Ruoyan Kong's CV

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Education

School of Economics and Management, Tsinghua University Beijing, China

- Master of Science in Insurance and Big Data Finance 09/2016 - Now
  - — GPA 3.5/4.0
  - — Rank 1/18 in Track, 12/110 in Department
  - — Master's Thesis: (Ongoing) A Risk Finance Paradigm for Dependent Catastrophe Losses with Pareto Severities, Advisor: Prof. Michael Powers

University of Science and Technology of China(USTC) Hefei, China

- Bachelor of Science in Mathematics (Information and Computational Science) 09/2012 - 06/2016
- Minor subject: Computer Science
  - — GPA 3.92/4.30, Major GPA 4.04/4.30
  - — Rank 1/22 in Track, 7/120 in Department
  - — Graduation Thesis: A Model of Incentives in Repeated Crowdsourcing Systems, Advisor: Prof. Qi Liu

Awards and Honors

- National Scholarship, National Ministry of Education of China, *top* 1% *2013*
- Gold Award of University's Excellent Students, USTC, *top* 3% *2014*
- Outstanding Student Research, USTC, *top* 3% *out of undergraduates in USTC* *2015*
- Huangyu Scholarship, USTC, *top* 3% *in the School of Mathematics* *2015*
- Outstanding Graduates, USTC *2016*
- First Prize Scholarship, Tsinghua University, *top* 3% *in the Department of Finance* *2017*

Research Experience

A Risk Finance Paradigm for Dependent Catastrophe Losses with Pareto Severities *09/2017*

Graduate Research (Ongoing) *School of Economics and Management, Tsinghua University*

Supervisor: Prof. Michael Powers(SEM)

- Modeled catastrophe losses' portfolios as a class of dependent Pareto severity variables with Gumbel copulas.
- Designed a parallel-serial numerical algorithm to get Fourier-analytic risks for levy-stable variables.
- Proposed a conservative risk finance paradigm that can be used to prepare the firm for worst-case scenarios with regard to (1) the firm's intrinsic sensitivity to risk, (2) the heaviness of the severity's tail and (3) the dependence between the risks.

A Model of Incentives in Repeated Crowdsourcing Systems *01/2016-06/2016*

Undergraduate Thesis *Department of Data Mining, National Engineering Laboratory for Language Information Processing*

Supervisor: Prof. Qi Liu(USTC)

- Modeled the effects of performance-contingent financial rewards in crowdsourcing systems and provided answers to the question: how does the anchoring effect influence the cumulative profits of requesters and workers?
- Proved that when the anchoring effect coefficient r of requesters is smaller than 1, the cumulative profits of requesters will converge to a certain value increasingly, and the value is negatively correlated with r (which means the optimal strategy for requesters is to increase the wage slowly).
- Proved that when the anchoring effect coefficient P of requesters is smaller than 1 and r is smaller than P, the cumulative profits of workers will converge to a certain value increasingly, and the value is negatively correlated with P (which means the optimal strategy for workers is to increase the effort slowly but keep the increase being larger than the reaction of requester), otherwise, the workers should leave the game.

Group Recommendation: An Approach Based on Nash Equilibrium *01/2015-06/2015*

Undergraduate Research Department of Data Mining, National Engineering Laboratory for Language Information Processing
Supervisor: Prof. Qi Liu(USTC)

- Proposed to explore the idea of Nash equilibrium to simulate the selections of members in a group by a game process to capture the group members' interactions and to ensure fairness.
- Designed a matrix factorization-based method (SVD) which aggregated the preferences in latent space and estimated the final group preference in rating space.
- The Nash approach had a Hit Rate 10% with a Harmonic(a fairness metric)1.09 while AVG method only had a Hit Rate 8% with a Harmonic 1.01.
- Awarded with *Outstanding Students Research* of USTC in 2015, *Hongke Zhao, Qi Liu, Yong Ge, Ruoyan Kong, Enhong Chen, Group Preference Aggregation: A Nash Equilibrium Approach, In Proceedings of the 16th IEEE International Conference on Data Mining (ICDM'16), Barcelona, Spain, 2016, 679-688*

Effect of Intramuscular Fat on Skeletal Muscle Mechanics *07/2015-09/2015*
Undergraduate Summer Research Program *Simon Fraser University(SFU)*
Supervisor: Prof. Nilima Nigam(SFU)

- Realized the Cpp code of different types of skeletal muscle by finite element tool dealii.
- Analyzed the mechanics of different types of skeletal muscle.

A Bayesian Network in Stock Market *12/2016-04/2017*
Supervisor: Mr. You Zhang (Chairman) *Derivatives-China*

- Built a bayesian network to predict linked rise or linked fall events in the stock market.
- Designed a chronological weight to decide the casuality relationships among events.
- Brought a consistent 15.1% Year To Date (YTD) Return with a max drawdown 3.9% and a monthly sharpe 2.7 for the company.

A Half-supervised Hidden Markov Model to Forecast Index Futures *12/2016-04/2017*
Supervisor: Mr. You Zhang (Chairman) *Derivatives-China*

- Designed an algorithm to estimate HMM by the Baum-Welch algorithm segmentally and combined the estimations by Adaboost to suit changeable economy environments and let HMM's hidden states make sense (e.g. the daily directions of index futures).
- Designed a parallel-serial optimization method to get the approximate global solution of Balm-Welch algorithm.
- Realized the code including database interface, model prediction, model back-testing, and daily automatic generation of reports.
- Brought a consistent 10.6% Year To Date (YTD) Return with a max drawdown 3.6% and a monthly sharpe 2.1 for the company.

A Markov Chain Monte Carlo (MCMC) Method to Estimate HMM *05/2017-09/2017*
Supervisor: Mr. You Zhang, thanks to Prof. Thomas J. Sargent's advice *Derivatives-China*

- Designed the algorithm to estimate HMM by Markov Chain quasi-Monte Carlo (MCQMC) with Sobel sequence to solve the dimension diasters in Balm-Welch method.
- Predicted GDP by a HMM estimated by MCQMC. The results showed that MCQMC has a lower error rate(0.52) in the estimation of HMM's parameters (e.g. covariance matrix) who have high dimensions and large value compared to Balm-Welch method(0.83).

Internship

Learn Order Execution Problem by Reinforcement Learning *03/2016-06/2016*
Supervisor: Mr. Siwei Chen (Investment Department's Director) *Guangzhou Securities*

- Built a model-based reinforcement problem to describe the states, actions, profits in the order execution problem.
- Applied backward induction algorithm to solve this reinforcement problem.
- Derived the optimal strategy for the firm to execute orders to minimize impact cost.

Teaching Experience

Teaching Assistant in Mathematics and English *2014*
Kongdian Middle School *Kongdian Village, Anhui Province*

- Enhanced students' studying enthusiasm for Math and English through games and educational activities with

limited resources in an underdeveloped village.
- Improved students' average scores in Mathematics and English. Awarded with *Advanced Social Practice Student Prize*.

Services

Multimedia Technical Support *09/2016-09/2017*

Liaison Department of Student Union *Tsinghua University*

- Supported large screen interactive multimedia display system in freshman orientation evening, Nanshan Ph.D Candidates Conference.

Violinist *09/2013-09/2015*

School Orchestra *University of Science and Technology of China*

Skills

Computer Speciality

- C++, Python, *C#*, Java, Sql, Matlab
- Pandas library, sklearn library, theano library, pymc library, Unity, dealii

Mathematics Speciality

- Numerical Methods, PDE, Optimization, Monte Carlo Simulation

Finance Speciality

- CFA Level I, Securities/Funds Practitioner Qualification Certificate

Publications

- Hongke Zhao, Qi Liu, Yong Ge, Ruoyan Kong, Enhong Chen, Group Preference Aggregation: A Nash Equilibrium Approach, In Proceedings of the 16th IEEE International Conference on Data Mining (ICDM'16), Barcelona, Spain, 2016, 679-688