

Ruda Zhang

The Statistical & Applied Mathematical Sciences Institute
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Positions

Aug 2019– Postdoctoral fellow.
The Statistical & Applied Mathematical Sciences Institute (SAMS), Durham, NC.

Jun 2018–Jul Postdoctoral research associate.
2019 University of Southern California, Los Angeles, CA.

Education

May 2018 Ph.D., Civil Engineering.
University of Southern California, Los Angeles, California.
Dissertation: “Taxicab Transportation: Operations, Equilibrium, and Efficiency”.
Committee: *Roger G. Ghanem* (Chair), Ketan Savla, Juan D. Carrillo (Economics).

May 2018 M.A., Economics.
University of Southern California, Los Angeles, California.
Thesis: “Taxi Driver Learns Dynamic Multi-Market Equilibrium”.
Committee: *Matthew E. Kahn* (Chair), M. Hashem Pesaran, Geert Ridder.

Jun 2012 B.E., Engineering Structure Analysis.
Peking University, Beijing, China.

Research Interests

Uncertainty Quantification. Machine Learning. Probabilistic Learning on Manifolds.
Big Data Analytics. Game Theory. Engineering Systems. Risk and Resilience.

Publications

- **Demand, Supply and Performance of Street-hail Taxi.**
Ruda Zhang and Roger Ghanem.
IEEE Transactions on Intelligent Transportation Systems. 2019. ([link](#))
- **Taxi Driver Learns Dynamic Spatial Equilibrium.**
Ruda Zhang and Roger Ghanem.
In peer review. Proceedings of the National Academy of Sciences. ([link](#))
Finalist, Graduate Student Paper Competition. NARSC 2018.
Finalist, Student Paper Competition. ASCE EMI/PMC 2016.
- **Normal-bundle Bootstrap.**
Ruda Zhang and Roger Ghanem.
In second-round review. SIAM Journal on Mathematics of Data Science. ([link](#))
- **Newton Retraction as Approximate Geodesics on Submanifolds.**
Ruda Zhang.
In peer review. Statistics and Computing. ([link](#))

Book Chapters

- **Environmental Economics and Uncertainty: Review and a Machine Learning Outlook.**
Ruda Zhang, Patrick Wingo, Rodrigo Duran, Kelly Rose, Jennifer Bauer, Roger Ghanem.
Oxford Research Encyclopedia of Environmental Science. 2020. ([link](#))

Working Papers

- **Kernel Density Estimation and Sampling on Riemmanian Submanifolds.**
Ruda Zhang and Roger Ghanem.
- **Subspace-constrained Accelerated Mean Shift.**
Ruda Zhang.
- **Manifold Surrogate of Computer Models.**
Ruda Zhang and Rodrigo Duran.
- **Manifold Scaffold Sampling.**
Ruda Zhang and Roger Ghanem.

Software

- **p1mr: Probabilistic Learning on Manifolds in R.**
An R package implementing methods for probabilistic learning on manifolds. ([link](#))

Data

- New York City Taxi Trip Records, 2009–2013.
Ruda Zhang. Open Science Framework. (Total size: ~200 GB) ([link](#))

Fellowships & Awards

2019–2021 Postdoctoral Fellow. NSF Grant DMS-1638521, Division of Mathematical Sciences.
2012–2016 Provost Fellow, University of Southern California.
2009–2010 Peking University Academic Excellence Award.
2009–2010 Wusi Scholarship.
2009 Fall HKUST Dean’s List.
2008–2009 Peking University Three-Good Student (Highest Honor).
2008–2009 First Prize, Starlight International Media Scholarship.

Teaching

2020 Fall ST 515: Experimental Statistics for Engineers I
Instructor. Shared with Dr. Dan Harris at NCSU.
Probability and statistics for engineering departments. 87 graduate students.

2017 Spring CE 402: Computer Methods in Engineering.
Teaching Assistant for Prof. Sami F. Masri at USC.
Numerical methods and numerical analysis. 25 undergraduate students.

2016 Fall CE 408: Risk Analysis in Civil Engineering.
Teaching Assistant for Prof. Roger G. Ghanem at USC.
Probability and statistics. 44 undergraduate students.

2014 Fall CE 408: Risk Analysis in Civil Engineering.
Teaching Assistant for Prof. Roger G. Ghanem at USC.

Presentations

Invited talks:

- Data Science, Statistics & Visualization (DSSV) Conference 2020. Virtual. July 29–31, 2020. Organized by International Association for Statistical Computing (IASC) International Statistical Institute (ISI). Title: Normal-bundle Bootstrap.
- SAMSI Games, Decisions, Risk and Reliability (GDRR) Program Transportation Workshop. Durham, NC. March 9–11, 2020. Title: Driver Strategy and Multimarket Oligopoly: Evidence from New York City.
- Institute for Operations Research and the Management Sciences (INFORMS) 2019 Annual Meeting. Seattle, WA. Oct 20–23 2019. Title: Driver Strategy and Multimarket Oligopoly: Evidence from New York City.
- METRANS Emerging Scholars Transportation Research (ESTR) Symposium 2019. Los Angeles, CA. Mar 29, 2019. Title: Taxicab Transportation: Operations, Equilibrium, and Efficiency.
- National Travel Monitoring Exposition and Conference 2018 (NaTMEC 2018). Irvine, CA. June 10–13, 2018. Title: Estimating Taxi Traffic from GPS Records.

Contributed talks:

- SAMSI Postdoctoral Fellow Seminars. Virtual. Oct 28, 2020. Title: Probabilistic Learning on Manifolds.
- SAMSI Postdoctoral Fellow Seminars. Virtual. Apr 1, 2020. Title: Normal-bundle Bootstrap.
- SAMSI Postdoctoral Fellow Seminars. Durham, NC. Oct 16, 2019. Title: Probability Approximation on Manifolds.
- Engineering Mechanics Institute Conference 2019 (EMI 2019) joint with Geo-Institute. Pasadena, CA. June 18–21, 2019. Title: Probability Approximation on Manifolds.
- 65th Annual North American Meetings of the Regional Science Association International (NARSC 2018). San Antonio, TX. Nov 7–10, 2018. Title: Taxi driver learns dynamic spatial equilibrium.
- GIS-Pro 2018 & CalGIS 2018. Palm Springs, CA. Oct 9–12, 2018. Title: Pick your poison: point, line, or polygon as your spatial unit?
- Engineering Mechanics Institute Conference 2018 (EMI 2018). Massachusetts Institute of Technology. May 29—Jun 1, 2018. Title: Taxi driver learns dynamic spatial equilibrium.
- Probabilistic Mechanics & Reliability Conference 2016 (PMC 2016). Vanderbilt University, May 22–25, 2016. Title: Sociodynamic Modeling of Urban Transportation System: Case Study of Taxi Commute in New York City.
- Engineering Mechanics Institute Conference 2016 (EMI 2016). Vanderbilt University, May 22–25, 2016. Title: Sustainability Score for Urban Systems.

- Engineering Mechanics Institute Conference 2015 (EMI 2015). Stanford University, June 16–19, 2015. Title: Quantifying Transit Accessibility in Urban Systems: Case Study in Portland Metropolitan Area.
- The National Workshop on Resilience Research (NWRR) for Critical Infrastructure: Current Status and Challenges. National Science Foundation, Arlington, VA. October 22–23, 2015. Title: Performance Metrics for Urban Infrastructure Systems: Transit Accessibility in Portland and Its Resilience.

Academic Service

Journal Review

- Transportation Research Record.
- Journal of Statistical Theory and Practice.
- Data-Centric Engineering.

Grant Review

- Sigma Xi. Grants in Aid of Research (GIAR). Virtual. May 1–2, 2020.
- Sigma Xi. Grants in Aid of Research (GIAR). Raleigh, NC. Dec 13–14, 2019.

Conference & Workshop Organization

- Session chair, Data Science 1. DSSV 2020.
- Session host, Statistical Learning 4. DSSV 2020.
- Workshop organizer, SAMSI GDRR Opening Workshop. Raleigh, NC. Aug 5–9, 2019.
- Session chair, Urban Economics. NARSC 2018.

Outreach & Engagement

- Student presentation judge. 2020 Sigma Xi Annual Meeting and Student Research Conference.
- R tutorial. SAMSI GDRR Undergraduate Workshop. Durham, NC. Feb 24–25, 2020. ([link](#))

Academic and Professional Affiliations

American Society of Civil Engineers (ASCE), Engineering Mechanics Institute (EMI).
 Society for Industrial and Applied Mathematics (SIAM).
 Institute for Operations Research and the Management Sciences (INFORMS).
 Regional Science Association International (RSAI).
 Urban Economics Association (UEA).
 California Geographic Information Association (CGIA).

Computer Skills

Languages R, C/C++17, Python; SQL; JavaScript, Ruby.

Applications QGIS, GRASS GIS, PostgreSQL/PostGIS, JOSM; OSRM, OpenTripPlanner, Conveyal R5; Emacs, Git, Inkscape.

Systems AWS (EC2, S3, CloudFront); HPC (Slurm); Debian Linux.

Updated: November 2020