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Research Interests

Sustainable Finance;
Microstructure and Liquidity;
FinTech and AI;
Foundations of Financial Behavior and Adaptive Markets.

Appointments

Peking University, School of Mathematical Sciences, Department of Financial Mathematics — Beijing, China
Assistant Professor, Boya Young Fellow — 2021 — Present

MIT Laboratory for Financial Engineering — Cambridge, MA, USA
Research Affiliate — 2015 – Present

Google — Mountain View, CA and New York, NY, USA
Senior Data Scientist — 2017 — 2021

Vatic Labs — New York, NY, USA
Partner, Market Scientist (quant trading) — 2015 – 2017

Education

Massachusetts Institute of Technology — Cambridge, MA, USA
Ph.D. in Applied Mathematics — 2011 – 2015
Committee: Andrew W. Lo (advisor), Michel Goemans, Peter Kempthorne
Dissertation: Economic Behavior from an Evolutionary Perspective

Peking University — Beijing, China
B.S. in Mathematics and Applied Mathematics — 2007 — 2011
B.A. in Economics (double degree) — 2008 — 2011

Honors & Awards

海外高层次人才计划青年项目	2021
Peking University Boya Young Fellow	2021
Tianjin Science and Technology Progress Award, Second Prize	2019
Google Spot Bonus, for “Exeptional Impact” to the company (5 times)	2018-2021
UC Berkeley Simons Institute for the Theory of Computing, Student Travel Grant	2013

MIT Presidential Fellowship	2011
Beijing Outstanding Graduate	2011
Peking University Undergraduate Academic Star of the Year	2010
WorldQuant Foundation Scholarship	2010
Finalist, Mathematical Contest in Modeling	2010
Meritorious, Mathematical Contest in Modeling	2009
University of Hong Kong Fung Scholarship	2008

Publications

[#] alphabetical authors; [*] corresponding author.

Book

1. *The Adaptive Markets Hypothesis: An Evolutionary Approach to Understanding Financial System Dynamics*
   Andrew W. Lo and Ruixun Zhang.
   Oxford University Press, (2022, in press).

2. *Biological Economics*, two volumes
   Andrew W. Lo and Ruixun Zhang (co-editor).
   Edward Elgar Publishing, (2018).

Financial Behavior and Adaptive Markets (Representative)

3. The Wisdom of Crowds vs. the Madness of Mobs: An Evolutionary Model of Bias, Polarization, and Other Challenges to Collective Intelligence
   Andrew W. Lo[#] and Ruixun Zhang[#*].
   Forthcoming in the inaugural issue of *Collective Intelligence*.

4. The Evolutionary Origin of Bayesian Heuristics and Finite Memory
   Andrew W. Lo[#] and Ruixun Zhang[#*].
   iScience, 24: 102853, (2021).

5. To Maximize or Randomize? An Experimental Study of Probability Matching in Financial Decision Making
   Andrew W. Lo[#], Katherine P. Marlowe[#], and Ruixun Zhang[#*].
   PLoS ONE, 16(8): e0252540, (2021).

6. The Origin of Risk Aversion
   Ruixun Zhang, Thomas J. Brennan, and Andrew W. Lo.
   Proceedings of the National Academy of Sciences, 111(50), 17777-17782, (2014).
   - Reported by MIT Sloan News.

Investment (Representative)

7. Quantifying the Impact of Impact Investing
   Andrew W. Lo[#] and Ruixun Zhang[#*].
   Submitted.
   - Reported by Institutional Investor.
8. Social Contagion and the Evolutionary Survival of Diverse Investment Styles
   David Hirshleifer[#], Andrew W. Lo[#], and Ruixun Zhang[#*].
   Submitted.
9. The Growth of Relative Wealth and the Kelly Criterion
   Andrew W. Lo[#], H. Allen Orr[#], and Ruixun Zhang[#].
   Journal of Bioeconomics, 20(1), 49-67, (2018).

FinTech and AI (Representative)

10. High-Frequency Liquidity in the Chinese Stock Market: Measurements, Patterns, and Determinants
    Ruixun Zhang, Chaoyi Zhao, Yufan Chen, Lintong Wu, Yuehao Dai, Ermo Chen, Zhiwei Yao, Yihao Zhou, and Lan Wu.
    Working paper.
11. When Does Quantitative Investing Make Money? Linking Predictability with Profitability of Machine Learning Models
    Ruixun Zhang.
    Working paper.
12. Explainable Machine Learning Models of Consumer Credit Risk
    Randall Davis, Andrew W. Lo, Sudhanshu Mishra, Arash Nourian, Manish Singh, Nicholas Wu, and Ruixun Zhang.
    Submitted.

Recommender Systems, Image, and Vision (Representative)

13. IBNet: Interactive branch network for salient object detection
    Xian Fang, Jinchao Zhu, Ruixun Zhang, Xiuli Shao, and Hongpeng Wang.
    Neurocomputing, 465, 574-583, (2021).
14. Learning Sparse Features with Lightweight ScatterNet for Small Sample Training
    Zihao Dong, Ruixun Zhang, Xiuli Shao, and Zengsheng Kuang.
    Knowledge Based Systems, 205, 106315, (2020).
15. Scale-Recursive Network with point supervision for crowd scene analysis
    Zihao Dong, Ruixun Zhang, Xiuli Shao, and Yumeng Li.
    Neurocomputing, 384, 314-324, (2020).
16. Recurrent Collaborative Filtering for Unifying General and Sequential Recommender
    Disheng Dong, Xiaolin Zheng, Ruixun Zhang, and Yan Wang.
    The 27th International Joint Conference on Artificial Intelligence (IJCAI), 3350-3356, (2018).

Other

17. Toward Interpretable Machine Learning: Evaluating Models for Heterogeneous Effects
    Ruixun Zhang.
    Working paper.

18. Collaborative learning in bounding box regression for object detection
    Xian Fang, Zengsheng Kuang, Ruixun Zhang, Xiuli Shao, and Hongpeng Wang.
    Pattern Recognition Letters, 148, 121-127, (2021).

19. Subspace Clustering with Block Diagonal Sparse Representation
    Xian Fang, Ruixun Zhang, Zhengxin Li, Xiuli Shao.
    Neural Processing Letters, 53, 4293–4312, (2021).

20. A Plug and Play Fast Intersection Over Union Loss for Boundary Box Regression
    Zengsheng Kuang, Xian Fang, Ruixun Zhang, Xiuli Shao, and Hongpeng Wang.
    IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP), 1705-1709, (2021).

21. Detection of Defect Proportion for Workpiece Surface Based on a Fusion Prediction Model
    Tao, Sikai, Ruixun Zhang, and Yumeng Li.
    IEEE 33rd International Conference on Tools with Artificial Intelligence (ICTAI), 1093-1098, (2021).

22. Improved Filtering and Hole Filling Algorithm for the Point Cloud of Rotor Surface Based on PCL
    Yumeng Li, Ruixun Zhang, Xiuli Shao, and Yuefan Xu.
    IEEE International Conference on Power Electronics, Computer Applications (ICPECA), 105-109, (2021).

23. An Improved Morphological Algorithm for Defect Detection on Point Cloud Data
    Hongyu Zhou, Ruixun Zhang, Huichao Li, and Xiuli Shao.
    IEEE International Conference on Artificial Intelligence and Information Systems (ICAIIS), 13-17, (2020).

24. Dynamic Attention Graph Convolution Neural Network of Point Cloud Segmentation for Defect Detection
    Yumeng Li, Ruixun Zhang, Huichao Li, and Xiuli Shao.
    IEEE International Conference on Artificial Intelligence and Information Systems (ICAIIS), 18-23, (2020).

25. Automatic annotation and segmentation of object instances with deep active curve network
    Zihao Dong, Ruixun Zhang, and Xiuli Shao.
    IEEE Access, 7, 147501-147512, (2019).

26. Multi-scale Discriminative Location-Aware Network for Few-Shot Semantic Segmentation
    Zihao Dong, Ruixun Zhang, Xiuli Shao and Hongyu Zhou.
    IEEE 43rd Annual Computer Software and Applications Conference (COMPSAC), 42-47, (2019).

27. Learning Deep Structured Multi-scale Features for Crisp and Object Occlusion Edge Detection
    Zihao Dong, Ruixun Zhang, and Xiuli Shao.
    International Conference on Artificial Neural Networks (ICANN), 253-266, (2019).

28. Surface Defect Segmentation with Multi-column Patch-Wise U-net
Zihao Dong, Xiuli Shao, and Ruixun Zhang.
IEEE 5th International Conference on Computer and Communications (ICCC), 1436-1441, (2019).

29. A CNN-RNN Hybrid Model with 2D Wavelet Transform Layer for Image Classification
Zihao Dong, Ruixun Zhang, and Xiuli Shao.
IEEE 31st International Conference on Tools with Artificial Intelligence (ICTAI), 1050-1056, (2019).

30. CNN and RNN mixed model for image classification
Qiwei Yin, Ruixun Zhang, and Xiuli Shao.
MATEC Web of Conferences, 02001, (2019).

31. Variety is the Spice of Life: Irrational Behavior as Adaptation to Stochastic Environments
Thomas J. Brennan[#], Andrew W. Lo[#], and Ruixun Zhang[#].
Quarterly Journal of Finance, 8(3), 1850009, (2018).

32. A New Combined CNN-RNN Model for Sector Stock Price Analysis
Ruixun Zhang, Zhaozheng Yuan, and Xiuli Shao.
IEEE 42nd Annual Computer Software and Applications Conference (COMPSAC), 546-551, (2018).

33. Multi-scale Feature Decode and Fuse Model with CRF Layer for Boundary Detection
Zihao Dong, Ruixun Zhang, Xiuli Shao, Huichao Li, and Zihan Yang.
International Conference on Neural Information Processing (ICONIP), 28-40, (2018).

34. Deep and wide neural networks on multiple sets of temporal data with correlation
Zhaozheng Yuan, Ruixun Zhang, and Xiuli Shao.
International Conference on Computing and Data Engineering (ICCDE), 39-43, (2018).

35. Forecasting of stock price trend based on CART and similar stock
Qiwei Yin, Ruixun Zhang, Yiwei Liu, and Xiuli Shao.
International Conference on Systems and Informatics (ICSAI), 1503-1508, (2017).

36. Group Selection as Behavioral Adaptation to Systematic Risk
Ruixun Zhang, Thomas J. Brennan, and Andrew W. Lo.
PLoS ONE, 9(10), e110848, (2014).

37. An Optimization Plan for the Arrangement of Hospital Bed Based on Q-process and Stochastic Analysis (In Chinese.)
Ruixun Zhang, Xin Sun, and Yue Yu.
Operations Research and Management Science, 20(2), 1-9, (2011).

38. Adjusting Active Basis Model by Regularized Logistic Regression
Ruixun Zhang.
UCLA Technical Report, (2010).

39. Studies on the Radiation Sensitivity of Different Crops Treated by ^{60}Co γ Rays (In Chinese.)
Ruixun Zhang, Shuiying Feng, Yongbin Qi, Yanting Lu, Shenghai Ye, and Xiaoming Zhang.
Chinese Agricultural Science Bulletin, 24(8), 266-269, (2008).

Talks and Conference Presentations

coauthor presentations.

Quantifying the Impact of Impact Investing

- China International Conference in Finance, Shanghai, China July-2022
- University of Washington April-2022
- # Q Group Spring Seminar, USA March-2022
- Cardiff University OR/Statistics Seminar March-2022
- International Association for Quantitative Finance (IAQF) / Thalesians joint webinar Feb-2022
- American Finance Association (AFA) Annual Meetings, Boston, MA, USA Jan-2022
- Annual Conference of the CSIAM Activity Group of Financial Technology and Algorithm, Zhuhai, China Jan-2022
- # NYU Volatility Institute 2021 Annual Conference, Shanghai, China Nov-2021
- # Journal of Investment Management Conference on Climate Change: Investment Management Implications, USA Oct-2021
- China Society for Industrial and Applied Mathematics (CSIAM) Annual Meeting, Hefei, China Oct-2021
- Peking University Center for Statistical Science, Beijing, China Oct-2021
- Peking University School of Mathematical Sciences, Beijing, China Sep-2021

Contagion and the Evolutionary Survival of Diverse Investment Styles

- China International Conference in Finance, Shanghai, China July-2022
- New York University Department of Finance and Risk Engineering, New York, USA 2019
- Conference on Evolution and Financial Markets, Cambridge, MA, USA 2018
- Applied Mathematics and Statistics Youth Forum, Peking University, Beijing, China 2018

Toward Interpretable Machine Learning: Evaluating Models for Heterogeneous Effects

- University of Hong Kong, Hong Kong, China 2020
- New York University Department of Finance and Risk Engineering, New York, USA 2019
- Peking University School of Mathematical Sciences, Beijing, China 2019

Variety is the Spice of Life: Irrational Behavior as Adaptation to Stochastic Environments

- American Finance Association (AFA) Annual Meetings, Philadelphia, PA, USA 2018

Application of Machine Learning in Finance and Technology

- Nankai University, Tianjin, China 2018

Behavioral Economics and its Applications in Digital Marketing

- Yahoo Research, Sunnyvale, CA, USA 2017

Teaching

Statistical Methods for Finance, PKU Mathematics 2021

For Graduate Students, Instructor

3+X Seminar in Financial Mathematics, PKU Mathematics 2021
For Undergraduate Students, Co-Instructor

Mentor for Undergraduate Research, MIT Mathematics 2014, 2015
Undergraduate Research Opportunities Program (UROP)

Grader, MIT EECS 2012, 2013
Dynamic Programming and Stochastic Control

Mentor for Undergraduate Research, MIT Mathematics 2012
Summer Program in Undergraduate Research (SPUR)
Topic: Least Absolute Deviations Method For Sparse Signal Recovery.

Academic Service

Reviewer for *Financial Analyst Journal*, *Journal of Empirical Finance*, *Journal of Risk*, *Journal of Economic Dynamics & Control*, *Expert Systems with Applications*, *International Journal of Accounting, Finance and Risk Management*, *Managerial Finance*, *IEEE Access*, *IEEE ICCC*, *Computers in Biology and Medicine*, *BioEssays*, *American Journal of Plant Sciences*, *Advances in Environmental Protection*, *Environmental Pollution*.

CSIAM Conference on Financial Mathematics, Financial Engineering, and Actuarial Science, Suzhou, China 2022
Organizing committee member.

Sixth PKU-NUS Annual International Conference on Quantitative Finance and Economics, Beijing, China 2022
Organizing committee member.

Annual Conference of the CSIAM Activity Group of Financial Technology and Algorithm, Zhuhai, China 2022
Organizing committee member.

American Statistical Association (ASA) 2019, 2020
Committee member of the Section on Statistical Learning and Data Science (SLDS) student paper competition.

Organizing seminars for the PKU Laboratory for Mathematical Economics and Quantitative Finance 2021

Interviewing masters students for the PKU Financial Mathematics Masters Program 2021

Academic Membership: AFA, INFORMS, SIAM, CSIAM

Other Experiences

Goldman Sachs — New York, NY, USA
Strategist — Summer 2015

Harvard Management Company — Boston, MA, USA
Analytics — Summer 2014

Princeton University — Princeton, NJ, USA
RTG Summer School in Financial Mathematics — Summer 2013

National University of Singapore — Singapore
Asia Summer Institute in Behavior Economics — Summer 2013

UCLA, Department of Statistics — Los Angeles, CA, USA
Summer Research — Summer 2010

National Center for Gene Research, CAS — Shanghai, China
Summer Research — Summer 2009

Skills

Programming
Proficient in: Python, Matlab, Golang, SQL.
Familiar with: R, C++, Java.

Languages
Chinese (native), English (proficient)