XIAO (ANTHONY) HONG

+1 (314)-857-4211 | email: hong.x@wustl.com

website: https://anthonyhongxiao.github.io/

EDUCATION

Washington University in St. Louis   St. Louis, United States

B.S. in Economics & Computer Science; Double Major in Mathematics   *Aug 2021 – May 2025*

- **Overall GPA**: 3.98/4.00; **Major GPA**: 3.99/4.00
- **Selected Honors**: Brian Blank Award, Dean's List, Freiwald Scholar, Tau Beta Pi Engineering Honor Society invitation (Upper 8th of McKelvey School of Engineering)
- **Selected Courses**: Math5045 Algebraic Topology (A); Math5046 Differential Topology (A); Math5031 Algebra I (A+); Math5022 Complex Analysis II (A-); Math547 Theory of Polytopes (A+); Math560 Compact Lie Group (in progress); CSE543T Algorithms of Nonlinear Optimization (A); Math5440 High-dimensional Probability (A+); Math586 Network Statistics (A); Math350 Dynamical System and Chaos (A).

PUBLICATIONS

1. **Xiao Hong**. (2020, December). "Study of Intergenerational Mobility and Urbanization Based on OLS Method and Ordered Probit Model." *2020 International Conference on Management Science Informatization and Economic Innovation and Development (MSIEID 2020).* IEEE, 10.1109/MSIEID52046.2020.00092
2. **Xiao Hong**, "The 2-Sheeted, 3-Sheeted, and Universal Coverings of Corresponding 2-Oriented Graph of Rank-2 Free Group", Accepted, *MathStat Conference: Focusing on Mathematics and Statistics (FMS 2024).* Dean & Francis.

RESEARCH EXPERIENCES

Summer Geometry Initiative, Massachusetts Institute of Technology   Remote

Mentored group projects   *Jul 2024 – Aug 2024*

Deforming Mesh (Dr. Nickolas Sharp)

- Computed and compared the Gromov-Hausdorff distance, Hausdorff distance, and Chamfer distance as shape dissimilarity measures.

Signed Distance Functions (Prof. Oded Stein and Prof. Silvia Sellán)

- Designed and reconstructed signed distance functions (SDFs) using the marching squares algorithm.
- Proved the theorem of characterization of SDF on plane by Eikonal equation and closest point condition.

Fitting Inconsistent Input with Noise Regularization (Prof. Amir Vaxman)

- Used shallow neural networks and adversarial modules to reconstruct surfaces from Poisson disc samples, visualized by Polyscope.

Winding Numbers Vectorization (Prof. Edward Chien)

- Computed winding numbers as harmonic functions on torus and its universal cover via C++ and CMake.
- Utilized intrinsic triangulations to resolve color region disconnections on the mesh, optimizing edge lengths in the feature space embedding.

Freiwald Scholars Program, Washington University in St. Louis   St. Louis, United States

Independent study supervised by Prof. Renato Feres   *Jul 2023 – Jan 2024*

Curvature of Cayley Graph of Abelian and Nilpotent Groups

- Developed efficient algorithms for computation of the Ollivier-Ricci curvature of Cayley graphs of abelian and nilpotent groups.
- Studied Wasserstein distance of point measures evolving along geodesics.
- Presented on Midstates Consortium for Math and Science 23 at University of Chicago and WashU SP24 Undergraduate Research Symposium.

Washington University in St. Louis   St. Louis, United States

Undergraduate honor thesis supervised by Prof. Xiang Tang   *Feb 2024 – Present*

The Atiyah-Guillemin-Sternberg Convexity Theorem

- Worked through Ana Cannas da Silva's *Lectures on Symplectic Geometry* and *Symplectic Toric Manifolds*.
- Wrote a report on Atiyah-Guillemin-Sternberg convexity theorem.

Imperial College London   Remote

Group project supervised by Prof. Jeroen Lamb   *Aug 2024 – Sep 2024*

Multifractals

- Reviewed theorems on Hausdorff dimension of α-level set of the local dimension of self-similar measure.
- Interpreted and visualized $f(\alpha)$ and $\tau(q)$ plots of multifractals in real-world data by Matplotlib.

COURSE PROJECTS

Hex & Bouwer Paper Report (Math4181 Topology II) *Mar 2022*
- Corrected an equivalence proof in David Gale's "The Game of Hex and The Brouwer Fixed-Point Theorem."

Split Spoils: Solution to Stolen Necklace Problem Via Borsuk-Ulam Theorem (Math4181 Topology II) *May 2022*
- Solved the 2-dimensional Necklace division problem using the Borsuk-Ulam Theorem.

A Note on Characterizations of Archetypal Riemann Surfaces (Math497 Topics in Group Theory) *May 2023*
- Summarized the isometry groups, automorphism groups, and curvatures of the three Riemann surfaces in the uniformization theorem.

Image Classification Using Wasserstein Distance from Monge-Kantorovich Solvers (CSE543 Algorithms of Nonlinear Optimization) *Dec 2023*
- Surveyed algorithms of gradient descent and numerical PDE for Monge problems in image classification.

Brion's Theorem and Khovanskii-Pukhlikov Theorem (Math547 Theory of Polytopes) *May 2024*
- Presented Brion's theorem and applied Todd operator to volume perturbation of unimodular polytopes.

WORK EXPERIENCE

Department of Mathematics, Washington University in St. Louis St. Louis, United States
Teaching Assistant, Math5046 Differential Topology, Prof. Rachel Roberts *Jan 2024 – May 2024*
- Held weekly office hours; graded weekly assignments.

Grader, Math4111 Introduction to Analysis, Prof. Ari Stern *Aug 2022 – Dec 2022*
Grader, Math4171 Topology I, Prof. Xiang Tang *Aug 2023 – Dec 2023*
Grader, Math5051 Measure Theory and Functional Analysis I, Prof. Henri Martikainen *Aug 2024 – Dec 2024*

TALKS AND SEMINARS

University of Chicago Chicago, United States
Speaker at Midstates Consortium for Math and Science 23 *Nov 2023*
- Presented work on curvature of Cayley graph of abelian and nilpotent groups.

Washington University in St. Louis St. Louis, United States
- Reading Group SP23: Algebraic Geometry.
- Reading Group FL23: Representation Theory.
- WashU SP24 Undergraduate Research Symposium.
- Speaker at Online Early Career Morning Sessions held by Prof. Henri Martikainen.
- UNC Undergraduate Analysis and PDE Online Seminar FL22-SP23.
- Convention on Stan Programming and Bayesian Modeling 23 Workshop.
- WUSTL Metamorphic Architecture Workshop 2019.

ADDITIONAL INFORMATION

Computer and Language Skills
- Software skills: Python, Latex, Java, MATLAB, Adobe Illustrator, Octave, R, Stata.
- Bilingual: Chinese & English.

Interests
- Classical Music, Chinese Calligraphy, Printmaking, Travelling, Tennis & Table Tennis.