中国运筹学会
OPERATIONS RESEARCH SOCIETY OF CHINA
数据科学与运筹智能分会（筹）

苏州大学商学院
BUSINESS SCHOOL·SOOCHOW UNIVERSITY

第三届数据科学与运筹智能学术会议

会议手册

主办单位

中国运筹学会数据科学与运筹智能分会（筹）

承办单位

苏州大学商学院

2026年9月19日-20日 苏州



会议主题

第三届数据科学与
运筹智能学术会议

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承办单位

苏州大学商学院

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会议日程

2026 年 9 月 18 日		
09:00–21:00	苏州金鸡湖馨乐庭公寓酒店一楼	会议报到
2026 年 9 月 19 日		
08:30–08:50	苏州大学商学院二楼报告厅	开幕式
08:50–09:35	苏州大学商学院二楼报告厅	大会报告 1：A Model–Free Approach to Assortment Optimization via Local Exploration and Adaptive Projection – Guillermo Gallego
09:35–10:20	苏州大学商学院二楼报告厅	大会报告 2：智能计算：理论与实践 – 葛冬冬
10:20–10:30	苏州大学商学院二楼报告厅	茶歇
10:30–10:50	苏州大学商学院二楼报告厅	分会委员会选举
10:50–11:35	苏州大学商学院二楼报告厅	大会报告 3：人工智能辅助的符号规律与决策公式发现 – 周源
11:35–12:20	苏州大学商学院二楼报告厅	大会报告 4：New Measures for Network Structure and Their Applications in Resilience – 吕欣
12:20–13:30	苏州金鸡湖馨乐庭公寓酒店 31 层自助餐厅	午餐
14:00–14:50	苏州大学商学院二楼报告厅	大会报告 5：Mean–Variance Optimization of Service–Rate Control in an M/M/1 Queue – 何启明
14:50–15:00	苏州大学商学院二楼报告厅	茶歇
15:00–17:30	苏州大学商学院 317	青年教师邀请报告： 主持人：吕欣
15:00–17:30	苏州大学商学院 318	优秀研究生邀请报告： 主持人：张玉利
17:30–18:00	苏州大学商学院二楼报告厅	师生邀请报告表彰会
18:00–20:00	苏州金鸡湖馨乐庭公寓酒店 31 层自助餐厅	晚餐
20:00–21:00	苏州大学商学院 317	分会委员会会议

2026 年 9 月 20 日		
08:30–11:30	苏州大学商学院 317	分论坛 1：AI for OR/OR for AI 主持人：詹东远 报告人：詹东远、唐昕迪、李雪曈、陈锐
08:30–11:30	苏州大学商学院 212	分论坛 2：数据驱动优化 主持人：于国栋 报告人：刘康琳、郝兆伟、于国栋、刘懋圻、聂伟业
08:30–11:30	苏州大学商学院 318	分论坛 3：风险厌恶、行为决策与市场机制 主持人：邱韫哲 报告人：邱韫哲、王珊珊、刘骁勇、袁兆良
08:30–11:30	苏州大学商学院 316	分论坛 4：网络、交通与平台运营优化 主持人：张宁威 报告人：张宁威、杜明睿、苏昌城、徐颖哲、安睿琦
08:30–11:30	苏州大学商学院 301	分论坛 5：运营管理中的优化、学习与激励 主持人：陈俊霖 报告人：潘东辉、姚轶溥、鲍奇峰、张璇
08:30–10:00	苏州大学商学院 215	分论坛 6：青年学者论坛 主持人：赵燕鲁 报告人：贺百花、陈昕韫
11:30–12:30	苏州金鸡湖馨乐庭公寓酒店 31 层自助餐厅	午餐

会议主旨报告

大会报告一：

A Model-Free Approach to Assortment Optimization via Local Exploration and Adaptive Projection



Guillermo Gallego

香港中文大学（深圳）数据科学学院

◆ 摘 要

Modern assortment and pricing decisions increasingly rely on simulators, learned predictors, and proprietary demand engines whose internal structure is inaccessible to the optimizer. Local Exploration and Adaptive Projection (LEAP) transforms such a revenue evaluator into a query–efficient decision interface. A local batch verifies the best one–product move and produces an affine score whose maximizer coordinates multiple product changes. For unconstrained binary linear–fractional objectives, LEAP reaches a global optimum in a linear number of rounds with a quadratic number of distinct oracle calls. Finite global convergence also holds for unconstrained Markov chain choice models under full–support initial arrivals and finite transience. With a fixed approximate oracle, LEAP provides finite–trajectory revenue guarantees and l conditions for exact–path recovery. For binary linear–fractional objectives, it also bounds terminal optimality gaps. LEAP extends naturally to probability–assisted initialization, active–set screening, and finite price menus. Across choice–model benchmarks and nonparametric decision forests, basic LEAP achieves mean gaps below 0.5% and 1.7%, respectively, with substantially fewer oracle calls than intensive local–search heuristics. The probability–assisted multi–start variant LEAP–MS attains the smallest mean gap in every unconstrained and constrained benchmark family. These results make local revenue queries a bridge from revenue evaluators to assortment and pricing decisions.

◆ 专家介绍

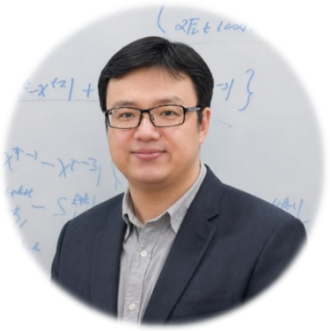
Prof. Gallego’s research interests are Dynamic Pricing and Revenue Optimization, Supply Chain Management, Electronic Commerce, and Inventory Theory. He has published influential papers in the leading journals of his field where he has also occupied a variety of editorial positions. His work has been supported by numerous industrial and government grants. In addition to theoretical research, Prof Gallego has developed strong collaboration with global corporations such as Disney World, Hewlett Packard, IBM, Lucent Technologies, Nomis Solutions, and Sabre Airline Solutions. He has also worked with government agencies such as the National Research Council, the National Science Foundation in United States and the Ireland Development Agency. His graduate students are associated with prestigious universities and occupy leading roles in their chosen fields. Prof Gallego received both his PhD degree and MS degree in Operations Research and Industrial Engineering from Cornell University in 1988 and 1987.

大会报告二：

智能计算：理论与实践

葛冬冬

上海交通大学智能计算研究院



◆ 摘　要

本次报告汇报了新一代数学规划算法在 GPU 架构下 LP，QP，SDP 等问题的新进展，以及在工业实践和 AI4S 的新领域拓展。

◆ 专家介绍

葛冬冬，上海交通大学智能计算研究院院长。主要研究兴趣为大规模优化问题的理论，计算与应用。主持国家自然基金原创探索，杰出青年，重大项目基金。担任杉数科技联合创

始人和首席科学家，曾参与波音、南航、华为、京东、顺丰、滴滴、国家电网 / 南方电网等国内外多个优化项目，也是专业数学规划软件 COPT 项目负责人。

大会报告三：

人工智能辅助的符号规律与决策公式发现



周　源

清华大学丘成桐数学科学中心和数学科学系

◆ 摘　要

从观测数据中发现简洁、可解释并符合领域知识的数学规律，是人工智能辅助科学发现的重要问题。本报告将主要介绍物理符号回归模型 PhyE2E。符号回归旨在从数据中直接发现描述变量关系的数学公式，但其通常面临搜索空间随表达式复杂度指数增长、奖励信号稀疏、物理先验难以有效融入，以及拟合精度与公式简洁性难以兼顾等挑战。PhyE2E 将物理量纲、公式复杂度、候选算符和常数等信息融入端到端模型，在生成公式的同时学习量纲一致性，并通过变量拆分将复杂的多变量公式分解为若干规模较小的子问题，再利用搜索算法进行局部修正。实验表明，该方法在符号准确性、量纲准确性和公式复杂度等指标上具有显著优势。

我们进一步将 PhyE2E 应用于多个空间物理问题。该方法能够刻画太阳黑子活动的短期与长期周期，发现具有明确物理结构的近地等离子体压强关系，并在观测数据较为稀缺的太阳高纬区域推导太阳差异自转公式。这些研究说明，人工智能不仅可以拟合观测数据，也可以辅助科学家发现可供解释、检验和进一步研究的数学表达式。

最后，报告将介绍一项正在进行的研究。复杂运营问题中的高质量决策策略通常依赖研究者针对具体模型进行分析和推导，而基于神经网络等方法学习的策略虽然能够处理复杂问题，却往往难以解释其结构，也难以严格验证其性能。针对这一问题，我们尝试将符号规划应用于运营决策，利用人工智能辅助发现简洁、可解释且可直接执行的决策公式，并通过人工智能辅助的方式验证其理论性质，从而为人工智能发现的决策规则提供可证明的理论保证。

◆ 专家介绍

清华大学丘成桐数学科学中心副教授。2009 年于清华大学获得计算机科学专业工学学士学位，2014 年在卡内基梅隆大学取得计算机科学博士学位。入职清华大学之前，曾任麻省理工学院应用数学系讲师，先后担任伊利诺伊大学厄巴纳 – 香槟分校、印第安纳大学伯明顿分校助理教授。研究方向为数据驱动决策以及面向科学领域的人工智能，研究领域涉及运筹学、机器学习与最优化。其多篇论文发表于运筹学、管理科学、机器学习、理论计算机科学领域的顶级期刊与学术会议，包括 Operations Research、Management Science、Mathematics of Operations Research、Production and Operations Management、SIAM Journal on Optimization、Nature Machine Intelligence、Journal of Machine Learning Research、ICML、NeurIPS、ICLR、COLT、STOC、FOCS、SODA。 现 任 Operations Research 与 Operations Research Letters 副主编。

大会报告四：

New Measures for Network Structure and Their Applications in Resilience



吕 欣

国防科技大学系统工程学院

◆ 摘 要

图论与复杂网络领域的相关研究主要围绕模型、结构和动力学展开。本报告围绕网络结构新度量及其韧性应用的前沿方向，首先介绍一个新的能解释无标度率的网络先天 – 后天演化模型，揭示社交网络后天主导、非社交网络先天主导的现实规律；随后在指标方面，提出三元嵌入结构、多重最短路、网络纺锤体等新指标，从微观 – 中观 – 宏观尺度分别度量网络结构，并揭示其在大规模真实通信网络、在线社交网络、基础物理设施网络中的信息传播、病毒扩散、灾害抗毁等动力学过程建模与应用。

◆ 专家介绍

吕欣，中国人民解放军国防科技大学系统工程学院首席专家，教授，博士生导师，国家杰出青年科学基金获得者，“对抗性复杂系统智能决策”创新研究群体负责人。主要研究方向为大数据、复杂网络、类脑智能、应急管理，研究成果广泛应用在地震、台风、疫情等国内外重大突发事件的应急响应中，关于应用移动大数据支撑应急救援的工作被 MIT 综合技术评论列为“全球十大突破性技术”，关于高风险人群网络抽样和统计推断的工作被命名为“吕 – 估计量”。研究成果发表在 Nature、PNAS、Nature Microbiology、Nature Communications、Physic Reports 等高水平期刊上，得到人民日报、新华社、解放军报、科技日报、BBC、纽约时报等高度正面评价。入选全球前 2% 顶尖科学家“终身科学影响力”榜单，获全球移动大奖（GLOMO Award），国家级教学成果二等奖，湖南省高等教育教学成果特等奖，教育部自然科学二等奖，教育部科技进步二等奖，军队科技进步二等奖，深圳市科技进步一等奖等。

大会报告五：

Mean-Variance Optimization of Service-Rate Control in an M/M/1 Queue



何启明

电子科技大学经济与管理学院

◆ 摘　要

We study stationary service-rate control in an M/M/1 queue when performance is measured by the mean, variance, or a weighted mean-variance criterion for the instantaneous steady-state cost rate. Variance is nonadditive because its center changes with the policy. We exploit the queue's birth--death product form to derive explicit coordinate sensitivities and objective-specific, policy-independent conditions under which every policy can be improved by imposing full service in the tail. The resulting equality of unrestricted and fixed-tail optimal values converts the countable-state search into a finite-dimensional core with an analytically evaluated geometric tail. We then adapt established

fixed–center pseudo–variance and performance–difference ideas to this common–tail class. Primitive geometric–moment conditions guarantee normalized Poisson solutions, valid cross–policy comparisons, and feasible state–wise selectors, yielding implementable descent algorithms for variance objective. For special cost functions, we further obtain bang–bang or threshold policies and, under stated conditions, a bang–bang reduction and a full–rate variance–minimizing representative. An energy–aware example distinguishes conservative analytical tail certificates from the much earlier full–rate onset observed in computed policies.

◆ 专家介绍

何启明博士目前在电子科技大学经济与管理学院工作。在此之前，他曾在滑铁卢大学和达尔豪斯大学担任管理科学与工程的教授。他于 1989 年在中国科学院应用数学研究所获得运筹学博士学位，再于 1996 年在滑铁卢大学管理科学系获得管理科学博士学位。他的主要研究方向包括应用概率中的计算方法、排队论、库存控制和生产管理等。在研究各种随机模型时，他最喜欢使用矩阵解析法。最近，他的研究工作包括深度强化学习、多类型客户的排队系统、多类型需求的库存系统、多类型索赔的风险 / 保险模型，以及相位型分布的表示及其应用。

分会场安排

分论坛 1：AI for OR/OR for AI

主持人：詹东远
时　间：08:30–11:30　　地　点：苏州大学商学院 317

詹东远	中国科学技术大学	Model Pooling or Specialization? Strategic Prediction for Competitive Product Innovation
唐昕迪	中央财经大学	充电基础设施演化下自动驾驶电动出租车队动态运营的少样本学习：一种元深度强化学习方法
李雪瞳	西安交通大学	A Unified Statistical Framework for Multi-Label Multiple-Instance Learning
陈　锐	香港中文大学（深圳）	Smooth Learning with Hard Constraints via Legendre-Regularized Policies

分论坛 2：数据驱动优化

主持人：于国栋
时　间：08:30–11:30　　地点：苏州大学商学院 212

刘康琳	北京交通大学	Joint Location-Inventory Optimization of Suburban Large Warehouse Bases for Peacetime-Emergency Dual Use
郝兆伟	东北财经大学	Robust Capacity Planning with General Upgrading
于国栋	山东大学	Trust the Data, Test the Judgment: Credible Data-driven Optimization via Bayesian DRO
刘懋圻	山东大学	Doing Well by Doing Good: Alignment of Revenue and Welfare in Robust Product Line Design
聂伟业	南京大学	旅行时间不确定条件下考虑顾客延误容忍度的外卖配送分布鲁棒优化

分论坛 3：风险厌恶、行为决策与市场机制

主持人：邱韫哲
时　间：08:30–11:30　　地点：苏州大学商学院 318

邱韫哲	北京大学	Dynamic Hedging Heuristics for a Risk–Averse Hog Farmer
王珊珊	北京航空航天大学	The Role of Mixed Discounting in Risk–averse Sequential Decision–making
刘骁勇	清华大学	Risk aversion in the price–setting newsvendor problem with random supply capacity
袁兆良	香港中文大学（深圳）	Variable Selection for Feature–Based Newsvendor

分论坛 4：网络、交通与平台运营优化

主持人：张宁威
时　间：08:30–11:30　　地点：苏州大学商学院 316

张宁威	兰州大学	Designing Mobile Battery–Swapping Networks for Electric Construction Vehicles
杜明睿	山东大学	Notification–Set Optimization for Ride–Hailing Aggregators under Heterogeneous First–Accept
苏昌城	浙江工业大学	骑手拒单行为感知与即时配送订单分派优化
徐颖哲	北京理工大学	Mitigating Welfare Loss from Strategic Storage Bidding: Payment Design for Energy Time–Shifting Services
安睿琦	北京交通大学	When Platforms Crowdsource to Communities: Hybrid Channel Design with Incentives and Endogenous Capacity

分论坛 5：运营管理中的优化、学习与激励

主持人：陈俊霖
时　间：08:30–11:30　　地点：苏州大学商学院 301

潘东辉	中央财经大学	Competition and Coordination between Farmers and Firms: Government Interventions in Dynamic Agricultural Markets

姚轶溥	英国杜伦大学	Joint Maintenance and Learning: Structural Policies and Endogenous Feedback in Condition-Based Maintenance
鲍奇峰	西南财经大学	Sparse Spare-Parts Network Design: An Unbalanced Optimal Transport Framework for Joint Location-Inventory-Allocation
张　璇	清华大学	The Truck-Drone Routing Problem with Payload-Energy Awareness: An Application in Precision Agriculture

分论坛 6：青年学者发展主题研讨

主持人：赵燕鲁
时　间：08:30-10:00　　地点：苏州大学商学院 215

贺百花	中国科学技术大学	Mixture of Decisions: A Unified Decision Averaging Framework
陈昕韫	香港中文大学（深圳）	Queueing-Aware Learning for Multi-Price Dynamic Pricing

分会场报告简介

分论坛 1：AI for OR/OR for AI

报告 1： Model Pooling or Specialization? Strategic Prediction for Competitive Product Innovation

报告人：詹东远　教授　中国科学技术大学

摘要：Firms increasingly use machine learning predictions not only to forecast demand but also to decide what products to develop. We study a fundamental model design choice in this setting: whether to train segment-specific models through single-task learning (STL) or pool information across consumer segments through multi-task learning (MTL). STL preserves segment-specific information but generates more variable predictions, whereas MTL reduces prediction variance through pooling at the cost of bias. We show that the learning paradigm that predicts best need not be the one that performs best economically. Without competition, prediction-focused and profit-focused choices are largely aligned. Under competition, however, this alignment can break sharply. When price competition is intense, firms may strategically adopt a learning paradigm with higher prediction error because it translates into differentiated innovation decisions, thereby softening downstream price competition. This prediction-based innovation differentiation can also generate asymmetric equilibria in which ex ante identical firms adopt different learning paradigms. Moreover, decision-focused model choice need not improve equilibrium profits: it can induce a prisoner's dilemma in which both firms choose less accurate models yet earn less than under accuracy-oriented model selection. Finally, competition can reverse firms' preferences over the composition of prediction errors, making variance more attractive relative to bias because variance facilitates product differentiation. Our results show that model architecture is not merely a statistical choice, but also a strategic instrument for product innovation and competition.

报告 2：充电基础设施演化下自动驾驶电动出租车队动态运营的少样本学习：一种元深度强化学习方法

唐昕迪　讲师　中央财经大学

摘要：随着电动汽车及充电基础设施的快速发展，自动驾驶电动出租车（Autonomous Electric Taxi, AET）车队的高效运营面临一个关键挑战，即如何适应充电站部署及空间配置的变化。现有研究大多假设充电网络是静态且预先给定的，这一简化假设使理论模型与实际运营之间存在显著差距。为弥补这一研究空白，我们提出 GAT-PEARL，一种新型元强化学习框架，旨在跨空间异质的充电环境学习具有适应性的运营策略。具体而言，该方法引入图注意力网络（Graph Attention Network, GAT），以有效提取不同基础设施布局下稳健的空间表征，并刻画城市环境中复杂的时空关系。此外，该框架采用基于概率嵌入的 Actor-Critic 强化学习方法（Probabilistic Embeddings for Actor-Critic Reinforcement Learning, PEARL），使策略能够通过基于推断的方式快速适应充电网络布局的变化，仅需进行有限的任务特定微调，而无需从头重新训练。基于中国成都真实数据开展的大规模仿真实验表明，GAT-PEARL 显著优于传统强化学习方法及其他具有竞争力的基准方法。该方法对训练阶段未见的仿真基础设施布局表现出更强的策略泛化能力，并在任务层面的配置变化下实现了更高的整体运营效率。

报告 3：A Unified Statistical Framework for Multi-Label Multiple-Instance Learning

李雪瞳　讲师　西安交通大学

摘要：Multi-label multiple-instance learning (MIML) is a key framework for weakly supervised data. We develop a unified statistical theory linking rare instance-level classes to bag-level labels and study maximum likelihood estimation under both instance- and bag-level supervision. To address the exponential complexity of the full MLE, we propose a pseudo-MLE with complexity linear in the number of labels and prove that it attains the same asymptotic efficiency. We further develop a subsampling MLE that balances annotation cost and efficiency. Using \(A\)-optimality with Kullback – Leibler regularization, we derive an optimal strategy for

partial instance annotation and show that its feasible version, based on a consistent pilot estimator, preserves the original asymptotic efficiency. Simulations and a real-data analysis demonstrate the finite-sample performance of the proposed methods.

● 报告 4：Smooth Learning with Hard Constraints via Legendre-Regularized Policies

陈　锐　助理教授　香港中文大学（深圳）

摘要：We revisit contextual optimization from the perspective of policy class design. A desirable policy class should be expressive enough to learn rich context-decision relationships, should enforce hard feasibility constraints, and should remain smooth enough for gradient-based training. Existing approaches usually emphasize only part of these requirements. We propose Legendre-regularized policies, which parameterize decisions as solutions of regularized optimization problems. This construction yields policies that are feasible by construction. We prove that the associated optimizer map is single-valued and differentiable, maps onto the relative interior of the feasible set, admits an explicit Jacobian, and can be made arbitrarily smooth. We also establish a universal approximation result showing that the proposed class can approximate any continuous feasible policy. Our approach demonstrates strong empirical performance on contextual newsvendor and resource allocation problems.

分论坛 2：数据驱动优化

● 报告 1：Joint Location-Inventory Optimization of Suburban Large Warehouse Bases for Peacetime-Emergency Dual Use

刘康琳　副教授　北京交通大学

摘要：The peacetime-emergency dual-use strategy is important for enhancing urban resilience, and suburban large warehouse bases are key carriers integrating routine logistics

services with emergency support. This paper studies the joint location–inventory optimization problem of such facilities by developing a model that considers peacetime demand, emergency reserve demand, emergency demand, and government incentives for emergency reserves. The square-root terms are reformulated into second-order cone form via norm equivalence, and a branch-and-bound embedded outer approximation algorithm is developed. Numerical experiments based on Beijing show that the model achieves full demand coverage and emergency distribution through the existing warehouse network.

报告 2：Robust Capacity Planning with General Upgrading

郝兆伟　副教授　东北财经大学

摘要：We study a multi-product capacity planning problem with general upgrading, where unmet demand for a lower-end product can be satisfied by any available higher-end product. To determine the optimal initial capacities under demand uncertainty, we formulate a two-stage distributionally robust optimization (DRO) model based on an ambiguity set characterized by marginal means and variances. To obtain a tractable formulation, we show that the dual second-stage problem can be equivalently reformulated as an economic lot-sizing problem with bounded inventory constraints. Using a shortest-path network representation, we further characterize the extreme points of the dual polyhedron and derive an exact second-order cone programming (SOCP) reformulation that is polynomially solvable. The proposed approach can also be extended to ambiguity sets incorporating partial correlation or Wasserstein information. Numerical experiments show that the DRO solution performs particularly well when training data are limited or demand is highly uncertain and nonstationary. A real-data study from a cosmetic company further demonstrates that the proposed model achieves higher average profit and lower profit variability than sample average approximation.

报告 3：Trust the Data, Test the Judgment: Credible Data-driven Optimization via Bayesian DRO

于国栋　教授　山东大学

摘要：Most data–driven optimization methods rely on objective observational samples. When those samples are scarce, noisy, or systematically shifted across sources, the resulting decisions can be inaccurate and hard to trust. We propose a credible Bayesian distributionally robust optimization that also leverages expert decisions. These decisions are not draws from the target law, but they encode approximate optimality judgments that observations alone cannot supply. A hierarchical model learns the target from heterogeneous sources after bias adjustment and centers a Wasserstein ball at the posterior predictive, with a radius set by residual posterior uncertainty. Expert decisions are mapped into convex inverse–optimization inequalities, and the equivalent robust program intersects the resulting judgment set with the observational ball. Compatible records therefore remove adverse distributions and raise out–of–sample accuracy without additional target samples. Empty intersection is a size–controlled compatibility test and returns the observational decision without radius inflation. We develop an equivalent linear programming reformulation for computation. We show that conditional regret tracks the tighter channel, and a two–point lower bound shows that this rate is essentially unimprovable without further structure. Valid records also buffer observational contamination, while a trimmed intersection retains coverage and performance when only a few decision records are corrupted. Synthetic newsvendor experiments, including a two–product capacity setting, show lower out–of–sample cost than observation–only Bayesian DRO and standard multi–source aggregations in small and moderate samples. A platelet–inventory study with real blood–center data confirms that the same rule remains stable under rolling–origin updates and protects the demand–driven policy when historical judgment fails the compatibility test.

报告 4：Doing Well by Doing Good: Alignment of Revenue and Welfare in Robust Product Line Design

刘懋圻 讲师 山东大学

摘要：This work investigates product line design (PLD), which selects a firm’s product portfolio from candidate options. To hedge revenue against such distributional uncertainty, we propose a distributionally robust optimization (DRO) model that maximizes the worst-case expected revenue over an \(\ell_1\)-Wasserstein ball centered at a nominal utility distribution. We uncover a “doing well by doing good” mechanism under preference uncertainty: robust revenue optimization endogenously promotes buyer welfare. We further summarize operational principles for two prevalent nominal distributions. For multinomial logit nominal models, robustness favors expanded product lines; for empirical nominal distributions, it prioritizes cost-effective product lines that deliver higher customer utility relative to extracted revenue.

报告 5：旅行时间不确定条件下考虑顾客延误容忍度的外卖配送分布鲁棒优化

聂伟业 南京大学

摘要：针对外卖配送中旅行时间不确定与顾客延误容忍度存在差异，本文研究了静态订单分配与取送路径联合优化问题。以某大型外卖平台的订单和骑手轨迹数据为背景，基于 Wasserstein 模糊集，构建考虑顾客异质延误容忍度的分布鲁棒优化模型，并进一步推导最坏情形期望的精确重构及订单风险的有限仿射面表示，据此设计结合风险补偿支配与自适应仿射面定价的精确算法。同时针对较大规模实例，提出融合延误风险的自适应大邻域搜索与路线池重组的混合启发式算法。数值实验表明，相比于传统算法，设计的精确算法在真实实例下的平均求解速度提升了超过十倍。同时与统一容忍度基准相比，考虑不同容忍度可通过调整订单分组和取送顺序降低经验延误风险。在小规模场景下，启发式算法相对于精确算法速度提升了约 20 倍，而平均偏差仅为 0.408%；对于包含 100 个订单和 20 名骑手的实例，启发式算法能够在 1200s 以内解决同时平均 BKS 在 10% 以内。

分论坛 3：风险厌恶、行为决策与市场机制

报告 1：Dynamic Hedging Heuristics for a Risk-Averse Hog Farmer

邱韫哲 讲师 北京大学

摘要：Previous research on commodity processing typically assumes risk neutrality, optimizing physical inventory flows in isolation from financial markets. However, for specialized, privately held firms, managing downside tail risk is a survival constraint, not merely a preference. This paper investigates the integrated inventory and financial hedging problem of a risk-averse hog farmer minimizing Dynamic Conditional Value-at-Risk (DCVaR). We formulate the problem as a high-dimensional stochastic dynamic program. Analytically, we prove the existence of an optimal state-dependent base-stock policy for physical inventory and characterize the complementary slackness structure of the optimal financial hedging policy, revealing a bidirectional feedback loop between the two dimensions. To overcome the curse of dimensionality, we propose a highly tractable look-ahead heuristic that generates both a strong inventory management policy and a strong financial hedging portfolio. To rigorously evaluate performance, we derive a tight upper bound using information relaxation duality. Benchmarked against a Deep Reinforcement Learning model and calibrated to real-world production and Chicago Mercantile Exchange data, our heuristic operates within single-digit percentages of the theoretical optimum, effectively truncating left-tail risk although preserving upside potential.

报告 2：The Role of Mixed Discounting in Risk-averse Sequential Decision-making

王珊珊 教授 北京航空航天大学

摘要：This paper proposes a new principled constructive model for risk preference mapping in infinite-horizon cash flow analysis. Axiomatically motivated, the mixed discounting model prescribes actions that account for both a traditional discounting by scaling the future incomes and a random interruption time for the cash flow. This work shed light on some properties of the new preference

model, establishing conditions under which the infinite-horizon risk is finite, and conditions where the mixed discounting model can be seen as either equivalent or providing a bound on the risk perceived by the traditional approach. Finally, two illustrative examples are presented: an optimal stopping problem and optimal insurance pricing application. In both cases, the impacts of employing mixed discounting on the optimal policy, obtained using dynamic programming, are investigated.

● 报告 3：Risk aversion in the price-setting newsvendor problem with random supply capacity

刘骁勇　清华大学

摘要：Both demand and supply uncertainties are major sources of risk in supply chain manage ment. For this reason, the firms are implementing different strategies to manage joint uncer tainty of demand and supply. Pricing is an essential strategy to alleviate the demand and supply risks. In this article, we study a risk-averse monopoly firm’s ordering and pricing deci sions under supply capacity uncertainty with stochastic price-dependent demand. By adopt ing Conditional Value-at-Risk (CVaR) as the decision criterion, we obtain the equations that the optimal ordering and pricing decisions satisfy under random supply capacity, and prove that the unlimited capacity is its special case. Comparative statics show the monotonicity properties and other characteristics of the optimal pricing and ordering decisions. Finally, numerical examples are given to illustrate our results. Among our results, we analytically show that the more risk-averse firm charges a higher sales price under mild conditions. This relation is first obtained in the risk-averse price-setting newsvendor problem where both the demand and supply sides are uncertain.

● 报告 4：Variable Selection for Feature-Based Newsvendor

袁兆良　香港中文大学（深圳）

摘要：Feature-based newsvendor models use observable covariates to tailor inventory decisions, aiming to balance hold ing and shortage costs under demand uncertainty. However, high-dimensional feature sets often hinder inter pretability and inflate data collection and implementation costs. This

paper studies variable selection for the feature–based newsvendor problem under a hard cardinality constraint on the number of selected features. We formulate the resulting l0–constrained empirical newsvendor problem with l2–regularization, establish its computa tional hardness, and develop a mixed–integer second–order cone programming reformulation that strengthens the standard Big–M formulation. To enable scalability beyond exact optimization, we develop a randomized–rounding algorithm with a bi–criteria guarantee and a greedy heuristic. Statistically, we provide theoretical analysis of the resulting sparse policy estimator, including finite–sample estimation error, out–of–sample risk bounds, and support recovery guarantees. Extensive experiments on both synthetic and real data illustrate the computational and sta tistical trade–offs among various baselines. Our results demonstrate that the proposed variable selection framework achieves competitive out–of–sample operational costs while using substantially fewer covariates.

分论坛 4：网络、交通与平台运营优化

● 报告 1：Designing Mobile Battery-Swapping Networks for Electric Construction Vehicles

张宁威　讲师　兰州大学

摘要：The electrification of construction vehicles is essential for reducing non–road emissions, yet adoption remains constrained by limited range and refueling access. We fill this gap by mobile battery–swapping networks for electric construction vehicles where trucks deliver fully charged batteries from stations to demand locations across a continuous region and return depleted batteries for recharging. Strategically designing such networks is central to operational efficiency under demand uncertainty. Thus, we formulate a spatial distributionally robust location–and–partition model minimizing cost by jointly optimizing station openings, continuous service–region partitions, and battery stock levels under moment–based spatial demand ambiguity. We establish its equivalence to a location–assignment formulation and show that optimal partitions are induced by nearest–station assignments. These results yield a decomposable semi–infinite conic formulation and an exact column–and–constraint generation (C&CG) algorithm. To improve scalability, we project out

assignment variables through equivalent inequalities and design a projected branch–and–cut algorithm whose separation subproblem admits an exact finite–enumeration solution exploiting two–dimensional geometry. Experiments calibrated with Beijing construction–site data show that this projected branch–and–cut algorithm runs over 1.68 times faster than the C&CG benchmark, while the geometric separation procedure reduces average subproblem solution time by more than a factor of 35. Case studies show that spatial distributionally robust optimization provides stronger service–level protection than sample–average approximation and achieves lower total cost under high stockout penalties. Sensitivity analyses highlight how battery depreciation, demand dispersion, transportation cost, and delivery speed shape station deployment, battery inventory, and costs, underscoring the value of jointly optimizing network–design decisions under spatial demand uncertainty.

报告 2：Notification-Set Optimization for Ride-Hailing Aggregators under Heterogeneous First-Accept

杜明睿　山东大学

摘要：We study notification design for a third–party ride–hailing aggregator under a First–Accept mechanism. For each ride, the aggregator selects a set of partner platforms to notify, while the first platform that accepts before the deadline receives the ride. Platforms differ in commission value and response behavior and face limited expected service capacity. We show that broader exposure creates a trade–off between service coverage and winner preemption. More importantly, response timing can redistribute service loads across platforms even when timely acceptance probabilities remain unchanged, and faster response may reduce system value under scarce capacity. We further show that selective exposure can steer load away from scarce platforms. Based on these properties, we develop a set–partitioning formulation and a tailored branch–and–price algorithm with First–Accept pricing bounds.

报告 3：骑手拒单行为感知与即时配送订单分派优化

苏昌城　浙江工业大学

摘要：针对即时配送订单分派中骑手自主拒单导致派单结果可执行性不足的问题，本文提出一种考虑骑手接单意愿的两阶段订单分派方法。首先，借鉴面向排序筛选的 Smart Predict-then-Optimize（SPO）决策树方法，根据骑手状态、配送距离及历史行为等特征预测接单意愿，并面向骑手筛选效用进行模型训练；其次，利用深度 Q 网络（DQN）评价订单 - 骑手组合的长期价值，并在筛选后的骑手中进行订单分派；最后，基于真实即时配送数据开展仿真实验，验证上述方法的有效性。实验结果表明：预测精度较高的模型未必会带来更优的骑手筛选效果；面向筛选效用训练的模型能够获得更低的决策损失，并在拒单控制和订单配送时效等方面取得更一致的改善。

报告 4：Mitigating Welfare Loss from Strategic Storage Bidding: Payment Design for Energy Time-Shifting Services

徐颖哲　北京理工大学

摘要：Energy storage shifts energy from low- to high-load periods, creating social value, but current market settlement pays it through separate charge/discharge transactions. We examine how this settlement values time-shifting and whether payments can align bidding with welfare. We model a two-period bilevel game: storage bids, ISO clears, prices are endogenous. The problem reduces to a one-dimensional quantity. More shifting raises low-load price and lowers high-load price, causing a quantity-spread trade-off: larger quantity compresses per-unit arbitrage margins. Hence, with interior optimum, storage under-provides time shifting. We identify a value-recognition gap: under current settlement, profit is below social value for any quantity, explaining underprovision. We then propose an idealized payment for completed time-shifting that compensates marginal incentive loss from spread compression and implements system-optimal dispatch when interior.

报告 5：When Platforms Crowdsource to Communities: Hybrid Channel Design with Incentives and Endogenous Capacity

安睿琦 北京交通大学

摘要：Delivery platforms in low-density markets must balance sparse demand against professional fulfillment costs. We study a hybrid model in which platforms subsidize local residents to create community delivery capacity, examining how cross-side network effects—the delay-reduction benefits of added capacity—shape optimal prices, labor subsidies, and stakeholder welfare. Under a rational-expectations equilibrium, we find that, contrary to intuition, stronger network effects induce the platform to raise its price and reduce its subsidy when these effects are moderate. The community channel strictly increases platform profit and labor welfare. However, endogenous pricing enables the platform to fully capture the surplus from expanded capacity, leaving expected consumer surplus unchanged. The findings guide decisions on adopting hybrid delivery and adjusting prices and subsidies as network effects evolve, while showing that community labor benefits platforms and workers but not consumers.

分论坛 5：运营管理中的优化、学习与激励

报告 1：Competition and Coordination between Farmers and Firms: Government Interventions in Dynamic Agricultural Markets

潘东辉 中央财经大学

摘要：Agricultural production features supply lags and severe price volatility. This paper develops a multi-period agricultural Cobweb model to compare price stability, competition, and coordination between farmers and agricultural firms under three scenarios: no government intervention, government subsidies, and contract farming. We characterize the production decisions of farmers and firms, compare long-term price stability, and evaluate the effects of government interventions across different scenarios. Our results reveal that in the absence of contract farming, traditional cost subsidies

typically cause oversupply, destabilize prices, and diminish the other party's welfare. By transforming supply competition into partially coordination, contract farming enables farmer subsidies to achieve a win–win outcome within specific parameter ranges. Notably, subsidizing firms' innovation costs can benefit all participants, whether contract farming is adopted or not.

报告 2：Joint Maintenance and Learning: Structural Policies and Endogenous Feedback in Condition-Based Maintenance

姚轶溥 英国杜伦大学

摘要：Maintenance decisions affect not only reliability and operating costs, but also when and how deterioration information is observed. We formulate a semi–Markov decision process in which a manager jointly chooses an imperfect–maintenance intensity and an inspection interval, with preventive replacement as an additional action and corrective replacement after failure. These decisions jointly determine the post–maintenance virtual age, failure exposure, cycle length, and observation censoring. We first study the structural relationship among maintenance intensity, inspection timing, and virtual age.

We provide sufficient conditions for an ordered optimal policy: maintenance intensity increases as the asset deteriorates, the inspection interval is optimized for each intensity, and preventive replacement becomes optimal beyond a state threshold. For a Weibull effective–age model, we express these conditions using model parameters and properties of the Bellman value function. We then consider unknown deterioration parameters. Because maintenance decisions control both operating outcomes and the information generated in each cycle, we formulate the learning problem as a structured bandit. We derive an asymptotic lower bound on the operational cost of learning and develop policies that focus exploration on informative and operationally efficient maintenance modes. Numerical experiments support the proposed policy structure and demonstrate the value of accounting for decision–dependent feedback.

报告 3：Sparse Spare-Parts Network Design: An Unbalanced Optimal Transport Framework for Joint Location-Inventory-Allocation

鲍奇峰 西南财经大学

摘要：We study sparse spare–parts network design with rare, discrete failures, right–censored maintenance records, and explicit service territories over a continuous geography. Existing discrete location–inventory–allocation models either distort service regions or become computationally prohibitive at fine resolution. We propose a semi–discrete unbalanced optimal transport framework that jointly determines facility activation, inventory deployment, and continuous service–region design to minimize expected annual cost. Survival analysis on censored records yields unit–level failure probabilities, embedded as a continuous demand field; the model is solved via a finite–dimensional dual reformulation, exact geometric service–region cost evaluation, and an iteratively reweighted L1 heuristic. Against a scenario–based stochastic benchmark, the framework is 3.5–5.1 times faster with out–of–sample cost premiums within 2.94%–6.14%. A European five–part case study cuts annual cost by 27.31%.

报告 4：The Truck-Drone Routing Problem with Payload-Energy Awareness: An Application in Precision Agriculture

张 璇 清华大学

摘要：Precision agriculture increasingly uses drones, but payload–dependent energy consumption complicates truck–drone routing. We formulate the Truck–Drone Routing Problem with Payload–Energy Awareness (TD–PEA), which jointly schedules a truck and drone across multiple hubs and trips. It minimizes total operational time while capturing nonlinear payload–dependent energy consumption during flight and service. We develop a compact two–index mixed–integer nonlinear formulation and an exponential trip–based reformulation. The latter supports a branch–price–cut–and–enumerate (BPCE) algorithm with tailored pricing and valid inequalities. BPCE finds optimal or near–optimal solutions for synthetic instances within one hour. Real–world experiments show that precise nonlinear energy modeling avoids the infeasibility and conservatism of simplified models. It increases average battery utilization from 48.40% to 88.48% and reduces total operational time by 36.89%.

分论坛 6：青年学者论坛

报告 1： Mixture of Decisions: A Unified Decision Averaging Framework

贺百花 副教授 中国科学技术大学

摘要：Data-driven decision-making has become ubiquitous, transforming data into actionable decisions in domains such as management, operations, finance, marketing, healthcare, and policy learning. Model averaging, by adopting an ensemble strategy of "not putting all eggs in one basket", provides a more robust perspective for decision-making.

However, the traditional model averaging in decision-making faces three key challenges: prediction -- decision mismatch, averaging prediction -- optimization mismatch, and fixed weight -- complex world mismatch. To address these issues, we propose a unified decision averaging framework for contextual data-driven decision-making to mitigate decision uncertainty. The framework integrates multiple actionable decisions and targets optimal downstream decision performance. Specifically, candidate decisions are flexibly constructed from different predictive models, optimization methods, expert heuristics, LLM agents, and other decision-making mechanisms. We develop a context-adaptive and decision-focused criterion to determine the weight function across the candidate decisions. Theoretically, we establish the asymptotic optimality of the proposed framework in the sense of attaining the lowest possible out-of-sample expected decision loss, and further derive weight convergence and regret bounds. Numerically, our proposed method outperforms candidate decisions and alternative averaging methods in both simulations and empirical applications to newsvendor, portfolio optimization and LLM routing problems.

报告 2： Queueing-Aware Learning for Multi-Price Dynamic Pricing

陈昕韫 副教授 香港中文大学（深圳）

摘要：Many data-driven control problems in stochastic systems involve large policy classes, high-dimensional transition dynamics, and observations generated endogenously by past controls. We show how structural knowledge of the underlying model can convert these difficulties into statistical

advantages. We study online learning of congestion-dependent pricing policies in a service system where customers respond nonparametrically to both price and delay. Rather than learning each pricing policy separately or estimating every arrival rate uniformly well, our approach learns the shared arrival rates from observations pooled across policies and directs estimation accuracy toward the states that matter for stationary performance. The key point is an alignment induced by the birth - death structure of the queueing model: the resulting error in stationary expectations and the expected visitation frequencies of each state are both tied to the same stationary probabilities. We instantiate this principle into Q-Pool,a queueing-structured online learning method based on cross-policy data pooling and regenerative sampling. Q-Pool achieves$O(\sqrt{(L\quad T\quad)}log(L\quad T\quad)$ regret over T regenerative cycles, together with an $\Omega(\sqrt{L\quad T\quad})$ minimax lower bound. More broadly, the sensitivity and concentration tools developed here illustrate how birth - death structure can guide the design and analysis of data-driven methods beyond the dynamic pricing setting.

● 贺百花、陈昕韫

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