

# LANRAN FANG

(+1) 872-901-2276    lanranfang@uchicago.edu

<https://lanranfang.github.io/>

## RESEARCH INTERESTS

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I am interested in uncertainty quantification for Monte Carlo methods, stochastic optimization and the theory of high-dimensional statistics, network modeling.

## EDUCATION

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### University of Chicago

*Sept 2023 - present*

M.S. in Computational and Applied Mathematics

*expected June 2025*

*Relevant courses:* Monte Carlo Simulation, Nonlinear Optimization, Measure-Theoretic Probability, Matrix Computation, Machine Learning, Applied Bayesian Modeling and Inference, Applied Functional Analysis, Foundations of Computational Dynamics, Applied Linear Statistical Methods.

### Jiangxi University of Finance and Economics

*Sept. 2019 - June 2023*

B.S in Economic Statistics (Elite Talent Program)

*Relevant courses:* Mathematical Analysis, Advanced Algebra, Real Function and Functional Analysis, Probability Theory and Mathematical Statistics, Applied Stochastic Process, Statistical Computing, Nonparametric Statistics, Multivariate Statistical Analysis, Ordinary Differential Equation.

## RESEARCH EXPERIENCE

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### Sequential Monte Carlo Method for Dynamic Stochastic Optimization

*Sept. 2024- present*

Advisors: John R. Birge, Mihai Anitescu

*University of Chicago*

- Developed a method using Particle Method to optimize a dynamic stochastic optimization model.
- Obtained error bounds on convergence to optimality as a function of sample size.

### Multi-period Dynamic Asset Allocation via Sequential Sampling

*March 2024- present*

Advisors: John R. Birge, Mihai Anitescu

*University of Chicago*

- Developed a simulation-based approach to multi-stage dynamic programming for risk-sensitive optimal dynamic asset allocation with mixtures of Gaussians.
- Sampled from a high-dimensional joint distribution defined on states and controls with the goal of minimizing the expected cost function.
- Illustrated a comparison between the standard Monte Carlo method and our sampling approach.

### Gradient-based Sparse Elliptical Component Analysis

*Sept. 2022 - June 2023*

Advisor: Chuanquan Li

*Jiangxi University of Finance and Economics*

- Developed a new iteration method based on Gradient Fantope Projection and Selection Algorithm.
- Applied this algorithm to the data with different high-dimensional ellipsoidal distribution.
- Extended the method for online learning with statistical estimation error analysis.

### Community Detection on Dynamic R Packages Network

*Oct. 2021 - May 2022*

Advisor: Chuanquan Li

*Jiangxi University of Finance and Economics*

- Used the D-SCORE model to conduct community detection and dynamic evolution of R.
- Contributed to writing several sections of the paper and presented findings at The 15th China-R Conference.

## PUBLICATIONS, THESES AND PATENTS

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1. Fang, Lanran. “Multi-period Dynamic Asset Allocation via Sequential Sampling.” Master’s thesis(in progress), University of Chicago, (2024). Advised by John Birge and Mihai Antisecu.
2. Fang, Lanran. “Gradient-based Sparse Elliptical Component Analysis.” Bachelor’s thesis, Jiangxi University of Finance and Economics, (2023). Advised by Chuanquan Li.
3. Li, Chuanquan, Lanran Fang, Qi Su, Xiaohui Liu, and Jiliang Sheng. “The Research of Open Source Ecosystem Based on Complex Network: R Language as an Example.” *Journal of System Science and Mathematical Science Chinese Series*, 43, no. 8 (2023).<https://doi.org/10.12341/jssms22690>.
4. Fang Zhenyu, Fu Yiting, Fang Lanran, et al. 2023. “Combination Risk Assessment Models, Methods, and Applications Applicable to Disease Risk Assessment.” Patent CN115602323B, Zhejiang Province, June 6, 2023.

## TALKS

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1. Representability of community detection models, *talk at the 15th China-R Conference(held virtually), China, November 2022*. Talk Title: A Research on the Open Source Ecosystem Based on Complex Networks: A Case Study for R Language.

## WORK EXPERIENCE

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### Zhejiang AI Healthcare Innovation Center

July 2022- Sept. 2022

Quantitative Analyst

- Involved in a project predicting diseases that young people may suffer from.
- Tested disease risk models (e.g., Cox, Multi-Factor, Fine-Gray Competitive Risk) using data extracted from a Navicat database via SQL.
- Collaborated with colleagues to draft and submit a patent for review.

### Zhejiang AI Healthcare Innovation Center

Aug. 2021- Sept. 2021

Quantitative Analyst

- Assisted in developing an operations research algorithm for patient scheduling across hospital departments and drafting patent descriptions related to medical big data.
- Utilized algorithms such as Greedy and Dijkstra to compute local optimal solutions, comparing them with true values.

## SKILLS

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### Programming Languages and Frameworks

Python (Numpy, Matplotlib, Pandas, Statsmodels, Pytorch)

R (Tidyverse, ggplot2, R Markdown)

Matlab, C++, Julia, HTML

### Languages

English: Fluent

Chinese: Native