Track：服务运营管理（track chair：卞亦文、关旭）

Session：Data-Driven Operations Management
Chair: 梅文俊，尤鹏程，北京大学

序号	演讲教授	学校	演讲题目
1	**宋磊**	**微软亚洲研究院**	**Deep Reinforcement Learning in Supply Chain Management**
2	**薛梦莹**	**中国科学技术大学管理学院**	**Consumer Choice Modeling via Operational Data Analytics**
3	**房智轩**	**清华大学交叉信息研究院**	**Designing Subsidies in Online Platforms**
4	**张政**	**浙江大学管理学院**	**Optimization of Active Surveillance Strategies for Heterogeneous Patients with Prostate Cancer**

讲座 1

标题

Deep Reinforcement Learning in Supply Chain Management

作者和单位信息

宋磊，微软亚洲研究院

摘要

There are plenty of optimization problems in industry, e.g., inventory management, vehicle routing etc. However, scale of these problems often makes traditional OR approaches unfeasible in these scenarios. In this talk, I will present potentials of deep reinforcement learning in solving large scale optimization problems in industry. I will first introduce an open source tool called MARO (multi-agent resource optimization), which is developed in MSRA and can support high efficient distributed reinforcement learning. Then, I will illustrate how it performs on two case studies with our industrial partners: inventory management optimization for an online platform and on-call orders scheduling in real-time.

作者简介

Lei Song is currently a principal researcher in Machine Learning group in MSRA. His research interests include AI technologies and their applications in industry. Before joining MSR Asian, Lei worked for a leading e-commerce company in China, where he tried to optimize supply chain management leveraging AI technologies. He also had plenty of research experience in academy and has authored tens of research papers in several international conferences. Lei got his PhD degree majored in computer science from IT University of Copenhagen in 2012, and then joined Max Planck Institute for Informatics and University of Technology, Sydney, as a research assistant.

讲座 2

标题

Consumer Choice Modeling via Operational Data Analytics

作者和单位信息

薛梦莹，中国科学技术大学管理学院

摘要

Choice models are widely applied in psychology, economics, transportation, marketing, and operations studies. An operational data analytics (ODA) framework is presented to estimate the general consumer choice model using data. This framework, generalizing the existing estimation methods for specific structural models, strikes a delicate balance between the (likely imprecise) structural knowledge and the data. This is achieved by articulating the domain of validation through extending the structural knowledge and by formulating the data-integration model based on the associated structural properties. We demonstrate the implementation of the ODA framework to identify the appropriate consumer choice models. The ODA estimate outperforms the existing parametric and nonparametric methods, particularly over the choice sets that are not covered in the data. We also discuss potential future research of developing ODA approaches to study the related aspects of consumer choice models.

作者简介

Dr. Xue Mengying is an associate professor at School of Management, University of Science and technology of China. She was a postdoc at Krannert School of Management, Purdue University and got her PhD from Tsinghua University. Her research focuses on integrating theoretical modeling and data analytics in supply chain management. Her research interests span the following areas: data-driven analytical approach, optimization modeling and algorithm, economic and game-theoretical analysis, and their applications in operations management, marketing and energy interfaces. Her research has been published by top-tier journals including POMS and MSOM.

讲座 3：

标题

Designing Subsidies in Online Platforms

作者和单位信息

房智轩，清华大学交叉信息研究院

摘要

As a handy tool to balance and match the demand and supply, subsidization has played an important role in improving the service quality and revenue of online platforms. In this talk, we will discuss the subsidy design through the scenario of bike sharing platforms. We propose a novel deep reinforcement learning framework for incentivizing users to rebalance such systems. We model the problem as a Markov decision process and take both spatial and temporal features into consideration. We will explore the possibility of combining the machine learning techniques and the market incentive design intuition, and share the lessons we learned from tackling spatial-temporal data.

作者简介

Zhixuan Fang is a tenure-track assistant professor at the Institute for Interdisciplinary Information Sciences (IIIS) at Tsinghua University, Beijing, China. He mainly focuses on the

design and analysis of multi-agent systems and networked systems. He received his Ph.D. degree in computer science from Tsinghua University, China, in 2018, and his B.S. degree in physics from Peking University, China, in 2013.

讲座 4

标题

Optimization of Active Surveillance Strategies for Heterogeneous Patients with Prostate Cancer

作者和单位信息

张政，浙江大学管理学院

摘要

Prostate cancer (PCa) is common in men with long latent periods, during which the disease is asymptomatic. Active surveillance is a monitoring strategy commonly used for patients diagnosed with low-risk PCa who may harbor latent high-risk PCa. The optimal monitoring strategy attempts to minimize the disutility of testing, while ensuring that the patient is detected at the earliest time when the disease progresses. Unfortunately, guidelines for the active surveillance of PCa are often one-size-fits-all strategies that ignore the heterogeneity among multiple patient types. In contrast, personalized strategies based on partially observable Markov decision process (POMDP) models are challenging to implement in practice given the large number of possible strategies that can be used. This article presents a two-stage stochastic programming approach that selects a set of strategies for predefined cardinality based on patients' disease risks. The decision variables include the selection of periods at which to test patients in each strategy and the assignment of multiple patient types to strategies. The objective is to maximize a weighted reward function that considers the need for cancer detection, missed detection, and cost of monitoring patients. We discuss the structure and complexity of the model and reformulate a logic-based Bender's decomposition formulation that can solve realistic instances to optimality. We present a case study for the active surveillance of PCa and show that our model results in strategies that vary in intensity according to patient disease risk. Finally, we show that our model can generate a small number of strategies that can significantly improve the existing "one-size-fits-all" guideline strategies used in practice.

作者简介

Dr. Zheng Zhang is a ZJU 100-Young professor (tenure-track assistant professor) at the School of Management, Zhejiang University. His primary research interests lie at the intersection of operations research and healthcare, particularly in healthcare operations management and medical decision making in cancer screening. His research has published in INFORMS Journal on Computing, IISE Transactions, etc. He is the finalist award of the INFORMS Service Science Best Paper Award.