



安泰经管学院
ANTAI COLLEGE
Economics · Management



标星-会议召开地点，1-自助午餐（研究生食堂二楼），2-晚餐（博学楼宾馆二楼品味馆）

Star-Conference venue (Antai College of Economics and Management) ,

1-Lunch buffet (Second Floor of Graduate Dining Hall) ,

2-Dinner (Pin Wei Guan, Second Floor of Bo Xue Lou Hotel)

Organized by Antai College of Economics and Management,

Shanghai Jiao Tong University

天地交而万物通 上下交而其志同

Address : Antai College of Economics and Management,
Shanghai Jiao Tong University, 1954 Huashan Road,
Xuhui District, Shanghai, China.

2017 MS/OM Workshop on the Future of Stochastic Simulation

2017 管理科学/运营管理体系研讨会

——随机仿真专题

Time: June 29, 2017 – July 1, 2017

Venue: Antai College of Economics and Management,

Shanghai Jiao Tong University, 1954 Huashan Rd.





Agenda

June 29th, 2017

Time	Event	Venue
13:00-17:00	Registration	A301, Antai College of Economics and Management

June 30th, 2017

Venue: A301, Antai College of Economics and Management

Time	Event		
7:30-8:00	Registration		
8:00-8:10	Opening Ceremony: Guohua WAN Professor & Associate Dean, Shanghai Jiao Tong University		
8:10-8:20	Group Photo		
Time	Speaker	Topic	Host
8:20-9:00	Xiaowei ZHANG Hong Kong University of Science and Technology	New Approaches for Enhancing Simulation Metamodeling	Xiren CAO Hong Kong University of Science and Technology
9:00-9:40	Siyang GAO City University of Hong Kong	An Optimal Opportunity Cost Selection Procedure	Jeff HONG City University of Hong Kong
9:40-10:00	Coffee Break		
10:00-10:40	Lei ZHAO Tsinghua University	Optimal Information Collection in Urban Delivery Resource Allocation	Loo-Hay LEE National University of Singapore



10:40-11:20	Haobin LI Agency for Science, Technology and Research (A*STAR) of Singapore	High-Performance Simulation-based Optimization via O ² DES.Net Framework	Wei JIANG Shanghai Jiao Tong University
--------------------	--	---	---

Panel Discussion on Research and Funding Applications

11:20-12:20

Members: Xiren CAO, Jeff HONG, Wei JIANG, Loo-Hay LEE,
Guangwu LIU, Chenglong XU, Liwei ZHANG, Lu ZHEN

12:20-14:00	Lunch Buffet & Free Discussion (Second Floor of Graduate Dining Hall) 自助午餐 & 自由讨论 (地点: 研究生食堂二楼)		
--------------------	---	--	--

Time	Speaker	Topic	Host
14:00-14:40	Huifen CHEN Chung Yuan Christian University	Passenger Security Screening Problem Considering a Waiting Time Constraint	Guangwu LIU City University of Hong Kong
14:40-15:20	Xuehua LU Sabre Airline Solutions	A Hybrid Approach of Optimization and Simulation for Service Agent Planning in a Passenger Queuing System	Chenglong XU Tongji University
15:20-15:40	Coffee Break		
15:40-16:20	Jie SONG Peking University	Optimal Inventory Control with Sequential Online Auction in Agriculture Supply Chain: An Agent- based Simulation Optimization Approach	Liwei ZHANG Dalian University of Technology
16:20-17:00	Qingshan JIA Tsinghua University	Reinforcement Learning Applied to Smart X – Buildings, Cities, and Grids	Lu ZHEN Shanghai University

17:00-18:00

Panel Discussion on Interaction between Research and Application

Members: Xiren CAO, Jeff HONG, Wei JIANG, Loo-Hay LEE,
Guangwu LIU, Chenglong XU, Liwei ZHANG, Lu ZHEN

18:00-19:30

Banquet (Pin Wei Guan, Second Floor of Bo Xue Lou Hotel)

晚宴 (地点: 品味馆, 博学楼宾馆二楼)



Agenda

July 1st, 2017

Venue: A507, Antai College of Economics and Management

Time	Speaker	Topic	Host
8:30-9:10	Na GENG Shanghai Jiao Tong University	Addressing Healthcare Operational Deficiencies	Shing Chih TSAI Cheng Kung University
9:10-9:50	Yanchu LIU Lingnan (University) College, Sun Yat-Sen University	On the Variance of Single-Run Unbiased Stochastic Derivative Estimators	Xiangwei WAN Shanghai Jiao Tong University
9:50-10:20	Coffee Break		
10:20-11:00	Guangxin JIANG City University of Hong Kong & Shanghai University	Constructing Surface for Derivative Pricing and Sensitivity Analysis: an Example of Offline-Learning-Online-Application	Jun LUO Shanghai Jiao Tong University
11:00-11:40	Pourya POURHEJAZY Shanghai Jiao Tong University	The New Generation of Operations Research Methods in Supply Chain Optimization: A Review	Dali ZHANG Shanghai Jiao Tong University
11:40-12:00	Closing Ceremony		
12:00-14:00	Lunch Buffet & Free Discussion (Second Floor of Graduate Dining Hall) 自助午餐 & 自由讨论（地点：研究生食堂二楼）		
Company Visit			



Talk Information:

June 30, 2017

Talk 1. Presenter: Xiaowei ZHANG

Title: New Approaches For Enhancing Simulation Metamodeling

Abstract:

Simulation models are often computationally expensive to execute. Metamodeling is a technique to approximate simulation models to support fast performance evaluation and decision making. The basic concept is that the user executes the simulation model only at a small number of carefully selected “design points”. A metamodel can be built to approximate the true response surface by interpolating the simulation outputs. The responses at other points are then predicted by the metamodel without running the simulation at all. However, existing metamodels generally treat the simulation model as a black box, discarding the structural properties of the response surface. Therefore, they often fail to capture highly nonlinear response surfaces. In this talk, new techniques will be discussed to address this issue, including stylized models and regularization in machine learning.

Short Bio:

XIAOWEI ZHANG is an assistant professor in the Department of Industrial Engineering and Logistics Management at the Hong Kong University of Science and Technology. He received his Ph.D. in Management Science and Engineering from Stanford University in 2011. He is a member of INFORMS and his research interests include simulation optimization, input uncertainty, rare-event simulation, and financial engineering.

Talk 2. Presenter: Siyang GAO

Title: An Optimal Opportunity Cost Selection Procedure

Abstract:

This study presents a new simulation budget allocation framework for the problem of selecting the best simulated design from a finite set of alternatives. The new framework is developed on the basis of general underlying distributions and a finite simulation budget. It adopts the expected opportunity cost (EOC) quality measure, which, compared to the traditional probability of correct selection (PCS) measure, penalizes a



particularly bad choice more than a slightly incorrect selection, and is thus preferred by risk-neutral practitioners and decision makers. To this end, a closed-form approximation of EOC is established to formulate the budget allocation problem and derive the corresponding optimality conditions. A sequential budget allocation algorithm is developed for implementation. The efficiency of the proposed method is illustrated via numerical experiments. This study also links the EOC and PCS-based budget allocation problems by showing that the two problems are asymptotically equivalent. This result, to some extent, explains the similarity in performance between the EOC and PCS allocation procedures observed in the literature.

Short Bio:

Siyang Gao received the B.S. degree in Mathematics from Peking University, Beijing, China, in 2009, and the Ph.D. degree in Industrial Engineering from University of Wisconsin-Madison, Madison, WI, in 2014. Dr. Gao is an Assistant Professor with the Department of Systems Engineering and Engineering Management, City University of Hong Kong. His research is devoted to simulation-based optimization, global optimization and their applications in healthcare management. His work has appeared in Operations Research, IEEE Transactions on Automatic Control, Automatica, and etc. Dr. Gao is a member of INFORMS and IEEE.

Talk 3. Presenter: Lei ZHAO

Title: Optimal Information Collection in Urban Delivery Resource Allocation

Abstract:

In a two-tier city logistics system, an urban logistics company usually partitions the urban area into regions and allocate its delivery resources (e.g., vehicles, delivery personnel) to these regions. On a daily basis, the delivery station in each region receives the delivery packages from the city distribution centers and delivers them to customers within the region, using its allocated delivery resources. A tactical decision in such a city logistics system is the allocation of delivery resources to the regions to minimize the expected operational cost of the entire system. However, due to the variability of the delivery locations and quantities, it can be very expensive to evaluate the operational cost associated with an allocation decision. We propose an information collection algorithm that, under an information collection budget, adaptively collects the cost information to optimally allocate the delivery resources. Specifically, we exploit the monotonicity of the expected operational cost in the number of allocated delivery resources in a region and extend the idea of knowledge gradient with discrete priors with resampling and re-generation. Our numerical results demonstrate the effectiveness of the proposed algorithm and the impact of resource allocation decisions



on the expected operational cost.

Short Bio:

Lei Zhao is an associate professor in the Department of Industrial Engineering at Tsinghua University. He received his PhD in Systems and Industrial Engineering at the University of Arizona in 2005. His research focuses on computational stochastic optimization methodologies (stochastic programming, approximate dynamic programming, simulation optimization) and their applications in supply chain risk management, logistics and transportation management, city logistics, retail operations management, and medical decision making. Prof. Zhao's research has been funded by three National Natural Science of China (NSFC) projects and by various industry collaborators such as Sinotrans, COSCONET, Sinopec, Mitsubishi Heavy Industries, General Mills, General Motors, IBM China Research. He has published in journals such as Annals of Operations Research, Computational Optimization and Applications, Computers & Operations Research, European Journal of Operational Research, Flexible Services and Manufacturing Journal, Transportation Research (Part B, Part C), etc. He currently serves as the associate editor of INFORMS Journal on Computing and the secretary/treasurer of the INFORMS Transportation Science and Logistics (TSL) Society.

Talk 4. Presenter: Haobin LI

Title: High-Performance Simulation-based Optimization via O²DES.Net Framework

Abstract:

As information technology evolves, the computerized simulation and simulation-based optimization become one of the important methodologies to help industries to analyze and improve the performance of their systems. Especially in the era of Industry 4.0 with connected systems and big data, high-performance simulation-based optimization is critical for understanding the real-time system's behaviors, to identify faster and more practical solutions.

Challenges arise in the following areas. Firstly, simulation models need to be developed collaboratively for complex systems based on various areas of domain knowledge, and with desired fidelity level that balances the evaluation accuracy and computational efficiency. Secondly, efficient optimization algorithms need to be developed for identifying quality system configurations with limited computing budget, by utilizing advanced computational infrastructure. Last but not least, the simulation and optimization should be integrated seamlessly, so as to deliver timely and affordable solutions to industrial practitioners.



The O2DES.Net is a software platform developed for such purposes. It incorporates the conventional discrete-event simulation modeling paradigm, with advanced object-oriented programming ideologies, which enables it to support flexible, yet composable and modularized model building. Several innovative optimization algorithms that newly developed are included in the package, with the potential to adapt to the latest parallel computing technologies to boost its performance. Experimental and practical examples are given to illustrate the integration between simulation and optimization modules, and the ease of building industrial solutions.

Short Bio:

Dr. Li, Haobin is Scientist for the Department of Computing Science, Institute of High Performance Computing (IHPC), Agency for Science, Technology and Research (A*STAR) of Singapore. He is a researcher in the capability group of Model-Based Engineering (previously named as Cross-discipline Data-intensive Analytics), with strong research focus on the discrete-event simulation modelling and stochastic simulation optimization. He received B.Eng. degree with 1st Class Honors in June 2009 from the Department of Industrial and Systems Engineering (ISE) at National University of Singapore (NUS), with minor in computer science; and Ph.D. degree from the same department in February 2014. He has been working as post-doctoral research fellow in the same department after receiving his Ph.D. degree and until joined A*STAR Singapore as a scientist in July 2015.

Talk 5. Presenter: Huifen CHEN

Title: Passenger Security Screening Problem Considering a Waiting Time Constraint

Abstract:

In the paper we solve the passenger security-screening problem where the system security level is maximized under mean-waiting-time and budget constraints. We simplify the original mixed-integer optimization problem to an integer optimization problem, where computation of the new objective function value requires a simple one-dimensional continuous search. We develop optimizations algorithms based on queueing theory and retrospective-optimization approaches. We also derive appropriate bounds of the optimal solution for efficient search and provide convergence proofs for the proposed algorithms.

Short Bio:

HUIFEN CHEN is professor of Industrial and Systems Engineering Department at Chung-Yuan University, Taiwan. She completed her Ph.D. in Industrial Engineering at



Purdue University in 1994 and master in statistics at Purdue University in 1990. Her research interests include statistical process control, public health, and stochastic root finding. Her email address is huifen@cycu.edu.tw.

Talk 6. Presenter: Xuehua LU

Title: A Hybrid Approach of Optimization and Simulation for Service Agent Planning in a Passenger Queuing System

Abstract:

With the wide spread use of kiosk systems in airports, the need for human services has been reduced significantly in recent years. As a result, the passenger service agent planning becomes more intricate. We present a hybrid approach based on optimization and simulation for computing the agent requirements over a planning horizon. The new model considers service quality control, kiosk impact, staff restriction, requirement consistency as well as randomness in agent service times and passenger inter-arrival times. We tested the model with various parameters using real client data. The result shows our model works better than many alternative approaches.

Short Bio:

陆学华，1983 年毕业于南京大学数学系，1986 年获中国科学院应用数学所硕士学位，1996 年获美国 Colorado 大学 Boulder 分校计算机系博士学位。早期在美国联邦快递从事飞机机组排班问题方面的工作一年，旋即加入 Sabre Airline Solutions 从事收益管理方面的工作，任全球第一个商用收益管理系统（AirMax）的第二代产品的架构师。2006 年来上海组建运筹开发团队，目前主要从事机场地面资源方面的数学模型和算法设计，包括地勤人员排班，登机口分配，值机人员排班，和枢纽机场控制，以及与之相关产品的维护。

Talk 7. Presenter: Jie SONG

Title: Optimal Inventory Control with Sequential Online Auction in Agriculture Supply Chain: An Agent-Based Simulation Optimization Approach

Abstract:

With the development of e-commerce, in agriculture supply chain, online auction is



adopted as an inventory clearing tool. Comparing to mathematical models studying inventory control over online sequential auctions, our agent-based simulation model could systematically describe the complexities of bidders' information interactions and behaviour preferences caused from financial and production perspectives, and by other supply chain members. In addition, we take into account the complex and dynamic market environment, which will impact the operation cost of auction policies. With identical auction items, the profit-maximizing firm must decide auction lot-size, which is the number of units in each auction, minimum initial bid, and the time interval between auctions. To obtain the optimal solution, nested partitions (NP) framework and optimal expected opportunity cost (OEA) algorithm are integrated to improve computation accuracy and efficiency. A case study based on real data is conducted to implement and validate the proposed approach. Furthermore, based on the model, the paper studies the sensitivities of the decision variables under different supply and demand scenarios.

Short Bio:

Dr. Jie Song is an associate professor with Department of Industrial and Management Engineering at Peking University, Beijing, China. She received the B.S. degree in applied mathematics from Peking University, Beijing, China, in 2004, and the M.S. and Ph.D. degree in industrial engineering from Tsinghua University in 2007 and 2010, respectively. She has been a research fellow in Georgia Institute of Technology from year 2007 to 2008, and during 2010 to 2012 she is a postdoc fellow in department of Industrial and System Engineering in University of Wisconsin Madison. Her research interests are simulation optimization, stochastic modeling in the application areas of logistics, healthcare and production. She is the winner of the Best Paper Award of 2014 IEEE CASE. Dr. Song has published journal papers in many leading journals including Discrete Event Dynamic Systems: Theory and Applications, Annals of Operations Research, IEEE Automation Science and Engineering etc. Her research has been funded from NSFC, National Key Technology Research and Development Program, Science Foundation of Ministry of Education of China. She is currently an Associate Editor of 《Flexible Services and Manufacturing Journal》, 《Asian Pacific Journal of Operations Research》, and Guest Editor of 《IEEE Automation Science and Engineering》.

Talk 8. Presenter: Qingshan JIA

Title: Reinforcement Learning Applied to Smart X – Buildings, Cities, and Grids

Abstract:

The recent advances in information technology make it possible to connect things together, which is known as the Internet of Things. This has provided a great



opportunity to improve the performance of these systems and to provide novel services, which is the essence of the “Smart X”. When things are connected into a large-scale complex network, they usually involve dynamics in multiple spatial and temporal scales. Reinforcement learning has a big role here to make things “smarter”. In this talk, we focus on a real problem in smart buildings, in which multiple buildings are connected into a micro grid. The renewable energy such as solar power and wind power are generated locally in the building, stored in the building, and consumed in the building by plug-in loads and electric vehicles. There are models to predict the power generation and consumption in minutes, hours, and days. And there are models to predict the power generation and consumption in individual buildings or a group of buildings. We developed a multi-scale event-based reinforcement learning method which makes decisions only when certain events occur, and uses policy projection and state and action aggregation to connect the models in multiple scales. The performance of this method is demonstrated by numerical examples. We will also briefly discuss how order statistics and the complexity theory may be combined with reinforcement learning to find policies with good performance and simple structures, which are important for distributed implementation in autonomous systems. We hope this work sheds light for the application of reinforcement learning in smart systems.

Short Bio:

(Samuel) Qing-Shan Jia received the B.E. degree in automation in July 2002 and the Ph.D. degree in control science and engineering in July 2006, both from Tsinghua University, Beijing, China. He is an Associate Professor in the Center for Intelligent and Networked Systems (CFINS), Department of Automation, Tsinghua University. He was a visiting scholar at Harvard University in 2006, at the Hong Kong University of Science and Technology in 2010, and at Laboratory for Information and Decision Systems, Massachusetts Institute of Technology in 2013. His research interest is to develop an integrated data-driven, statistical, and computational approach to find designs and decision-making policies which have simple structures and guaranteed good performance. His work relies on strong collaborations with experts in manufacturing systems, energy systems, autonomous systems, and smart cities. He is an associate editor of IEEE Transactions on Automatic Control, IEEE Transactions on Automation Science and Engineering, and Discrete Event Dynamic Systems – Theory and Applications. He served the Discrete Event Systems Technical Committee chair in IEEE Control Systems Society (2012-2015), and now serves the Control for Smart Cities Technical Committee chair in International Federation of Automatic Control, the Smart Buildings Technical Committee co-chair in IEEE Robotics and Automation Society, and the Beijing Chapter Chair of IEEE Control Systems Society.



Talk Information:

July 1, 2017

Talk 9. Presenter: Na GENG

Title: Addressing Healthcare Operational Deficiencies

Abstract:

This paper summarizes the past work of the author. The healthcare operational deficiencies are addressed in a demand-driven way. First, we describe the main operational deficiencies motivating our research in operational management of critical hospital resources. Second, the relevant literature is reviewed. Then our past works are presented by giving key assumptions, formal mathematical models, and properties of the optimal solution, solution approaches and main numerical findings. Methodologies of this paper are then shown to apply widely to other healthcare settings. The relaxation of key assumptions of this paper leads to various future research directions that have drawn significant interests of the operation research and industrial engineering communities. Finally, conclusions and future perspectives are presented.

Short Bio:

Dr. Na GENG, associate professor in Department of Industrial Engineering and Management, Shanghai Jiao Tong University(SJTU), China. She received her Ph.D in 2010 in Industrial Engineering from both SJTU, China and Ecole Nationale Supérieure des Mines de Saint-Etienne, France. Her research interests include capacity planning and allocation, patient scheduling, dynamic programming, and stochastic programming. Main results are published in IEEE Transactions on Automatic Control, IEEE Transactions on Robotics & Automation Magazine, IEEE Transactions on Automation Science and Engineering, European Journal of Operational Research, etc.

Email: gengna@sjtu.edu.cn Tel: 13917048340

Talk 10. Presenter: Yanchu LIU

Title: On the Variance of Single-Run Unbiased Stochastic Derivative Estimators

Abstract:

In this note, we analyze the variance of single-run unbiased stochastic derivative



estimators. The distribution of a specific conditional expectation characterizes an intrinsic distribution property of the derivative estimators in a given class, which in turn separates two of the most popular single-run unbiased derivative estimators, infinitesimal perturbation analysis (IPA) and the likelihood ratio (LR) method, into disjoint classes. In addition, a necessary and sufficient condition for the estimator achieving the lowest variance in a class is provided, as well as insight on finding an estimator with lower variance. We offer a sufficient condition that substantiates a rule of thumb that IPA has a smaller variance than LR, and provide a counterexample when the sufficient condition is not satisfied. (This is a joint work with Zhenyu Cui, Michael Fu, Jianqiang Hu, Yijie Peng and Lingjiong Zhu)

Short Bio:

Yanchu Liu is an Assistant Professor of Finance at Lingnan (University) College, Sun Yat-sen University since 2014. He received a Ph.D. degree in Financial Engineering at the Chinese University of Hong Kong in 2012, and M.S. and B.S. degrees in Statistics at University of Science and Technology of China in 2008 and 2005, respectively. His main research interests are quantitative and empirical methods with applications in finance and risk management. He has published in leading journals such as Operations Research, Energy Policy and Journal of Futures Markets. Part of his research is supported by the National Natural Science Foundation of China.

Talk 11. Presenter: Guangxin JIANG

Title: Constructing Surface for Derivative Pricing and Sensitivity Analysis: an Example of Offline-Learning-Online-Application

Abstract:

In financial industries, practitioners often need to know the derivative prices and their Greeks in real-time trading. The analytical formulae of the price surfaces are often unavailable and Monte Carlo simulations are used to estimate the prices and Greeks at fixed values of the market parameters. However, simulations are often time consuming and cannot be used in making real-time decisions. In this article, we propose to utilize the market close time to estimate an analytical expression of the derivative price surface that may be used the next day for pricing and Greeks calculation (through differentiating the surface). This work is an example where offline learning (i.e., a simulation study) is used to learn a surface for an online application (i.e., real-time calculation of the prices and Greeks). We call this regime offline-learning-online-application and argue that it is what simulation is good at when there is ample computational resource.



Short Bio:

Guangxin Jiang is a postdoctoral fellow in the Department of Economics and Finance at the City University of Hong Kong, and will join the School of Management, Shanghai University. He received his PhD and B.Sc in Applied Mathematics from Tongji University, in 2015 and 2010, respectively. His research interests lie in simulation methodology, modeling, analytics, and optimization.

Talk 12. Presenter: Pourya POURHEJAZY

Title: The New Generation of Operations Research Methods in Supply Chain Optimization: A Review

Abstract:

The possibilities of applying Operations Research (O.R.) techniques in the design of real-world systems are vast. The optimization and design of the supply chain network (SCN) is one of the relevant topics that has directed the attention of many scholars. Sound decisions in this regard, including the proper selection of the facility's location, transportation modes and routes and inventory management policies, can noticeably improve the systems performance. Over 380 articles published between 2005 and 2016 in the ISI/Web of Science database have applied advanced O.R. techniques in SCN optimization studies. This paper offers a systematic review of these published contributions by focusing on two categories of O.R. approaches most recently applied for the design of SC systems: integrated mathematical modeling and simulation-optimization (S-O) frameworks. A taxonomy analysis of the mentioned approaches is presented based on the supply chain elements. A bibliometric analysis is also conducted to provide technical insights into the possible gaps in the field. Moreover, the relevant studies on SC sustainability are highlighted. The research results are supportive of the S-O frameworks as either an alternative approach or an effective solution method for the integrated problems. The research outcomes can provide researchers in the field with useful details of the integrated problems and S-O frameworks as the most recent O.R. methodologies in the field of SC optimization.

Short Bio:

Pourya is a postdoctoral fellow of Shanghai Jiao Tong University. He holds B.E. and M.S.E. degrees in Industrial Engineering, and recently obtained a Ph.D. degree in Logistics systems. His research focus areas include analysis and design of supply chain networks and logistics systems using mathematical modelling and meta-heuristics.



安泰经管学院
ANTAI COLLEGE
Economics · Management

This image shows a full page of a worksheet designed for handwriting practice. It features 18 evenly spaced, horizontal dashed lines across the entire width of the page. The background is plain white, and there are no margins, text, or other markings present.



安泰经管学院
ANTAI COLLEGE
Economics · Management

This image shows a full page of a worksheet designed for handwriting practice. It features 18 evenly spaced, horizontal dashed lines across the entire width of the page. The background is plain white, and there are no margins, text, or other markings present.



安泰经管学院
ANTAI COLLEGE
Economics · Management

[illegible]