# QINGXUAN JIANG

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## OBJECTIVE

To apply for PhD programs starting Fall 2021.

## EDUCATION

**Cornell University**, College of Arts and Sciences — *Ithaca, NY*
Double Major in Mathematics and Computer Science — *Sept. 2017 - May 2021 (expected)*
Overall GPA: **4.11/4.3** (Dean's List, All Semesters)

## RESEARCH INTERESTS

Convex Optimization, Mathematical Foundations of Machine Learning, Geometric Deep Learning

## PUBLICATION AND WORKING PAPER

**Conference Paper**

- Horace He, Aaron Lou*, **Qingxuan Jiang***, Isay Katsman*, Serge Belongie, and Ser-Nam Lim, Adversarial Example Decomposition, International Conference on Machine Learning Workshop (ICMLW), Long Beach, CA, 2019. [arXiv]
- Aaron Lou*, Isay Katsman*, **Qingxuan Jiang***, Serge Belongie, Ser-Nam Lim, and Christopher De Sa, Differentiating through the Fréchet Mean, International Conference on Machine Learning (ICML), 2020. [arXiv] [Code] [Video]
- Aaron Lou*, Derek Lim*, Isay Katsman*, Leo Huang*, **Qingxuan Jiang**, Ser-Nam Lim, and Christopher De Sa, Neural Manifold Ordinary Differential Equations, to appear at Neural Information Processing Systems (NeurlPS), 2020. [arXiv] [Code]

(* indicates equal contribution)

**Journal Paper**

- **Qingxuan Jiang**, Tian Lan, Kasso Okoudjou, Robert Strichartz, Shashank Sule, Sreeram Venkat, Xiaoduo Wang, Sobolov Orthogonal Polynomials on the Sierpinski Gasket, submitted to *Journal of Fourier Analysis and Applications*. [arXiv] [Website] [Code]

(In alphabetical order)

## RESEARCH EXPERIENCE

**Acceleration of Optimization Algorithms via Numerical Analysis Methods** — *Sep. 2020 - Present*
*Supervisor: Adrian Lewis* — *Department of Operations Research and Information Engineering, Cornell*

- Year-long senior thesis project
- Working on applying the regularized nonlinear acceleration method to speed up optimization algorithms

**Local Elasticity and Generalization of Neural Networks** — *Jul. 2020 - Present*
*Supervisor: Weijie Su* — *Department of Statistics at the Wharton School, University of Pennsylvania*

- Working on empirical evaluation of the relationship between local elasticity and generalization of neural networks

**First-order Methods on Large-scale Convex Optimization Problems** — *Jul. 2019 - Dec. 2019*
*Supervisor: James Renegar* — *Department of Operations Research and Information Engineering, Cornell*

- Implemented subgradient method with restart scheme in MATLAB.
- Applied the above method to speed up algorithms for simple convex feasibility problems with half-spaces.

**Manifold Optimization and Geometric Deep Learning** — *Sep. 2018 - Present*
*Supervisor: Christopher De Sa* — *Undergraduate Artificial Intelligence Research Group, Cornell*

- Developed optimization methods for computation and differentiation of the Fréchet mean
- Integrated these methods into current hyperbolic deep learning architectures, and achieved state-of-the-art result in graph embedding tasks with high hyperbolicity.

## PROJECT EXPERIENCE

**Analysis and Implementation of Spectral Method** — *Jun. 2020 - Aug. 2020*
*Supervisor: Alex Townsend* — *Department of Mathematics, Cornell*

- Sponsored by Cornell Research Experience for Undergraduates (REU)

- Developed efficient numerical methods for evaluating exponential integrators, and improved current methods for finding eigenvalues of self-adjoint operators
- Paper under preparation

**Orthogonal Polynomials on the Sierpinski Gasket** *Jun. 2019 - Jul. 2019*
*Supervisor: Kasso Okoudjou, Robert Strichartz* *Department of Mathematics, Cornell*

- Sponsored by Cornell Summer Program for Undergraduate Research (SPUR)
- Developed theory and a Python package for computation of Sobolov and Chebyshev polynomials on SG

**Quantum Mechanics-Inspired Acquisition Function in Bayesian Optimization** *Jul. 2018 - Aug. 2018*
*Supervisor: Tingyang Xu* *Tencent AI Lab Machine Learning Group*

- Developed new acquisition functions for Bayesian Optimization using quantum distribution functions
- Achieved 10% improvement from baseline Gaussian Process methods on certain benchmark functions

## CAMPUS INVOLVEMENT

**Teaching Assistant** *Jan. 2018 - Present*
*Department of Computer Science, Cornell*

- CS 2800: Discrete Structures (SP18, FA18, SP19). Instructor: Michael George
- CS 4820: Introduction to Algorithms (FA19). Instructor: Eva Tardos
- CS 4850: Mathematics Foundations for the Information Age (SP20). Instructor: John Hopcroft
- CS 4780: Introduction to Machine Learning (FA20). Instructor: Thorsten Joachims

**Cornell Math Club**, Member *Aug. 2017 - Present*
**Cornell Putnam Team**, Member *Dec. 2018 - Present*
**Cornell Data Science Club**, Member *Aug. 2017 - Dec. 2017*

- Worked in teams of 3 and achieved top 16% in Zillow's Home Value Prediction Competition

## AWARDS & CERTIFICATES

**Honorable Mention**, International Mathematical Contest in Modeling 2019 *Jan. 2019*
**4th Place**, Cornell Mathematical Contest in Modeling *Nov. 2018*
**Rank 122 out of 4638**, William Lowell Putnam Mathematical Competition 2017 *Dec. 2017*
**Tanner Dean's Scholars**, Cornell University *May 2017*
**3rd Place Karl Menger Memorial Award**, American Mathematical Society *May 2016*
**4th Award in Math**, Intel International Engineering and Science Fair (ISEF) *May 2016*