

Yuhe Qin

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Education

Southern University of Science and Technology (SUSTech)

Sep 2022 – Jul 2026

B.Sc. in Mathematics and Applied Mathematics

(expected)

- Fields Honors Class in Mathematics.
- Relevant coursework: Machine Learning, Optimization, Topology, Probability and Statistics, Mathematical Analysis, Linear Algebra.

University of California, Berkeley

Jan 2025 – Dec 2025

Visiting Student

- GPA: 3.81/4.00.
- Relevant coursework: Efficient Algorithms and Intractable Problems, Data Structures, Artificial Intelligence, Structure and Interpretation of Computer Programs, Discrete Mathematics.

Teaching Experience

Teaching Assistant and Grader, Calculus II

Spring 2026

Southern University of Science and Technology

Shenzhen, China

- Prepared and delivered weekly recitation and review sessions in English for a class of 37 students.
- Reviewed common mistakes from previous homework and guided students through in-class practice problems.
- Held office hours and graded homework, providing individualized support and feedback on students' performance.

Research Experience

Topology-Aware Learning for 3D Point Clouds

Dec 2025 – May 2026

Bachelor's thesis project, supervised by Prof. Yifei Zhu

Shenzhen, China

- Analyzed geometric and topological inductive biases in deep learning frameworks, evaluating persistent homology for robust feature extraction and geometric representations in unstructured 3D vision data.
- Proposed a two-axis taxonomy based on representation mechanisms and integration strategies, comparing the strengths and limitations of each category to guide future topology-aware point cloud learning.
- Designed and executed empirical ablation studies using PointNet backends to quantify the performance gain of multi-modal feature fusion (topological descriptors + geometric coordinates).

Computational Topology and Signal Representation

Mar 2024 – Sep 2024

Research intern, supervised by Prof. Yifei Zhu

Shenzhen, China

- Studied topological data analysis with a focus on persistent homology and its computational pipeline.
- Reviewed auditory Gestalt principles and explored mathematical formulations of perceptual grouping for signal representation.
- Designed preliminary experiments converting speech signals into topology-based embeddings.

SPIRES 2024 Poster Presentation

Aug 2024

Poster presenter

Oxford, England

- Presented a poster on topology-enhanced machine learning for classifying voiced and voiceless consonants in speech signals.

Selected Projects

Interactive Vietoris–Rips Filtration and Persistence Diagram Demo [↗](#)

May 2026 (ongoing)

Web-based computational topology visualization tool

- Built an interactive demo for Vietoris–Rips filtrations and persistence diagrams on 2D point clouds.
- Visualized H_0 , H_1 , and H_2 features with birth–death pairs and persistence filtering.
- Added hover interactions linking simplices, birth–death pairs, and persistence features for easier interpretation.

Artificial Intelligence Projects

Fall 2025

- Implemented Markov Decision Processes (MDPs) and Q-learning architectures for multi-agent planning; built neural network classifiers from scratch in Python focusing on first-order optimization methods, convergence behaviors, and gradient descent variants.

Semantic Segmentation for Autonomous Driving

Spring 2023

- Developed Fully Convolutional Networks (FCN) for pixel-level semantic segmentation, optimizing cross-entropy loss functions and evaluating via mIoU metrics.”

Data Structures and Algorithms Projects

Spring 2025

- Built Java projects involving custom data structures, graph search, corpus analysis, and WordNet-style semantic queries.

Academic Experience

Student Seminars in Mathematics

2023 – 2024

Seminar speaker

- Delivered advanced seminar talks on set theory (the Axiom of Choice), Fourier analysis (Poisson summation, uncertainty principles) and extremal combinatorics, demonstrating strong foundations in mathematical analysis applicable to continuous learning models.

Skills

Programming: Python, C++, Java, C#, Scheme, SQL, HTML/CSS.

Machine Learning: PyTorch, NumPy, SciPy, Matplotlib, GUDHI.

Tools: $\text{\LaTeX}$, Git, Blender, Figma, Unity, Unreal Engine.