ANDY ZHANG

CURRICULUM VITAE

CONTACT INFORMATION

Email: az8940@princeton.edu

EDUCATION

Princeton University **Fall 2022 – Present**
PhD in Applied and Computational Mathematics Princeton, NJ
Advisor: Amit Singer

Duke University **Fall 2018 – Winter 2021**
Bachelor of Science in Computer Science | Bachelor of Science in Mathematics | Minor in Economics Durham, NC
GPA: 3.94/4.00

RESEARCH INTERESTS

Broad: applied mathematics, biological imaging
Specific: 3-D reconstruction in cryo-EM, method of moments, convex optimization

CURRENT PROJECTS

A rotationally-invariant metric for molecules computable from cryo-EM images *(in progress)*
with Joe Kileel, Eric J. Verbeke, Nicholas F. Marshall, Marc Aurèle Gilles, Amit Singer

Method of moments with non-uniform distribution of viewing angles and homologous modeling *(in progress)*
with Oscar Mickelin, Amit Singer

RESEARCH EXPERIENCE

Continuous Distributions of Interdomain Orientations **Winter 2021 – Winter 2022**
Bruce Donald (CS Department) Duke University
- Fit continuous Bingham distributions on the 3-sphere to realistically model intramolecular motion for RNA/TAR
- Using smoothness, created a gradient descent algorithm over SO(3) that probes the loss landscape and extends to Gaussian mixture models
- Generating synthetic molecular data to determine how our Branch and Bound algorithm used to fit distributions functions under noise

OSPREY in Scheme **Summer 2020**
Bruce Donald (CS Department) Duke University
- Coded a Scheme interface for our laboratory's open-source protein design software suite, OSPREY 3.0
- Allowed for students in discrete math to design proteins without the need of learning a new language
- Designed and analyzed the binding energies of mutations of the HIV antibody PG9, validating earlier designs and documenting an example workflow

Distance Geometry **Spring 2019**
Bruce Donald (CS Department) Duke University
- Investigated designing polynomial time approximation schemes for protein structure determination given sparse NMR data
- Re-examined the proof of NP-Hardness of approximation by observing that the graph formulation involved superimposition of hydrogen molecules

TEACHING EXPERIENCE

Duke University
Head Teaching Assistant – Computer Science 230: Discrete Mathematics for Computer Science **Instructor:** Bruce Donald
Fall 2019, Fall 2020, Fall 2021
Teaching Assistant – Computer Science 590: Computational Structural Biology **Instructor:** Bruce Donald
Spring 2019, Spring 2020

INDUSTRY EXPERIENCE

Amazon **Summer 2021**
Software Development Engineer Intern, AWS Seattle, WA
- Worked with the Database Migration team to make statistics, logs, and other relevant debugging information more easily accessible
- Modified the team's Ruby on Rails website to allow engineers to search for, retrieve, and grep within logs hosted elsewhere
- Reduced the need for manual ssh calls by automating running commands on a remote host and writing the results to the team's website

AWARDS & HONORS

Graduate Research Fellowship Program **National Science Foundation**
Alex Vasilos Memorial Prize **Duke University**