312: Foundations of Computing II**, UW CSE.
- Taught an introductory class on probability and statistics intended for a general undergraduate CS audience.
 - Initiated weekly sections for 25+ students, grading 200+ assignments weekly and conducting office hours.

Projects

- May 2023 - **SVD-based word embeddings**, Python, numpy, pandas.
- May 2023:
 - Engineered a state-of-the-art word embedding solution, utilizing the top 10,000 words from a vast Wikipedia corpus of 1.5 billion words, enhancing language understanding.
 - Leveraged Singular Value Decomposition (SVD) to capture semantic and syntactic meaning within a high-dimensional vector space.
 - Utilized state-of-the-art embeddings to conduct projection analysis, unveiling syntactic relationships and showcasing a high level of proficiency in linguistic concepts.
- Nov 2022 - **Image Classifier**, Python, pandas, pytorch, numpy.
- Dec 2022:
 - Analysed different deep learning architectures to classify images using the CIFAR-10 dataset.
 - Optimized fully connected and convolutional neural network training by designing and implementing a robust architecture using numpy and PyTorch.
 - Obtained a validation accuracy of >50% and > 65% respectively using a fully connected neural network and a convolutional neural network.
- June 2022 - **Campus Paths**, Java, Javascript, React, Node.js.
- Aug 2022:
 - Displays the most optimal paths between requested locations at the University of Washington via a custom-built full-stack application.
 - Implemented a Java-directed graph, Dijkstra's algorithm, REST API endpoints, TypeScript and a React user interface.
 - Redesigned project deliverables to include specific accessibility enhancements, such as visual cues and intuitive navigation; improved user engagement and satisfaction.
- May 2022 - **Quantum and Quantum Inspired algorithms**, \LaTeX .
- May 2022:
 - Studied many quantum algorithms in fields ranging from molecular chemistry to machine learning.
 - Analyzed the advantages of aforementioned quantum algorithms and the ways these techniques could improve pre-existing classical algorithms.
 - Investigated the differences between complexity classes; classical and quantum and their implications in complexity theory.

Languages and Skills

Languages Java, Python, Lean, OCaml, C++, C, Racket, Javascript, SQL, MySQL

Technologies \LaTeX , Mathematica, Git, Jupyter Notebooks, AWS, PyTorch, TensorFlow