# Lukshya Ganjoo

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## 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:** Graduate Algorithms, Graduate Natural Language Processing, Quantum Computing, Toolkit for Modern Algorithms, Introduction to Algorithms, Complexity Theory, Machine Learning, Data Structures.

## Research Experience

### University of Washington, Seattle

Sep 2023 – present ***Gate-based computation and simulation using qu($d$)it systems***.
I am presently under the guidance of Professor Sara Mouradian and Vikram Kashyap, where I'm focused on gate-based quantum computation utilizing qu($d$)it gates. In broad strokes, I study qu($d$)it-gate fidelity, gate decomposition, and the experimental advantages in the context of an enlarged basis.

Advisor : **Dr. Sara Mouradian**, *Assistant Professor, Department of Electrical & Computer Engineering*, (*Personal Web-page*)

## Teaching

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

Fall, 2023: **CSE 599: Graduate Quantum Computing**, UW CSE.

- Taught a special topics graduate class on quantum computing and algorithms.
- Graded homework assignments and conducted 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 a 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 - May 2023: **SVD-based word embeddings**, Python, numpy, pandas.

- 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 - Dec 2022: **Image Classifier**, Python, pandas, pytorch, numpy.

- 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 - Aug 2022: **Campus Paths**, Java, Javascript, React, Node.js.

- 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 - May 2022: **Quantum and Quantum Inspired algorithms**, LaTeX.

- 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