Helen Zhang

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Education

Sept. 2023	**Mila/Université de Montréal** *Ph.D. Computer Science* Supervised by Dr. Simon Lacoste-Julien
Sept. 2021 - Present	**University of British Columbia - 95.3%** *M.Sc. Computer Science, Lab of Computational Intelligence* Supervised by Dr. Mark Schmidt Thesis (in progress): Strategic Exploration in Reinforcement Learning
Sept. 2015 - Sept. 2019	**University of British Columbia - Major 87.3%** *B.Sc. Combined Honours in Computer Science and Mathematics* Graduated with Distinction

Publications

UAI 2023 (Oral)	**Optimistic Thompson Sampling for Episodic Reinforcement Learning** *B. Hu, **T. Zhang**, N. Hegde, M. Schmidt*

Research Experience

Sept. 2022 - Present	**Optimization in Safe RL -Master's Thesis in progress** *UBC · Department of Computer Science* Supervised by Dr. Mark Schmidt and Dr. Sharan Vaswani (SFU) - Researching safe reinforcement learning modeled by constrained Markov Decision Process, its linear programming formulation, and existing convergence bounds - Approaching zero constraint violation in tabular online learning via Interior Point Method, and exploring extension to linear function approximation via policy mixture
May 2019 - Aug. 2019	**Safe Set Reachability Analysis - Undergraduate Research Assistant** *UBC · Department of Computer Science* Supervised by Dr. Ian Mitchell - Investigated finite horizon invariant kernel of an affine system using zonotopes - Improved approximation of heuristic objectives and proving its convexity under scaling - Formulated optimization and automated test routines in Julia using convex.jl and JuMP
Jan. 2019 - Apr. 2019	**Mini-max games on Galton-Watson Trees - Directed Studies** *UBC · Department of Mathematics* Supervised by Dr. Omer Angel - Studied minimax game and its convergence and endogeny on Galton-Watson tree - Analysed uniqueness of distribution function via numerical Taylor series expansions

Scholarships and Awards

2022	**UBC Cloud Innovation Center Fellowship, $20000**
	- Assistantship and scholarship funding based on academic performance and experience
2019	**NSERC Undergraduate Student Research Award, $6000**
	- Awarded to students demonstrating exemplary qualities for research in natural sciences
2018	**UBC Faculty of Science International Student Scholarship, $10000**
	- Awarded to students demonstrating strong academic achievement, engagement in the faculty, and potential to make scholarly contributions within their chosen field of study
2016, 2017, 2018, 2019	**UBC Science Faculty Dean's Honour List**
	- Awarded to students maintaining an academic average above 80%
2015	**UBC Outstanding International Student Award, $6000**
	- Entrance scholarship awarded to qualified students showing strength academically and displaying involvement outside of the classroom

Course Projects

Jan. 2022 - Apr. 2022	**Stability of Stochastic Gradient Descent**
	UBC · CPSC 532S: Statistical Learning Theory
	- Conducted literature review on generalization error and uniform stability of SGD and its practical implications in differential privacy and online learning
Jan. 2022 - Apr. 2022	**Deep Generative Models**
	UBC · CPSC 540: Machine Learning
	- Studied architecture of Variational Auto-encoder, Generative Adversarial Networks, and normalizing flows, compared advantages, limitations, and applications of each model
Sept. 2021 - Dec. 2021	**Transfer Learning in Dynamic Environment**
	UBC · CPSC 533V: Learning to Move
	- Implemented Soft Actor-Critic method on OpenAI gym classic control games with Proximal Policy optimization method and GAE lambda advantage function - Trained universal policy with dynamic system identification to reduce Sim-to-Real gap
Sept. 2021 - Dec. 2021	**Mitigating Bias in Hate Speech Detection**
	UBC · CPSC 503: Computational Linguistics
	- Fine-tuned and compared BERT, LSTM, and RNN for online hate speech detection - Mitigated bias by generating synthetic identity words via LDA topic modeling
Sept. 2021 - Dec. 2021	**Graph Recommendation System**
	UBC · EECE 571F: Deep Learning with Structures
	- Implemented experiments on feature transformations and activations on Graph Convolutional Neural Network based collaborative filtering recommendation system - Combine knowledge graph with GCN models to exploit auxiliary information

Teaching

Sept. 2021 - Present	**Graduate Teaching Assistant** *UBC · CPSC 532M/340: Machine Learning and Data Mining*
	- Gave guest lectures on Deep Reinforcement Learning and Autonomous Driving - Hosted weekly tutorials on topics in algorithms for dimensionality reduction, nonlinear regression, classification, clustering, and unsupervised learning
Jan. 2018 - Apr. 2018	**Undergraduate Teaching Assistant** *UBC · Math 152: Linear Systems*
	- Designed and graded homework assignments and exam questions for 2D and 3D geometry, vectors and matrices, eigenvalues and vibration, physical applications - Hosted lab sessions to demonstrate computer solutions of large systems using MATLAB
Sept. 2017 - Apr. 2018	**Undergraduate Teaching Assistant** *UBC · CPSC 121: Models of Computation*
	- Hosted weekly tutorials on physical and mathematical structures of computation, sets and relations, and proof techniques - Directed weekly lab sessions on Boolean algebra and combinations logic circuits, functions and sequential circuits, finite state machines, and sequential instruction execution
July 2017 - Aug. 2017	**Undergraduate Teaching Assistant** *UBC · Math 102: Integral Calculus*
	- Graded homework assignments and exams on functions, derivatives, optimization, growth and decay, and discrete probability
Jan. 2017 - Apr. 2017	**Mathematics Mentor** *Windermere Secondary School*
	- Mentored around 25 high-school students with math or science homework

Competitions

Dec. 2018	**Putnam Competition, Mathematical Association of America** Ranked top 1500 in North America
Sept. 2014	**Chinese Physics Olympiad (CPhO)** Guangdong provincial secondary prize

Presentations

Oct. 2022	**Language Models are Few Shot Learners (GPT-3)** *UBC · Machine Learning Reading Group*
June 2022	**Active Learning and Image Segmentation** *UBC · Machine Learning Reading Group*
Mar. 2022	**Oops I Took a Gradient: Scalable Sampling for Discrete Distributions** *UBC · Machine Learning Reading Group*
Dec. 2021	**Understanding The Origins of Bias in Word Embeddings** *UBC · Machine Learning Reading Group*
Dec. 2021	**Reinforcement Learning and Autonomous Driving** *UBC · CPSC 340: Machine Learning and Data Mining*
Nov. 2021	**Probabilistic Topic Modeling** *UBC · CPSC 503: Computational Linguistics*

Additional Work Experience

May 2022 - Present	**Research Developer**
	UBC-AWS Cloud Innovation Center
	- Advised undergraduate students with machine learning knowledge to build an innovation dashboard for the Office of the Vice-President, Research and Innovation of UBC - Processed NSERC and CIHR data with AWS Glue Studio, developed a web application to display researchers' profiles and contributions to assist grant resource allocation
Sept. 2019 - Apr. 2021	**Software Engineer**
	Magnitude - Simba Technologies
	- Developed JDBC driver releases for Amazon Redshift Database using Java and SQL - Designed customer test packages and its website BigSight using React.js and HTML/CSS - Implemented installation package file directory and test automation Python scripts
July 2018 - Aug. 2018	**Research Intern**
	Bank of China International, London
	- Trained a US Treasury prediction model using linear regression, analyzed the company's earning calls, and composed financial reports on futures and options predictions
May 2018 - June 2018	**Research Intern**
	China CITIC Bank International Limited, Shanghai
	- Processed and analyzed companies' financial statement data, investigated backgrounds of their competitors, buyers, and suppliers and assessed future market value and risks
July 2016 - Aug. 2016	**Customer Manager Intern**
	Guotai Junan Securities Co., Ltd, Shanghai
	- Constructed personalized securities investment portfolios, calculated and visualized expected rate of return and risk levels

Certificates

Dec. 2018	**Instructional Skills Workshop Completion Certificate**
	UBC Centre for the Integration of Research, Teaching, and Learning (CIRTL)

Volunteering and Extracurricular Activities

Jan. 2022 - Present	Member, UBC Mathematics of Information, Learning, and Data research group
Sept. 2017 - Present	Representative, UBC Dance Horizon Club
Apr. 2022	Volunteer, Graduate Student Orientation
Dec. 2021	Student Helper, Graduate Recruiting Committee
Sept. 2015 - Apr. 2019	Member, UBC Math Club
Sept. 2018	Volunteer, UBC Computer Science Tri-Mentoring Program
Apr. 2017	Volunteer, Greater Vancouver Regional Science Fair (GVRSF) Lab Tour