第三届

中国运筹学会算法软件与应用分会
算法软件与应用大会

会议手册

福建·福州

2026年4月17-19日

目 录

中国运筹学会算法软件与应用分会
第三届算法软件与应用大会
(ASA2026)

为加强全国运筹优化学术与应用团队间的交流与合作，聚焦运筹优化算法与理论、软件、工程、应用与落地的全流程，促进运筹优化与相关行业发展融通共进，兹定于 2026 年 4 月 17-19 日在福建省福州市召开“中国运筹学会算法软件与应用分会第三届算法软件与应用大会”。本次会议由中国运筹学会算法软件与应用分会主办，福州大学、福建省运筹学会承办。

会议主要交流运筹优化的算法、软件及其应用的理论与应用成果，探讨分会的发展与建设。主要议题包括（但不局限于）：连续优化、离散优化、全局优化、仿真优化、工程与管理等领域中的优化、人工智能与优化等方面的理论研究、算法设计、软件研发、平台集成、应用推广和人才培养等。本届年会将邀请国内外运筹优化领域的知名专家和优秀中青年学者作学科前沿报告，并举行专题分组报告以及分会发展研讨。欢迎全国运筹优化学术与应用的个人与团队到会交流，共同探讨。

学术委员会：

主任：戴彧虹（中国科学院数学与系统科学研究院）

韩德仁（北京航空航天大学）

委员：（按照姓名汉语拼音排序）

蔡邢菊（南京师范大学）

陈彩华（南京大学）

刘新为（河北工业大学）

沈吟东（华中科技大学）

肖　勇（浙江清华长三角研究院）

张晨松（中国科学院数学与系统科学研究院）

朱文兴（福州大学）

会议组织委员会：

主任：蔡邢菊（南京师范大学）

刘勇进（福州大学）

副主任：（按照姓名汉语拼音排序）

陈　亮（中国科学院数学与系统科学研究院）

高　雪（河北工业大学）

林蓝玉（福州大学）

谢家新（北京航空航天大学）

秘书：（按照姓名汉语拼音排序）

江亚宁（南京财经大学）

王　群（浙江财经大学）

杨美佳（北京科技大学）

张　欣（宿迁学院）

会务组联系人：

林蓝玉　联系电话：13235916706　电子邮箱：linly8250@fzu.edu.cn

谢家新　联系电话：13699187735　电子邮箱：xiejx@buaa.edu.cn

中国运筹学会会员招募

马年入会，马上有为！

中国运筹学会作为在中国科学技术协会领导下的国家一级学术团体，是汇聚广大运筹学科技工作者的核心平台。学会成立于 1980 年，目前拥有各类会员近万人，团体会员 10 家。我们致力于推动运筹学在中国的理论创新、应用实践与人才培养，促进学科交叉融合，面向国际科学前沿，服务国家战略需求。现诚挚邀请您加入中国运筹学会，与我们携手共进。成为会员，您将享有以下权益：

个人会员在会员有效期内享有如下权利：

（一） 学会的选举权、被选举权和表决权；

（二） 参加学会及其分支机构的活动时按规定享受优先票；

（三） 优惠或无偿获得学会提供的技术报告或信息服务；

（四） 通过学会渠道向相关部门推荐优秀科技成果或奖励项目；

（五） 对学会工作的批评建议和监督权。

团体会员在会员有效期内享有如下权利：

（一） 免费获得学会和分会的（年度）学术活动计划、学会通讯。

（二） 免费或优惠获得学会刊物及相关技术资料。

（三） 免费在学会网站等宣传渠道上登载信息，介绍和宣传团体会员及其优秀运筹学科技活动和成果，招聘人才。

（四） 在学会和分会学术活动期间进行广告推广时，获得广告费减免优惠。

（五） 优先参加学会和分会举办的学术交流、教育培训、科技咨询、展览展示等活动。

（六） 优先承办学会和分会举办的各项学术交流、科普相关活动，以及开展科技讲座、研讨班、应用咨询或联合科技研发等活动。

（七） 团体会员每年可以获得 1 年期个人会员免费名额 30 个。

（八） 团体会员可派代表参加会员代表大会，对学会的重要决策有建议权和表决权。

（九） 团体会员可提名 1 名理事候选人，高级团体会员可提名 1 名常务理事候选人。

（十） 具有至少 4 年连续会龄的团体会员可提名会长候选人。

期待您的加入，共同运筹帷幄，决胜千里！

扫描二维码加入

注册过程中如遇问题，欢迎发送邮件至：member@orsc.org.cn
特别提醒：欢迎在注册时，根据实际情况勾选加入“*** 分会”！

会议安排

时间安排：

- 4 月 17 日：注册报到（10:00-20:00）
- 4 月 17 日下午：短期课程
- 4 月 18 日上午：开幕式；大会报告
- 4 月 18 日下午：专题报告；自由报告
- 4 月 18 日晚上：理事会、分会发展论坛
- 4 月 19 日上午：邀请报告
- 4 月 19 日下午：专题报告；自由报告；闭幕式
- 4 月 20 日：离会

会议地点：福建省福州市福州佩伯酒店

会务费标准：

日期	会员	非会员	学生会员	学生非会员
3 月 17 日前（含）	1300 元	1700 元	700 元	900 元
3 月 17 日后	1700 元	2100 元	900 元	1200 元

报到地点：福建省福州市福州佩伯酒店

酒店信息：

住宿：标间、大床 450 元/晚（包含 2 份早餐）；

地址：福州市高新区智慧大道 104 号

交通指南

出发地	出行方式	路线	公交地铁运营时间	里程	时间	费用
福州站	打车	北三环、西三环、浦上大桥、旗山大道、智慧大道		27km	35min	60 元
	公共交通方案 1	火车站南广场站 323 路往大学城总站方向，乘坐 18 站，到达葛岐村公交站，换乘 151 路往两园兆元方向，乘坐 9 站，到达新塘洋公交站，步行 409 米到达佩伯酒店	323 路 6:00-20:30 151 路 7:00-20:00		115min	2 元
	公共交通方案 2	火车站乘地铁 1 号线往三江口方向，乘坐 5 站到达南门兜地铁站，换乘 2 号线往苏洋方向，乘坐 8 站到达厚庭地铁站，换乘 922 路公交车往南屿公交站方向，乘坐 14 站，到达南屿公交站，步行 400 米到达佩伯酒店	1 号线 6:30-23:00 2 号线 6:39-23:17 922 路 6:30-22:00		85min	7 元
福州南站	打车	下洋路、福峡路、南三环、湾边大桥、旗山大道、智慧大道		21km	30min	50 元
	公共交通方案 1	福州南站西广场公交站乘坐 176 路往公交大学城总站方向，乘坐 28 站，到达顺华乌龙江大区公交站，步行 1.3 公里到达佩伯酒店	176 路 6:30-20:00		81min	2 元
	公共交通方案 2	福州南站地铁站 5 号线往荆溪厚屿方向，乘坐 9 站到台屿地铁站，换乘 357 路公交往虎秀山公园方向，乘坐 7 站，到达新塘洋公交站，步行 409 米到达佩伯酒店	5 号线 6:30-23:00 357 路 6:30-19:00		65min	6 元
长乐国际机场	打车	——		56km	51min	165 元
	公共交通方案 1	滨海快线往福州火车站方向，乘坐 6 站到达三叉街站，步行 247 米到达上三路口站，换乘 357 路公交车往仙宗禅寺方向，乘坐 20 站，到达新塘洋公交站，步行 409 米到达佩伯酒店	357 路 6:30-19:00		107min	18 元
	公共交通方案 2	滨海快线往福州火车站方向，乘坐 5 站到达帝封江站，换乘 5 号线往荆溪厚屿方向，乘坐 5 站到达台屿站，换乘 357 路公交车往仙宗禅寺方向，乘坐 7 站，到达新塘洋公交站，步行 409 米到达佩伯酒店	5 号线 6:30-23:00 357 路 6:30-19:00		87min	18 元

会议简要日程

2026 年 4 月 17 日 (星期五)		
时间	**地点**	**议程**
10:00-20:00	福州佩伯酒店	会议注册
14:00-18:00	一楼雅正厅 2 厅	Julia 短期课程简介 主讲人：李庆娜、陈亮、赵明宇
18:00-20:30	晚餐（一楼元融餐厅）	

2026 年 4 月 18 日（星期六）			
时间	**地点**	**议程**	**主持人**
08:30-08:45	集体合影		
08:45-09:15	一楼雅正厅 1+2 厅	开幕式	蔡邢菊
09:15-10:00		大会报告 孙德锋	杨新民
10:00-10:30	茶歇（一楼雅正廊厅）		
10:30-11:15	一楼雅正厅 1+2 厅	大会报告 吕长虹	朱文兴
11:15-12:00		大会报告 孟德宇	刘新为
12:00-13:30	午餐（一楼元融餐厅）		
13:30-15:00	专题报告、自由报告		
15:00-15:30	茶歇（二楼雅意廊厅）		
15:30-17:30	专题报告、自由报告		
18:00-19:30	晚餐（一楼元融餐厅）		
20:30-21:30	一楼雅正厅 3 厅	理事会、分会发展论坛	蔡邢菊

<table>
<tr><th colspan="4">2026 年 4 月 19 日（星期日）</th></tr>
<tr><th>时间</th><th>地点</th><th>议程</th><th>主持人</th></tr>
<tr><td colspan="4">青年邀请报告—优化组</td></tr>
<tr><td rowspan="3">08:30-10:15</td><td rowspan="3">一楼雅正厅
2 厅</td><td>邀请报告 边 伟</td><td rowspan="3">陈彩华</td></tr>
<tr><td>邀请报告 张 进</td></tr>
<tr><td>邀请报告 胡耀华</td></tr>
<tr><td>10:15-10:40</td><td colspan="3">茶歇（一楼雅正廊厅）</td></tr>
<tr><td rowspan="2">10:40-11:50</td><td rowspan="2">一楼雅正厅
2 厅</td><td>邀请报告 高 斌</td><td rowspan="2">姜 波</td></tr>
<tr><td>邀请报告 谢家新</td></tr>
<tr><td colspan="4">青年邀请报告—应用组</td></tr>
<tr><td rowspan="3">08:30-10:15</td><td rowspan="3">一楼雅正厅
3 厅</td><td>邀请报告 罗 俊</td><td rowspan="3">沈吟东</td></tr>
<tr><td>邀请报告 罗志兴</td></tr>
<tr><td>邀请报告 孙若愚</td></tr>
<tr><td>10:15-10:40</td><td colspan="3">茶歇（一楼雅正廊厅）</td></tr>
<tr><td rowspan="2">10:40-11:50</td><td rowspan="2">一楼雅正厅
3 厅</td><td>邀请报告 吴春林</td><td rowspan="2">王祥丰</td></tr>
<tr><td>邀请报告 袁 坤</td></tr>
<tr><td>12:00-13:30</td><td colspan="3">午餐（一楼元融餐厅）</td></tr>
<tr><td>13:30-15:00</td><td colspan="3">专题报告、自由报告</td></tr>
<tr><td>15:00-15:30</td><td colspan="3">茶歇（一楼雅正廊厅）</td></tr>
<tr><td>15:30-17:30</td><td colspan="3">专题报告、自由报告</td></tr>
<tr><td>17:30-18:00</td><td>一楼雅正厅
3 厅</td><td>闭幕式</td><td>蔡邢菊</td></tr>
<tr><td>18:00-19:30</td><td colspan="3">晚餐（一楼元融餐厅）</td></tr>
</table>

2026 年 4 月 20 日（星期一）
离　会

报告信息

大会报告 (一楼雅正厅 1+2 厅)
(2026 年 4 月 18 日星期六)

09:15-10:00	A GPU-based Halpern Peaceman-Rachford method for convex programming	孙德锋 香港理工大学
10:30-11:15	基于归纳与归约思想的数学应用	吕长虹 华东师范大学
11:15-12:00	MLR-SNet (Meta-LR-Schedule-Net): Transferable LR schedules for heterogeneous tasks	孟德宇 西安交通大学

青年邀请报告 (一楼雅正厅 2 厅)
(2026 年 4 月 19 日星期日)

08:30-09:05	Robust principal component analysis with rank and cardinality regularization under matrix factorization	边伟 哈尔滨工业大学
09:05-09:40	A single-loop gradient algorithm for pessimistic bilevel optimization via smooth approximation	张进 南方科技大学
09:40-10:15	On convergence of iterative thresholding algorithms to global solution for nonconvex sparse optimization	胡耀华 深圳大学
10:40-11:15	First-order methods on bounded-rank tensors converging to stationary points	高斌 中国科学院数学与系统科学研究院
11:15-11:50	Stochastic dual coordinate descents for linearly constrained convex optimization	谢家新 北京航空航天大学

青年邀请报告 (一楼雅正厅 3 厅)
(2026 年 4 月 19 日星期日)

08:30-09:05	从并行计算到 LLM 智能体：面向大规模服务系统的决策优化研究	罗俊 上海交通大学
09:05-09:40	Approximation for pure integer two-stage distributionally robust service network design problem with demand uncertainty	罗志兴 南京大学
09:40-10:15	PC 层：加速大模型训练的多项式预条件方法	孙若愚 香港中文大学 （深圳）
10:40-11:15	Sparse computation in image inverse problems: from optimization to learning	吴春林 南开大学
11:15-11:50	Accelerating LLM pre-training through flat-direction dynamics enhancement	袁坤 北京大学

专题报告、自由报告

(2026 年 4 月 18 日星期六)

张量和多项式优化理论与应用 1 组织者：崔春风、罗自炎、张立平 主持人：张立平			
4 月 18 日 13:30-15:00 二楼雅韵厅	杨庆之	The generally unitarily decomposable partially symmetric tensors and their approximation	南开大学
	倪谷炎	Spectral clustering for community detection of multi-layer networks	国防科技大学
	陈艳男	Quaternion-based Frobenius norm estimation for tensors	华南师范大学
张量和多项式优化理论与应用 2 组织者：崔春风、罗自炎、张立平 主持人：喻高航			
4 月 18 日 15:30-17:30 二楼雅韵厅	白敏茹	Functional multipletensor decomposition	湖南大学
	丁维洋	Randomized structured-TLS based higher order extended dynamic mode decomposition	复旦大学
	江波	On approximation of tensor nuclear norm minimization	上海财经大学
	高斌	Normalized tensor train decomposition	中国科学院数学与系统科学研究院

机器学习中的优化方法 1 **组织者：常静雅** **主持人：江波**			
4 月 18 日 13:30-15:00 二楼雅颂厅	**陈碧连**	Tensor factorization machine and its lifted form	厦门大学
	刘晓霞	Plug-and-play proximal block coordinate descent method for hyperspectral anomaly detection	华南理工大学
	葛志利	基于动态窗口机制的 Swin Transformer 在静态手语识别中的应用研究	南京特殊教育师范学院
随机优化算法及其应用 **组织者：李婷、徐玲玲** **主持人：徐玲玲、李婷**			
4 月 18 日 15:30-17:30 二楼雅颂厅	**余国林**	集值均衡问题的最优性理论、算法及应用	北方民族大学
	李婷	A resampling-free stochastic projection contraction algorithm for solving stochastic variational inequalities	江苏师范大学
	龙梦	车路协同下的动态公交信号优先：深度强化学习方法与优化	重庆师范大学 重庆国家应用数学中心
	高娟	A decentralized mini-batch variance-reduced gradient tracking method with Barzilai-Borwein step sizes	天津理工大学
	路宁	模糊 b 距离空间中一个关于 Cauchy 列的引理介绍	内蒙古大学

算法应用推广 **组织者：肖勇** **主持人：肖勇**			
4 月 18 日 13:30-15:00 二楼雅意 B1 厅	**吴易明**	具身智能是智能科学的新范式	西安中科光电精密工程有限公司
	陈锐	基于光电 Ising 机的组合优化问题高效求解方法探讨	北京伊辛智能科技有限公司
	宋成蹊	基于非欧数据的图异常检测及其应用	中国科学院大学
电力系统优化 **组织者：陈亮、吴江华** **主持人：陈亮**			
4 月 18 日 15:30-17:30 二楼雅意 B1 厅	**翟桥柱**	电力系统优化调度中的几个模型化简及变换技术	西安交通大学
	杨知方	电力系统机组组合问题的困难案例构建及计算性质初探	重庆大学
	司方远	工业绿色微电网能量管理	北京交通大学
	袁沐琛	电力系统混合整数规划问题数据集构建方法	中国电力科学研究院有限公司

数学优化方法与国产算力平台 组织者：王祥丰 主持人：王祥丰			
4 月 18 日 13:30-15:00 二楼雅意 B2 厅	李泓霈	大规模问题的 GPU 优化算法与国产芯片适配	Cardinal Operations
	王源	基于昇腾 NPU 算力的一阶 MILP 求解器研究	深圳市大数据研究院
	王祥丰	大模型驱动的国产算力算子生成与优化	华东师范大学
前沿优化算法及应用 组织者：刘泽显、黄亚魁 主持人：黄亚魁			
4 月 18 日 15:30-17:00 二楼雅意 B2 厅	张娇娇	Memory-efficient correlated noise for locally differentially private momentum in distributed learning	大湾区大学
	刘晨晨	An auto-adjusted stochastic Barzilai-Borwein stepsize for stochastic gradient descent	北京邮电大学
	刘泽显	梯度法、共轭梯度法和拟牛顿法的步长及其收敛速率	贵州大学

算子分裂框架下的一阶非凸优化算法 1 **组织者：张文星** **主持人：张文星**			
4 月 18 日 13:30-15:00 6 楼游廊	**田文义**	Analysis of an optimal control problem of the backward fractional Feynman-Kac equation with temporal approximation	天津大学
	姜帆	A class of parallel splitting proximal augmented Lagrangian methods with optimal step size	南京信息工程大学
	高雪	Bregman-augmented Lagrangian method for nonconvex nonsmooth optimization with general inequality constraints	河北工业大学
优化算法与金融应用 **组织者：赵志华、董志龙** **主持人：徐凤敏**			
4 月 18 日 15:30-17:30 6 楼游廊	**李子博**	ESG 偏好不对称下投资组合研究	西安交通大学
	蒋恒燕	From disagreement to robustness: Tackling ESG rating disagreement with distributionally robust portfolio selection	西安交通大学
	赵志华	STNAdam: A stochastic two-track Nesterov-accelerated Adam method for nonconvex composite optimization	西安电子科技大学
	董志龙	基金网络系统性风险优化模型与算法研究	西安交通大学

整数规划算法与应用 1 **组织者：陈伟坤** **主持人：陈伟坤**			
4 月 18 日 13:30-15:00 7 楼游廊	**郑迥之**	华为天筹求解器技术进展与规划	华为技术有限公司
	贺翔	整数二次规划：局部搜索算法及其在互联网工业的应用	中国科学院软件研究所
	陈伟坤	Two new variable implication oriented presolve techniques	北京理工大学
整数规划算法与应用 2 **组织者：陈伟坤** **主持人：王阿康**			
4 月 18 日 15:30-17:30 7 楼游廊	**江弘亿**	Approximation algorithms for line planning with multiple resource constraints	香港城市大学
	吕维	Towards large-scale probabilistic set covering problems: An efficient Benders decomposition approach	湘潭大学
	王兆维	Enhancing presolve in mixed integer programming by combining probing and dual fixing	中国科学院数学与系统科学研究院
	王阿康	Sinkhorn-reparameterized primal-dual optimization for scalable quadratic assignment	深圳市大数据研究院

信号处理中的优化 1 **组织者：李庆娜、孙聪** **主持人：李庆娜**			
4 月 18 日 13:30-15:00 8 楼游廊	**孙聪**	Single loop method for a special mixed integer robust optimization problem in physical layer security	北京邮电大学
	王治国	A gradient guided diffusion framework for chance constrained programming	四川大学
	杨在	Low-rank optimization models for spectral compressed sensing in radar and communications	西安交通大学
	高杰星	大规模无线网络优化技术	华为技术有限公司
信号处理中的优化 2 **组织者：李庆娜、孙聪** **主持人：孙聪**			
4 月 18 日 15:30-17:30 8 楼游廊	**李庆娜**	A robust EDM optimization approach for 3D single-source localization with angle and range measurements	北京理工大学
	马俊杰	Asymptotic analysis of nonlinear one-bit precoding in massive MIMO systems via approximate message passing	中国科学院数学与系统科学研究院
	邵明杰	Quantized signal processing in massive MIMO: Identifiability, optimization, and deep learning algorithms	中国科学院数学与系统科学研究院
	路程	非凸二次优化问题的非凸二次重构方法及其应用	华北电力大学
	孙琳淇	A modified inertial self-adaptive algorithm for bilevel variational inequalities with applications to signal processing	宁夏大学

流形优化 组织者：黄文 主持人：黄文			
4 月 18 日 13:30-15:00 9 楼游廊	邓致丰	Diffeomorphic logarithm of special orthogonal matrices	厦门大学
	冯帅铃	Nesterov accelerated proximal gradient methods for convex composite optimization on Riemannian manifolds	厦门大学
	郭媛媛	Low-rank approximation of correlation matrix for classification tasks	厦门大学
绝对值方程组的理论及算法 组织者：陈彩荣、于冬梅、吴世良 主持人：吴世良			
4 月 18 日 15:30-17:30 9 楼游廊	周睿智	基于 SOR 展开的学习型绝对值方程求解方法	中国农业大学
	于冬梅	A predefined-time robust gradient neural network for solving absolute value equations	辽宁工程技术大学
	汤朝霞	From absolute value equations to linear inequalities: An efficient reduction-based solution framework via the RGRK method	云南师范大学
	陈彩荣	多层绝对值结构非线性方程组的固定时间动力学模型	福建师范大学

组合优化的人工智能方法 组织者：李安琪 主持人：李安琪			
4 月 18 日 13:30-15:00 11 楼游廊	刘文钊	Purity law for neural routing problem solvers with enhanced generalizability	中国科学院大学
	邹海军	LMask: Learn to solve constrained routing problems	中国科学院数学与系统科学研究院
	李泓霈	基于连续 - 整数联合分布的 MILP 生成式求解框架	Cardinal Operations
高维数据中的优化与计算方法 组织者：陈艳男、何洪津、喻高航 主持人：何洪津			
4 月 18 日 15:30-17:30 11 楼游廊	张立平	General group-sparse factorization for Schatten-q quasi norm and its regularization for low-rank matrix recovery	清华大学
	潘珺珺	QuatIca: Advanced numerical linear algebra and optimization for quaternionic matrices in Python	香港浸会大学
	侯良哨	A fast block coordinate descent method for orthogonal nonnegative matrix factorization	中山大学
	黄宝华	Nonconvex robust quaternion matrix completion for imaging processing	福建师范大学

前沿分裂算法及其应用 1 组织者：吴中明、蔡邢菊 主持人：吴中明			
4 月 18 日 13:30-15:00 13 楼游廊	李敏	Nonconvex truncated conditional value at risk-based sparse linear regression	南京大学
	江如俊	Loss landscape and error bound analysis of regularized deep matrix factorization	复旦大学
	常小凯	Adaptive Bregman primal-dual algorithms for general bilinear minimax problems with applications to imaging	兰州理工大学
非光滑优化算法 组织者：徐梦薇 主持人：徐梦薇			
4 月 18 日 15:30-17:30 13 楼游廊	樊军	Support recovery for sparse regression with quadratic measurements via weakly-convex-concave regularization	河北工业大学
	付文豪	A natural SQP method with potentially infeasible subproblems for nonlinear optimization	苏州科技大学
	张瑞进	Polynomial iteration complexity of a path-following smoothing Newton method for symmetric cone programming	南开大学
	徐梦薇	A surrogate value function formulation for bilevel optimization	河北工业大学

专题报告、自由报告

(2026 年 4 月 19 日星期日)

张量和多项式优化理论与应用 3 组织者：崔春风、罗自炎、张立平 主持人：崔春风			
4 月 19 日 13:30-15:00 二楼雅韵厅	唐新东	稀疏矩 - 平方和松弛的紧性	香港浸会大学
	陈中明	Efficient generative modeling with unitary matrix product states using Riemannian optimization	杭州电子科技大学
	杨宇宁	Improving sketching algorithms for low-rank matrix approximation via sketch-power iterations	广西大学
张量和多项式优化理论与应用 4 组织者：崔春风、罗自炎、张立平 主持人：罗自炎			
4 月 19 日 15:30-17:30 二楼雅韵厅	胡胜龙	Low rank approximations of symmetric tensors	国防科技大学
	车茂林	How many integrals should be evaluated at least in two-dimensional hyperinterpolation?	贵州大学
	李妍	Unsupervised feature selection via nonnegative orthogonal constrained regularized minimization	中国科学院数学与系统科学研究院
	李小玉	Learning fused row-sparse structures via Newton methods for linear matrix equations	北京交通大学

机器学习中的优化方法 2 **组织者：常静雅** **主持人：常静雅**			
4 月 19 日 13:30-15:00 二楼雅颂厅	**孟凡云**	Multi-objective adaptive Nesterov-like acceleration algorithm for multi-task deep learning	青岛理工大学
	高莹	Blind hyperspectral and multispectral images fusion: A unified tensor fusion framework from coupled inverse problem perspective	北京航空航天大学
	董悠然	Efficient curvature-aware hypergradient approximation for bilevel optimization	南京大学
前沿分裂算法及其应用 2 **组织者：吴中明、蔡邢菊** **主持人：吴中明**			
4 月 19 日 15:30-17:30 二楼雅颂厅	**林义尊**	A two-step Krasnoselskii-Mann algorithm with adaptive momentum and its applications to image processing	暨南大学
	马峰	求解鞍点问题的对称 PDHG 算法	火箭军工程大学
	丁彦昀	ADMM-based bilevel descent aggregation algorithm for sparse hyperparameter selection	深圳职业技术大学
	王坛兴	General inertial proximal gradient method with gradient extrapolation for nonconvex nonsmooth optimization problems	北京航空航天大学

调度算法与落地 **组织者：陈峰** **主持人：陈峰**			
4 月 19 日 13:30-15:00 一楼雅正厅 3 厅	**滕娇**	基于多资源约束与遗传算法的复杂车间调度优化	东莞理工学院
	白瑞斌	Combining OR and ML for challenging transportation optimization problems	宁波诺丁汉大学
	陈峰	通用调度算法：挑战、架构、路径、创新、引擎与落地	上海交通大学
在线学习的算法与应用 **组织者：陈彩华** **主持人：陈彩华**			
4 月 19 日 15:30-17:30 一楼雅正厅 3 厅	**陈彩华**	A learning and rectification algorithm for nonstationary online linear programming	南京大学
	杨嘉玟	Point-wise convergence to the expected equilibrium price in stochastic online Fisher markets: A human-AI collaborative study	南京大学
	占杨	Computing equilibria in network formation games	南京大学
	吴钰炜	Data-driven robust multiproduct pricing with fairness concerns	南京大学

算子分裂框架下的一阶非凸优化算法 2 **组织者：张文星** **主持人：张文星**			
4 月 19 日 13:30-15:00 6 楼游廊	**贾泽慧**	A variable metric Douglas-Rachford splitting method for nonconvex composite optimization	南京信息工程大学
	何鑫	Accelerated primal-dual methods in continuous and discrete time	西华大学
	陈红梅	Convergence analysis of the constrained gradient method	四川师范大学
自由报告/均衡与交通中的优化 **主持人：陈圣杰**			
4 月 19 日 15:30-17:30 6 楼游廊	**唐中正**	When does additional information lead to longer travel time in multi-origin-destination networks?	北京邮电大学
	姜梦琦	A hybrid intelligent algorithm for multi-UAV task allocation and path planning	北方民族大学
	王鹏	面向强约束场景的大语言模型自动建模方法研究——以食品添加剂合规配方优化为例	江南大学

自由报告/随机优化算法 主持人：彭再云			
4 月 19 日 13:30-15:00 7 楼游廊	**卢俊宇**	Stochastic conjugate gradient algorithm with adaptive importance sampling strategy	广西大学
	张思宇	Distributed projection neurodynamic approaches for solving absolute value equations	辽宁工程技术大学
	杨舒婷	Inertial randomized subspace regularized Newton method	广西大学
自由报告/张量优化 主持人：王嘉妮			
4 月 19 日 15:30-17:30 7 楼游廊	**胡象鑫**	Hankel tensor completion via $L_* - L_F$ optimization model	太原师范学院
	靳嘉琪	A Gauss–Seidel augmented Lagrangian algorithm for Tucker rank tensor completion	太原师范学院
	韩池	Hankel tensor completion via two-layer optimization for functional magnetic resonance images recovery	太原师范学院
	李成梁	Quaternion matrix completion with quasi-nonnegative constraints and sparsity for color image restoration	云南大学

非凸优化理论与算法 组织者：彭拯 主持人：彭拯			
4 月 19 日 13:30-15:00 8 楼游廊	**户将**	Nonconvex federated learning on compact smooth submanifolds with heterogeneous data	清华大学
	刘洋	Solver-aware high-order optimization for large-scale nonconvex problems	大湾区大学
	胡雅伶	Risk-averse two-stage distributionally robust mixed-integer optimization with decision-dependent ambiguity sets	湘潭大学
自由报告/机器学习与优化 主持人：彭拯			
4 月 19 日 15:30-17:30 8 楼游廊	**肖亮海**	A relaxation method for nonsmooth nonlinear optimization with binary constraints	暨南大学
	罗俊杰	Strategyproof multi-resource allocation for cloud computing under divisible and indivisible task models	北京交通大学
	叶俊佑	Kernel-free quadratic surface SVM for conditional probability estimation in imbalanced multi-class classification	新疆大学

自由报告/两阶段优化 主持人：樊军			
4 月 19 日 13:30-15:00 9 楼游廊	谢航	Bilevel programming approach for image restoration problems with automatically hyperparameter selection	河南大学
	张一鸣	Two-stage distributionally robust optimization of EV charging stations under demand and disruption uncertainties	辽宁工程技术大学
	郭二杨	A two-stage evolutionary algorithm based on hybrid penalty strategy and its application to multi-UAV path planning	宁夏大学

自由报告/优化算法 1 **主持人：董志龙**			
4 月 19 日 13:30-15:00 11 楼游廊	**华旭科**	Robust log-contrast regression for high-dimensional compositional data	河南大学
	黄雪羽	A partially linearized Bregman ADMM for composite nonconvex and nonsmooth optimization	广西民族大学
	史梦娇	Efficient group Lasso regularized rank regression with data-driven parameter determination	河南大学
	王惠敏	Grouping method based on entropy recursive differential and general separability for large-scale global optimization	北方民族大学
自由报告/优化算法 2 **主持人：陈永鑫**			
4 月 19 日 15:30-17:30 11 楼游廊	**朱之翰**	次梯度流影法	北京航空航天大学
	屈云飞	Balancing the data-fidelity: A fair and inexact primal-dual splitting framework for image inverse problems	中国地质大学（北京）
	何演超	A mismatched adaptive anchoring Halpern iteration algorithm for solving linear inverse problems	宁波大学
	黄子麟	A multi-stage non-convex relaxation algorithm for the sparse solution of underdetermined linear equations	闽江大学

短期课程

Julia 短期课程简介

李庆娜、陈亮、赵明宇

课程摘要：本短期课程旨在帮助参会者快速入门 Julia——专为科学计算与优化设计的高性能语言。课程涵盖 Julia 的诞生背景、安装与环境配置、基础语法讲解以及优化案例实战，带领大家完成从认识软件到实际运用的全流程代码演练。通过系统学习与动手实践，参会者将掌握利用 Julia 进行科学计算与优化建模的基本能力，为后续科研打下扎实基础。

主讲人简介：李庆娜，北京理工大学数学与统计学院教授，博士生导师。湖南大学本科、博士，中科院数学与系统科学研究院博士后. 曾访问英国南安普顿大学、曼彻斯特大学，新加坡国立大学、香港中文大学等。主持多项国家自然科学基金青年、面上项目等. 任中国运筹学会数学优化分会理事、算法与软件应用分会常务理事、北京运筹学会理事。曾担任《Pacific Journal of Optimization》特刊客座编委。主要研究最优化理论与算法及应用。著有专著《多维标度方法》,《Modern Optimization Methods》，及《凸分析讲义》等系列教材。获 2020、2021 北京市高校优秀毕业设计指导教师荣誉称号。曾获北京运筹学会优秀青年论文奖（2021），获批国家一流本科课程《最优化方法》(2025).

陈亮，中国科学院数学与系统科学研究院工程师。主要研究方向是混合整数规划算法、软件及其应用，是国产混合整数规划软件 CMIP 的创始骨干成员，并致力于其研发工作。主持国家自然科学基金青年基金项目以及若干国防领域项目，参加国家自然科学基金重点项目、面上项目、国家重点研发计划项目等；入选中国科学院技术人才支撑项目；获中国运筹学会科学技术奖运筹应用奖；在运筹优化的著名刊物 JOGO、EJOR 等发表若干文章。

赵明宇，北京理工大学数学与应用数学专业博士研究生，2022 年毕业于中国矿业大学（徐州），获数学与应用数学专业学士学位。主要研究最优化理论与算法及应用。

大会报告

A GPU-based Halpern Peaceman-Rachford method for convex programming

孙德锋　　香港理工大学

报告摘要： We aim to employ an accelerated preconditioned alternating direction method of multipliers (pADMM), whose proximal terms are convex quadratic functions, to solve linearly constrained convex optimization problems. To achieve this, we first reformulate the pADMM into a form of proximal point method (PPM) with a positive semidefinite preconditioner which can be degenerate due to the lack of strong convexity of the proximal terms in the pADMM. Then we accelerate the pADMM by accelerating the reformulated degenerate PPM (dPPM). Specifically, we first propose an accelerated dPPM by integrating the Halpern iteration into it, achieving non-asymptotic convergence rates. Subsequently, building upon the accelerated dPPM, we develop an accelerated pADMM algorithm that exhibits the non-asymptotic nonergodic convergence rates in terms of practical stopping criteria — the Karush–Kuhn–Tucker residual and the primal objective function value gap. Extensive numerical experiments on large-scale linear programming and convex composite quadratic programming benchmark datasets, conducted using a GPU, demonstrate the substantial advantages of our Halpern Peaceman–Rachford (HPR) method — a special case of the Halpern-accelerated pADMM framework applied to the dual problems — over state-of-the-art solvers, including the award-winning PDLP, as well as PDQP, SCS, CuClarabel, and Gurobi, in achieving high-accuracy solutions.

个人简介： 孙德锋，香港理工大学应用数学系系主任和应用优化与运筹学讲座教授，美国数学学会会士，美国工业与应用数学学会会士，中国工业与应用数学学会会士，中国运筹学会会士，香港数学学会前任会长。荣获 2018 国际数学规划 Beale–Orchard-Hays 奖及新加坡国立大学科学学院首届杰出科学家奖。曾任《Asia-Pacific Journal of Operational Research（亚太运筹学杂志）》主编，现任《Mathematical Programming》编委，《SIAM Journal on Optimization》编委等。在 Mathematics of Operations Research, Mathematical Programming, SIAM Journal on Optimization 等国际权威优化刊物上发表学术论文百余篇。主要从事连续优化及机器学习的研究，包括基础理论、算法及应用。在半光滑和光滑化牛顿方法，以及线性和非线性矩阵优化等方面具有很深造诣。其在非对称矩阵优化问题方面取得的系列成果促成了矩阵优化这一新研究方向。2021 年凭借排产方面优化求解器的贡献，获得华为香港研究所和诺亚方舟实验室分别颁发杰出合作奖。2022 年获香港研资局高级研究学者奖。

基于归纳与归约思想的数学应用

吕长虹　　华东师范大学

报告摘要：归纳和归约是处理问题的两种基本思想。本报告将通过举例来说明如何运用归纳与归约思想进行解决企业的实际问题。

个人简介：吕长虹，华东师范大学数学科学学院教授，校长助理，本科生院院长，国家高层次人才计划入选者，主要从事图论和离散优化方面理论和应用研究。2020 年获得上海市科技进步特等奖和萧树铁应用数学奖，2021 年获 CSIAM 首届数学落地成果奖和华为优秀技术成果奖。现为中国运筹学会副理事长、中国数学会常务理事、中国工业与应用数学常务理事。

MLR-SNet (Meta-LR-Schedule-Net): Transferable LR schedules for heterogeneous tasks

孟德宇　　西安交通大学

报告摘要： The learning rate (LR) is one of the most important hyperparameters in stochastic gradient descent (SGD) algorithm for training deep neural networks (DNN). However, current hand-designed LR schedules need to manually pre-specify a fixed form, which limits their ability to adapt to practical non-convex optimization problems due to the significant diversification of training dynamics. Meanwhile, it always needs to search proper LR schedules from scratch for new tasks, which, however, are often largely different with task variations, like data modalities, network architectures, or training data capacities. To address this learning-rate-schedule setting issues, we propose to parameterize LR schedules with an explicit mapping formulation, called *MLR-SNet*. The learnable parameterized structure brings more flexibility for MLR-SNet to learn a proper LR schedule to comply with the training dynamics of DNN. Image and text classification benchmark experiments substantiate the capability of our method for achieving proper LR schedules. Moreover, the explicit parameterized structure makes the meta-learned LR schedules capable of being transferable and plug-and-play, which can be easily generalized to new heterogeneous tasks. We transfer our meta-learned MLR-SNet to query tasks like different training epochs, network architectures, data modalities, dataset sizes from the training ones, and achieve comparable or even better performance compared with hand-designed LR schedules specifically designed for the query tasks. The robustness of MLR-SNet is also substantiated when the training data are biased with corrupted noise. We further prove the convergence of the SGD algorithm equipped with LR schedule produced by our MLR-Net, with the convergence rate comparable to the best-known ones of the algorithm for solving the problem. The source code of our method is released at https://github.com/xjtushujun/MLR-SNet.

个人简介： 孟德宇，西安交通大学数学与统计学院教授，大数据分析与计算分析工程实验室统计与大数据中心常务副主任。长期致力于机器学习基础理论与算法的研究，近五年来，在机器学习相关领域期刊会议发表论文百余篇，为科瑞维安、艾斯维尔高被引学者。入选长江学者特聘教授，中组部青年拔尖人才计划。现任 TPAMI 等七个国内外期刊编委。

青年邀请报告

Robust principal component analysis with rank and cardinality regularization under matrix factorization

边伟　　哈尔滨工业大学

报告摘要： Robust principal component analysis (RPCA) is an important representative method in data analysis. It is usually viewed as an optimization problem involving the rank and ℓ_0-norm of matrices. In this paper, we study the rank and ℓ_0 regularized matrix optimization problem based on matrix factorization for the first time. In the context of RPCA, the low-rank structure provides computational benefits for the factorized model. For the rank and ℓ_0 regularized model and its factorization model, we establish their equivalences on global minimizers and stationary points, respectively. Furthermore, we construct a broadly applicable equivalent nonconvex relaxation framework for the constrained factorization model, and establish the equivalence between it and its diverse relaxations in the sense of global minimizers and stationary points with strong optimality conditions (called strong stationary points). For the general factorization problem with lower semicontinuous regularizers and a loss function whose gradient is locally Lipschitz, we propose a novel proximal gradient-based algorithm based on joint and alternating calculation with convergence to its limiting critical points. We prove that the proposed algorithm can attain the stationary points of the rank and ℓ_0 regularized problem and its adaptive counterpart can attain the strong stationary points of the constrained factorization problem and its relaxation problems, respectively.

个人简介： 边伟，哈尔滨工业大学数学学院，教授、博士生导师。2004 年和 2009 年于哈尔滨工业大学分别获得学士和博士学位。2010-2012 年访问香港理工大学，跟随陈小君教授从事博士后工作。主要研究领域为：最优化理论与算法。先后在 Math. Program., Math. Oper. Res., SIAM J. Optim., SIAM J. Numer. Anal., SIAM J. Sci. Comput., SIAM J. Imaging Sci. 等期刊发表多篇学术论文。现任 SCI 期刊 Journal of Optimization Theory and Application 编委，中国运筹学会常务理事，黑龙江省数学会常务理事。

First-order methods on bounded-rank tensors converging to stationary points

高斌　　中国科学院数学与系统科学研究院

报告摘要： Provably finding stationary points on bounded-rank tensors turns out to be an open problem [E. Levin, J. Kileel, and N. Boumal, Math. Program., 199 (2023), pp. 831–864] due to the inherent non-smoothness of the set of bounded-rank tensors. We resolve this problem by proposing two first-order methods with guaranteed convergence to stationary points. Specifically, we revisit the variational geometry of bounded-rank tensors and explicitly characterize its normal cones. Moreover, we propose gradient-related approximate projection methods that are provable to find stationary points, where the decisive ingredients are gradient-related vectors from tangent cones, line search along approximate projections, and rank-decreasing mechanisms near rank-deficient points. Numerical experiments on tensor completion validate that the proposed methods converge to stationary points across various rank parameters.

个人简介： 高斌，中国科学院数学与系统科学研究院计算数学所副研究员。2019 年毕业于中国科学院数学与系统科学研究院。曾先后赴比利时、德国从事博士后研究。其主要研究兴趣是矩阵和张量流形上的优化算法，及其在人工智能、科学计算、量子信息中的应用。曾获中国科学院院长特别奖、钟家庆数学奖。受到中国科协青托工程、中科院和国家海外高层次人才计划等项目资助。

On Convergence of Iterative Thresholding Algorithms to Global Solution for Nonconvex Sparse Optimization

胡耀华　　深圳大学数学科学学院

报告摘要： Sparse optimization is a popular research topic in applied mathematics and optimization, and nonconvex sparse regularization problems have been extensively studied to ameliorate the statistical bias and enjoy robust sparsity promotion capability in vast applications. However, puzzled by the nonconvex and nonsmooth structure in nonconvex regularization problems, the convergence theory of their optimization algorithms is still far from completion: only the convergence to a stationary point was established in the literature, while there is still no theoretical evidence to guarantee the convergence to a global minimum or a true sparse solution.

This talk aims to find an approximate global solution or true sparse solution of an underdetermined linear system. For this purpose, we propose two types of iterative thresholding algorithms with the continuation technique and the truncation technique respectively. We introduce a notion of limited shrinkage thresholding operator and apply it, together with the restricted isometry property, to show that the proposed algorithms converge to an approximate global solution or true sparse solution within a tolerance relevant to the noise level and the limited shrinkage magnitude. Applying the obtained results to nonconvex regularization problems with SCAD, MCP and Lp penalty and utilizing the recovery bound theory, we establish the convergence of their proximal gradient algorithms to an approximate global solution of nonconvex regularization problems.

个人简介： 胡耀华，深圳大学数学科学学院教授、副院长，主要从事连续优化理论、方法与应用研究，代表性成果发表在 SIAM Journal on Optimization、Mathematical Programming、Mathematics of Operations Research、Journal of Machine Learning Research、Genome Biology、Bioinformatics 等期刊，授权多项国家发明专利，开发多个生物信息学工具包与数据库。

从并行计算到 LLM 智能体：面向大规模服务系统的决策优化研究

罗俊　　上海交通大学

报告摘要：大规模服务系统中的决策优化问题通常具有高维状态空间、复杂约束结构以及动态环境变化等特征，因此在求解过程中往往面临计算复杂度高、实时响应难和策略适应性不足等挑战。随着高性能计算与生成式人工智能技术的发展，为此类问题的优化方法带来新的机遇。本次报告将介绍两项相关研究工作。（1）城市急救医疗服务系统优化。针对经典空间超立方排队模型在异质服务场景面前的计算瓶颈，我们改进了模型结构并设计了迭代求解算法，从而实现对异质服务系统的快速精确求解。在此基础上，我们进一步构建并行计算框架，将算法中 91% 以上的计算过程并行化，显著提升了模型的求解效率与可扩展性。（2）云计算平台中的虚拟机调度优化。针对需求过程非平稳、传统启发式策略难以兼顾适应性与性能的问题，我们提出了基于 LLM 智能体的分层决策优化框架。在内层，利用大语言模型在局部稳定场景中挖掘候选调度策略；在外层，基于历史上下文对策略进行组合与切换，从而实现对动态环境的自适应调度。在真实工业数据集测试，实验结果表明性能与最优离线算法比率达到 96.4%，而且该方法能够有效整合、重组并扩展已有启发式规则。

个人简介：罗俊，上海交通大学安泰经济与管理学院教授，博士生导师，上海交通大学行业研究院副院长。香港科技大学工业工程与物流管理专业博士，南京大学数学系统计学学士。主要研究方向包括随机建模、仿真优化、统计学习，以及它们在服务运营管理、健康医疗管理、供应链物流管理等方面的应用。主持国家自然科学基金重点项目、专项项目，优秀青年基金项目，阿里巴巴 AIR 项目等。在 Operations Research、INFORMS Journal on Computing、IISE Transactions 等国际期刊上发表论文 30 余篇。曾获得中国教育部第八届高等学校科学研究优秀成果奖（人文社会科学）二等奖，上海交通大学“教书育人奖”（三等奖）等荣誉奖励。目前担任 Naval Research Logistics 副编辑，《系统管理学报》编辑部主任，管理科学与工程学会和中国“双法”研究会等多个二级分会副主任委员/常务理事等。

Approximation for Pure Integer Two-stage Distributionally Robust Service Network Design Problem with Demand Uncertainty

罗志兴　　南京大学

报告摘要： We investigate a distributionally robust service network design problem with integer recourse and addresses the computational challenge stemming from integer recourse. Based on a two-stage consolidation-based formulation, the second-stage worst-case expected cost can be evaluated in closed form by leveraging the concave envelope of the recourse function. The closed-form nature enables reformulation of the original two-stage model into an approximate model that can be solved directly by commercial solvers. Numerical experiments on the Civil Aeronautics Board dataset show that the proposed approximation approach is capable of solving large-scale instances — with up to 3.5 million variables — within acceptable computation time. Out-of-sample simulations demonstrate that our model outperforms both deterministic and stochastic benchmarks, validating the quality of the approximation.

个人简介： 罗志兴博士于 2010 年在华南理工大学获得学士学位，于 2014 年在香港城市大学获得博士学位，现为南京大学工程管理学院教授、博士生导师，主要研究的领域是运筹优化算法设计、智慧物流、智能制造等。他主持国家自然科学基金青年项目、面上项目和优秀青年项目各一项，在国际知名期刊 Management Science、Manufacturing & Service Operations Management、INFORMS Journal on Computing、Transportation Science、Transportation Research Part-B: Methodological 以及 Naval Research Logistics 发表论文十多篇。他 2018 年参加京东物流举办的" 全球运筹优化挑战赛"，在城市物流运输车辆智能调度赛题获得第一名，2019 年入选中国科协青年人才托举工程，2020 年获得华为诺亚方舟实验室优秀高校合作项目奖。

PC 层：加速大模型训练的多项式预条件方法

孙若愚　　香港中文大学（深圳）

报告摘要：我们提出了一种预条件（PC）层，目的是为了大语言模型（LLM）训练过程中保持健康的权重矩阵的条件数。理论上，对于深度线性网络，我们证明了将每一层的奇异值一致地远离零和无穷大进行有界约束，可以确保梯度下降达到全局最小值的几何收敛性。为了实现实用且可扩展的谱控制，我们引入了一个内置于层的 PC 模块，通过高效的低次多项式预条件来重塑奇异值谱，仅需少量矩阵乘法，避免了昂贵的矩阵分解。关键在于，预条件后的权重可以在训练后合并回原始架构，不带来任何推理开销。实验上，PC 层在 Llama2-1B 的预训练中相对于标准 Transformer 基线提升了 30% 以上的效率。

个人简介：孙若愚现任香港中文大学（深圳）和深圳河套学院副教授，深圳市大数据研究院大模型中心主任。2017 年至 2022 年，他在伊利诺伊大学厄巴纳-香槟分校（UIUC）工业与系统工程系担任终身轨助理教授。加入 UIUC 之前，他曾是 Facebook AI Research 的访问研究科学家，曾在斯坦福大学从事博士后研究。他在明尼苏达大学获得电气工程博士学位，在北京大学获得数学学士学位。他目前的研究兴趣包括机器学习与优化，涵盖大语言模型、深度学习理论与算法、生成式人工智能。他曾担任 NeurIPS、ICML、ICLR、AISTATS 等顶级机器学习会议的领域主席，以及《Transactions on Machine Learning Research》的行动编辑。他曾获得 INFORMS George Nicholson 学生论文竞赛第二名，以及 INFORMS 优化学会学生论文竞赛荣誉提名。

Sparse computation in image inverse problems: from optimization to learning

吴春林　　南开大学

报告摘要: In image inverse problems, an important technique is based on sparse computation. In this talk, we will introduce briefly the developments and trends of sparse computation in image inverse problems. We will talk about some typical optimization algorithms and the recent learning strategies, in particular some of our related works on L1DecNet+ and seisClear package.

个人简介: 吴春林，南开大学数学科学学院教授、博导。研究兴趣为图像反问题、稀疏优化、深度学习。吴春林入选国家高层次人才青年项目、天津市高层次人才青年项目，主持多项国家级、省部级基金项目以及企业横向项目。（曾）任中国数学会计算数学分会常务理事、中国运筹学会数学规划分会理事、中国运筹学会算法软件与应用分会理事、天津市数学会计算数学分会理事长、天津市数学会理事、天津市工业与应用数学会理事、南开大学数学科学学院副院长、科学与工程计算系主任、国际 SCI 期刊 ACDM 及 TVCJ 编委等。近年来特别关注图像反问题中的深度展开方法以及企业应用、基于动力系统视角的深度学习方法的机理研究。

Stochastic dual coordinate descents for linearly constrained convex optimization

谢家新　　北京航空航天大学

报告摘要： The problem of finding a solution to the linear system Ax=b with certain minimization properties arises in numerous scientific and engineering areas. In the era of big data, the stochastic optimization algorithms become increasingly significant due to their scalability for problems of unprecedented size. This talk focuses on the problem of minimizing a strongly convex function subject to linear constraints. We consider the dual formulation of this problem and adopt the stochastic coordinate descent to solve it. The proposed algorithmic framework, called adaptive stochastic dual coordinate descent, utilizes sampling matrices sampled from user-defined distributions to extract gradient information. Moreover, it employs Polyak's heavy ball momentum acceleration with adaptive parameters learned through iterations, overcoming the limitation of the heavy ball momentum method that it requires prior knowledge of certain parameters, such as the singular values of a matrix. With these extensions, the framework is able to recover many well-known methods in the context, including the randomized sparse Kaczmarz method, the randomized regularized Kaczmarz method, the linearized Bregman iteration, and a variant of the conjugate gradient (CG) method. We prove that, with strongly admissible objective function, the proposed method converges linearly in expectation. Numerical experiments are provided to confirm our results.

个人简介：谢家新，北京航空航天大学数学科学学院副教授，博士生导师。研究兴趣为随机优化算法及其加速技术。已在 SIOPT，SIMAX，Numer. Math.，Math. Comp. 等期刊发表论文多篇。主持国家自然科学基金面上项目等项目。现为中国运筹学会算法软件及应用分会理事兼副秘书长，中国运筹学会数学规划分会青年理事。

Accelerating LLM Pre-Training through Flat-Direction Dynamics Enhancement

袁坤　　北京大学

报告摘要： Pre-training Large Language Models requires immense computational resources, making optimizer efficiency essential. The optimization landscape is highly anisotropic, with loss reduction driven predominantly by progress along flat directions. While matrix-based optimizers such as Muon and SOAP leverage fine-grained curvature information to outperform AdamW, their updates tend toward isotropy—relatively conservative along flat directions yet potentially aggressive along sharp ones. To address this limitation, we first establish a unified Riemannian Ordinary Differential Equation (ODE) framework that elucidates how common adaptive algorithms operate synergistically: the preconditioner induces a Riemannian geometry that mitigates ill-conditioning, while momentum serves as a Riemannian damping term that promotes convergence. Guided by these insights, we propose LITE, a generalized acceleration strategy that enhances training dynamics by applying larger Hessian damping coefficients and learning rates along flat trajectories. Extensive experiments demonstrate that LITE significantly accelerates both Muon and SOAP across diverse architectures (Dense, MoE), parameter scales (130M–1.3B), datasets (C4, Pile), and learning-rate schedules (cosine, warmup-stable-decay). Theoretical analysis confirms that LITE facilitates faster convergence along flat directions in anisotropic landscapes, providing a principled approach to efficient LLM pre-training.

个人简介： 袁坤，现任北京大学前沿交叉学科研究院研究员，博士生导师，北京大学博雅青年学者，国家级高层次青年人才计划入选者。他于 2019 年在美国加州大学洛杉矶分校获得博士学位，2019 至 2022 年在阿里巴巴达摩院美国西雅图研究中心任高级算法专家。袁坤主要从事最优化、信号处理、机器学习等领域中的理论与算法研究，目前主要关注如何为人工智能大模型设计高效预训练、微调与推理算法。他在 2017 年获得 ICCM 杰出论文奖，2018 年获得 IEEE 信号处理协会青年作者最佳论文奖，2025 年获得 IEEE CloudCom 杰出论文奖。相关研究成果曾被集成在阿里巴巴” 敏迭” 运筹优化求解器软件，英伟达视觉 AI 官方软件开发库 DeepStream。现主持国自然重大研究计划培育项目、国家重点研发计划课题等多项国家级科研基金项目。

A Single-Loop Gradient Algorithm for Pessimistic Bilevel Optimization via Smooth Approximation

张进　　南方科技大学

报告摘要： Bilevel optimization has garnered significant attention in the machine learning community recently, particularly regarding the development of efficient numerical methods. While substantial progress has been made in developing efficient algorithms for optimistic bilevel optimization, the study of methods for solving Pessimistic Bilevel Optimization (PBO) remains relatively less explored, especially the design of fully first-order, single-loop gradient-based algorithms. This paper aims to bridge this research gap. We first propose a novel smooth approximation to the PBO problem, using penalization and regularization techniques. Building upon this approximation, we then propose SiPBA (Single-loop Pessimistic Bilevel Algorithm), a new gradient-based method specifically designed for PBO which avoids second-order derivative information or inner-loop iterations for subproblem solving. We provide theoretical validation for the proposed smooth approximation scheme and establish theoretical convergence for the algorithm SiPBA. Numerical experiments on synthetic examples and practical applications demonstrate the effectiveness and efficiency of SiPBA.

个人简介： 张进，南方科技大学数学系/深圳国家应用数学中心教授，从事最优化理论和应用研究，研究成果获得中国运筹学会青年科技奖、广东省青年科技创新奖，代表性成果发表在 Math Program、SIAM J Optim、Math Oper Res、SIAM J Numer Anal、J Mach Learn Res、IEEE Trans Pattern Anal Mach Intell，以及 ICML、NeurIPS、ICLR 等最优化和机器学习期刊与会议上。

专题报告

自由报告

Functional multiple tensor decomposition

白敏茹　　湖南大学

报告摘要： Triple decomposition has attracted increasing attention for decomposing third-order tensors into three factor tensors. However, this approach is limited to third-order tensors and enforces uniformity in the lower dimensions across all factor tensors, which restricts its flexibility and applicability. To address these issues, we propose the multiple tensor decomposition (MTD), a novel framework that generalizes triple decomposition to arbitrary order tensors, and allows different short dimensions of the factor tensors. Connections between the proposed multiple rank and the triple rank, CP rank, and Tucker rank are established. Furthermore, we develop the functional multiple tensor decomposition (FMTD), which decomposes a tensor function into a set of factor functions along each dimension. By operating in the functional domain, FMTD naturally accommodates continuous and non-grid data. We employ the Proximal Alternating Least Squares algorithm to solve the FMTD-based tensor reconstruction models, and provide a convergence analysis for the algorithm that does not rely on the Kurdyka-Lojasiewicz property. Extensive experiments on robust tensor completion and point cloud upsampling tasks further validate the effectiveness of our method. This work is cooperate with Kunjing Yang and Libin Zheng.

Combining OR and ML for challenging transportation optimization problems

白瑞斌　　宁波诺丁汉大学

报告摘要： Many real-life optimisation problems are intended for complex systems with limited predictability. Such systems are characterized by the large scale of the problem sizes, nonlinearity, multi-objectivity and uncertainties. In marine container terminals, truck dispatching optimization is often considered as the primary focus as it provides crucial synergy between the sea-side operations and yard-side activities and hence can greatly affect the terminal throughput and quay crane utilization. However, many existing studies rely on strong assumptions that often overlook the uncertainties and dynamics innate to real-life applications. In this talk, we investigated several learning based dynamic algorithms for transportation. Different from offline methods that search for full solutions directly, the proposed generative methods focus on obtaining a generative policy (heuristic) that makes more balanced decisions between two extremes: near-term greediness and long-term reward forecasts which are mostly over-optimistic under uncertainties. This presentation shall report a deep reinforcement learning hyper-heuristic and a genetic programming ensemble hyper-heuristic method. Experiment studies show our proposed methods have good generalization and achieve the state-of-the-art results on the problems derived from real-life transportation problems.

Adaptive Bregman primal-dual algorithms for general bilinear minimax problems with applications to imaging

常小凯　　兰州理工大学

报告摘要： We develop Bregman golden ratio primal-dual algorithms (GRPDA) for solving a class of general bilinear minimax problems. The proposed method employs a convex combination step and Bregman regularization, which help achieve convergence under more relaxed step size conditions and expand the scope of applications. The convergence and convergence rate of the Bregman GRPDA are established for both fixed and adaptive step sizes. The theoretical result significantly improves the existing convergence conditions by relaxing the upper bounds of the key parameters in both the convex combination step and the step size condition, broadening the bounds from the golden ratio value to 2. Moreover, under a specific setting, a fully adaptive primal-dual three-operator splitting method is produced for solving three-block composite optimization problems, where the step sizes are computed using only current iteration information without linesearch or prior knowledge of the Lipschitz constants. Numerical experiments on the color transfer and image reconstruction problems are conducted to compare the proposed Bregman GRPDA with state-of-the-art counterparts, demonstrating the efficiency of the proposed methods.

How many integrals should be evaluated at least in two-dimensional hyperinterpolation?

车茂林　　贵州大学

报告摘要： In this talk, we introduce a novel approach to approximating continuous functions over high-dimensional hypercubes by integrating matrix CUR decomposition with hyperinterpolation techniques. Traditional Fourier-based hyperinterpolation methods suffer from the curse of dimensionality, as the number of coefficients grows exponentially with the dimension. To address this challenge, we propose two efficient strategies for constructing low-rank matrix CUR decompositions of the coefficient matrix, significantly reducing computational complexity while preserving accuracy. The first method employs structured index selection to form a compressed representation of the tensor, while the second utilizes adaptive sampling to further optimize storage and computation. Theoretical error bounds are derived for both approaches, ensuring rigorous control over approximation quality. Additionally, practical algorithms — including randomized and adaptive decomposition techniques — are developed to efficiently compute the CUR decomposition. Numerical experiments demonstrate the effectiveness of our methods in drastically reducing the number of required coefficients without compromising precision. Our results bridge matrix/tensor decomposition and function approximation, offering a scalable solution for high-dimensional problems. This work advances the field of numerical analysis by providing a computationally efficient framework for hyperinterpolation, with potential applications in scientific computing, machine learning, and data-driven modeling.

Tensor factorization machine and its lifted form

陈碧连　　厦门大学

报告摘要： Factorization machines (FMs) are a new type of simple, efficient, yet powerful second-order supervised predictor that can effectively and efficiently exploit feature interactions in data;

this greatly helps in alleviating the negative effects caused by data sparsity, such as the difficulty in parameter estimation. Thanks to the rapid development of data acquisition technology, tensor data are now ubiquitous in various realistic applications such as computer vision, and they typically carry useful structural information. However, to the best of our knowledge, we are not aware of any tensor-oriented FM in the literature that can exploit such information. To further improve the effectiveness of FMs in dealing with structured sparse tensor data, in this paper, we propose two tensor FMs that can preserve and utilize the structural information therein, thereby differing fundamentally from existing FMs. Specifically, we first directly generalize the vanilla FM to its tensor form using multilinear algebra; but unfortunately this direct generalization exhibits some shortcomings in terms of computation and optimization. To overcome these limitations, we propose another lifted tensor FM based on the lifting technique. These considerations, together with the inherited ability of tensor FMs to learn even under huge sparsity, make them an effective tool for the desired purpose. With respect to the two tensor FMs, efficient training algorithms based on gradient descent are developed, and theoretical analysis regarding their convergence and complexity is also carried out. Extensive experiments on several real-world benchmark datasets show superior performance of tensor FMs in image classification under sparsity.

A learning and rectification algorithm for nonstationary online linear programming

陈彩华　　南京大学

报告摘要: This paper investigates online linear programming (OLP) under resource capacity constraints, aiming to maximize total reward over a finite horizon. To address the limitations of stochastic models in nonstationary settings and the conservatism of adversarial models, we introduce a globally nonstationary and locally stationary arrival model to the OLP context. This framework partitions the horizon into known periods where requests are independent and identically distributed within each period, while the underlying distribution varies across periods, balancing environmental evolution with local stability. Assuming the true distribution is unknown, but an inaccurate prior is available, we propose the Gradient Descent with Learning and Rectification (GDLR) framework. This dual-based method optimizes budget consumption for each request through two complementary components: a learning component that leverages local stationarity to refine estimates by combining prior knowledge with real-time observations, and a rectification component that counters global nonstationarity by adaptively adjusting estimates based on cumulative resource imbalance. Theoretically, we demonstrate that rectification serves as robust optimization against estimation errors in dual and ensures primal feasibility. The regret bound of GDLR decomposes into intrinsic stochasticity, estimation error, and allocation suboptimality, with the latter two significantly reduced via learning and rectification. Empirically, our approach consistently outperforms baselines on synthetic and real-world datasets. To our knowledge, this work presents the first enterprise OLP deployment at Alipay, achieving a 2.2% average revenue gain in online A/B tests.

多层绝对值结构非线性方程组的固定时间动力学模型

陈彩荣　　福建师范大学

报告摘要： 由于与互补问题的密切联系, 近年来含有绝对值结构的非线性方程组受到越来越多的关注。本文介绍一类特殊的多层绝对值结构非线性方程组, 研究它的误差界等理论性质, 建立求解它的固定时间动力学模型, 并将所得的理论与算法应用于求解扩展的垂直线性互补问题。数值实验验证了理论结果的正确性。

通用调度算法：挑战、架构、路径、创新、引擎与落地

陈峰　　上海交通大学

报告摘要： 报告根据自身科学研究与落地实施经验, 围绕通用调度算法创新, 从挑战、架构、路径、方法、引擎等层面, 结合国家战略型复杂应用场景, 对关键内容与未来发展进行探讨。

Convergence analysis of the constrained gradient method

陈红梅　　四川师范大学

报告摘要： The constrained gradient method (CGM) has recently been proposed for solving convex optimization and monotone variational inequality (VI) problems with general functional constraints. Existing convergence results, however, rely on rather restrictive assumptions, and in some cases these assumptions are even mutually inconsistent, which leads to gaps in the current theory. In this talk, I present a new convergence analysis of CGM under weaker and more reasonable assumptions. The results focus on strongly convex optimization problems and strongly monotone VI problems, where rigorous and improved convergence guarantees are obtained. Preliminary numerical experiments are also included to illustrate the effectiveness of the method.

基于光电 Ising 机的组合优化问题高效求解方法探讨

陈锐　　北京伊辛智能科技有限公司

报告摘要： 组合优化问题多为 NP-hard 问题，传统算法处理大规模问题时存在复杂度高、收敛性不足等困境。Ising 机作为统计物理与组合数学的交叉载体，可高效映射各类组合优化问题，例如旅行商、背包问题等典型场景，能依托物理系统并行演化实现全局寻优。其中光电 Ising 机凭借光子技术优势，具备超高计算吞吐量与室温稳定运行能力，求解速度更快、适配规模更大，进一步强化了 Ising 机求解效率与稳定性，适配大规模、多约束需求，为运筹优化提供专用高效求解路径，其能力可为运筹优化算法创新与软件研发提供重要支撑，本次报告将交流其核心能力及应用潜力。

Two new variable implication oriented presolve techniques

陈伟坤　　北京理工大学

报告摘要： Variable implications refer to the logical dependencies between the bound changes of variables in the MIP problem. In this talk, we present two new variable implications oriented presolve techniques for mixed integer programming (MIP) problems.The first technique aggregates multiple variable implications to reduce the number of constraints and tighten the linear programming (LP) relaxation. The second technique integrates variable implications into the linear constraint based domain propagation, enabling the derivation of tighter variable bounds for more variables. Numerical results demonstrate the effectiveness of the two presolve techqniues.

Quaternion-based Frobenius norm estimation for tensors

陈艳男　　华南师范大学

报告摘要： In the era of big data, the rapid growth of large-scale tensor data in science and engineering poses a fundamental challenge: efficiently estimating the tensor Frobenius norm, especially for distributed or streaming data. Exact computation is often prohibitively expensive, rendering randomized estimation a promising alternative. Existing randomized methods for estimating the Frobenius norm of real-valued tensors typically employ real or complex random vectors and have achieved notable results. This work investigates the use of quaternion-valued random vectors, whose entries are independent and identically distributed standard Gaussian variables. Theoretical results confirm that the quaternion-based estimator is unbiased and exhibits smaller variance and stronger concentration than the real- and complex-based estimators. This advantage becomes more significant for higher-order tensors. Numerical experiments reveal that, in large-scale scenarios, the proposed quaternion-based method achieves nearly an order-of-magnitude speedup over exact computation.In the era of big data, the rapid growth of large-scale tensor data in science and engineering poses a fundamental challenge: efficiently estimating the tensor Frobenius norm, especially for distributed or streaming data. Exact computation is often prohibitively expensive, rendering randomized estimation a promising alternative. Existing randomized methods for estimating the Frobenius norm of real-valued tensors typically employ real or complex random vectors and have achieved notable results. This work investigates the use of quaternion-valued random vectors, whose entries are independent and identically distributed standard Gaussian variables. Theoretical results confirm that the quaternion-based estimator is unbiased and exhibits smaller variance and stronger concentration than the real- and complex-based estimators. This advantage becomes more significant for higher-order tensors. Numerical experiments reveal that, in large-scale scenarios, the proposed quaternion-based method achieves nearly an order-of-magnitude speedup over exact computation. Finally, this estimation method is implemented as an efficient subroutine for tensor kernel interpolation to reconstruct scalp voltage topographies in electroencephalography.

Efficient generative modeling with unitary matrix product states using Riemannian optimization

陈中明　　杭州电子科技大学

报告摘要： Tensor networks, which are originally developed for characterizing complex quantum many-body systems, have recently emerged as a powerful framework for capturing high-dimensional

probability distributions with strong physical interpretability. This paper systematically studies matrix product states (MPS) for generative modeling and shows that unitary MPS, a simple and expressive tensor-network architecture motivated by the natural expression of pure quantum states, offers clear benefits for unsupervised learning by reducing ambiguity in parameter updates and improving efficiency. To overcome the inefficiency of standard gradient-based MPS training, we develop a Riemannian optimization approach that casts probabilistic modeling as an optimization problem with manifold constraints, and further derive an efficient space-decoupling algorithm. Experiments on Bars-and-Stripes, EMNIST datasets and quantum state tomography (QST) demonstrate fast adaptation to data structure, stable updates, and strong performance while maintaining the efficiency and expressive power of unitary MPS.

Diffeomorphic logarithm of special orthogonal matrices

邓致丰　　厦门大学

报告摘要： The inverse problem of matrix exponential of skew-symmetric matrices — the matrix logarithm — exhibits a highly nontrivial local diffeomorphism structure, and the notion of a nearby logarithm arises naturally as a local inverse of the skew-restricted exponential. In this work, we establish a complete description of the local diffeomorphism structure of the exponential on the skew-symmetric matrices. By introducing a canonical alignment rule for Schur decompositions, we obtain a labeling and interpretation of the countably many diffeomorphic regions where the derivative of the exponential is invertible. A notion of diffeomorphic logarithm with a maximal domain is introduced that maintains a diffeomorphism structure. An efficient algorithm is proposed, which only costs one additional Schur decomposition. Moreover, the diffeomorphic logarithm is applied to the Karcher mean problem on $\mathbb{SO}_n$, demonstrating continuous mean behavior under the motion of the data points.

Randomized structured-TLS based higher order extended dynamic mode decomposition

丁维洋　　复旦大学

报告摘要： Dynamic mode decomposition (DMD), a fundamental methodology for data-driven dynamical systems analysis, faces three persistent limitations: restricted applicability to nonlinear systems, sensitivity to noise-induced instabilities, and computational inefficiency at scale. Recent advances partially address these constraints. However, these approaches still require a trade-off between computational efficiency and accuracy. This work introduces a unified randomized higher order extended DMD (randomized HOEDMD) framework integrating randomized linear algebra with structured total least squares (STLS). Its innovations include Cholesky decomposition-enhanced randomized QB algorithms that reduce spatial complexity. Furthermore, we establish theoretical error bounds demonstrating quantifiable convergence to deterministic HOEDMD solutions under mild conditions. Evaluations across synthetic, cylinder wake flow, and fMRI datasets demonstrate

(1) substantially improved computational efficiency while maintaining accuracy relative to the deterministic counterpart, and (2) superior precision compared to standard DMD and its randomized variants. Overall, the proposed method provides an efficient, theoretically grounded approach for analyzing noise-contaminated, multiscale dynamical systems, effectively bridging computational tractability and dynamical fidelity.

ADMM-based bilevel descent aggregation algorithm for sparse hyperparameter selection

丁彦昀　　深圳职业技术大学

报告摘要： Hyperparameter selection plays a critical role in sparse optimization. Bilevel optimization provides a robust framework for addressing this issue; however, existing methods heavily rely on the lower-level singleton (LLS) assumption, which significantly limits their practical applicability. To overcome this limitation, this paper focuses on a class of nonsmooth convex sparse optimization problems and proposes a novel bilevel optimization framework that effectively integrates the alternating direction method of multipliers (ADMM) with a bilevel descent aggregation (BDA) algorithm. Specifically, ADMM is employed to efficiently solve the lower-level problem, while BDA explores the hyperparameter space, enabling seamless coordination between the upper and lower levels. A key contribution of this work is a new convergence analysis, demonstrating that the proposed ADMM-BDA algorithm achieves global convergence under substantially relaxed conditions, thereby eliminating the need for the LLS assumption commonly required in the literature. Extensive numerical experiments on both synthetic and real-world datasets show that ADMM-BDA outperforms several state-of-the-art methods in terms of effectiveness and robustness, particularly when the lower-level problem involves elastic-net penalized statistical models.

Efficient curvature-aware hypergradient approximation for bilevel optimization

董悠然　　南京大学

报告摘要： Bilevel optimization is a powerful tool for many machine learning problems, such as hyperparameter optimization and meta-learning. Estimating hypergradients is crucial for developing gradient-based methods for bilevel optimization. In this work, we propose a computationally efficient technique for incorporating curvature information into the approximation of hypergradients and present a novel algorithmic framework based on the resulting enhanced hypergradient computation. We provide convergence rate guarantees for the proposed framework in both deterministic and stochastic scenarios, particularly showing improved computational complexity over popular gradient-based methods in the deterministic setting. This improvement in complexity arises from a careful exploitation of the hypergradient structure and the inexact Newton method. In addition to the theoretical speedup, numerical experiments demonstrate the significant practical performance benefits of incorporating curvature information.

基金网络系统性风险优化模型与算法研究

董志龙　　西安交通大学

报告摘要：本文聚焦基金抱团瓦解中的资产折价销售现象，研究风险在基金网络中的传染机制。通过基金共同持股关系构建加权无向网络，提出以最小化网络间接损失为目标的线性优化模型，模型综合考虑流动性约束、投资者赎回行为及资产抛售的价格冲击。结合网络拓扑分析与数值实验，模拟不同市场冲击下的单期与多期风险演化，并对投资者情绪、流动性标准与市场深度进行敏感性分析。结果表明：基金网络具有小世界与无标度特征，关键节点抛售行为会放大系统性损失；提高市场深度能有效抑制价格螺旋；非理性赎回与过高流动性要求则加剧风险传染。研究为金融系统性风险量化与监管提供了优化建模新视角。

Support recovery for sparse regression with quadratic measurements via weakly-convex-concave regularization

樊军　　河北工业大学

报告摘要：The recovery of unknown signals from quadratic measurements finds extensive applications in fields such as phase retrieval, power system state estimation, and unlabeled distance geometry. This paper investigates the finite sample properties of weakly convex-concave regularized estimators in high-dimensional quadratic measurements models. By employing a weakly convex-concave penalized least squares approach, we establish support recovery and ℓ_2-error bounds for the local minimizer. To solve the corresponding optimization problem, we adopt two proximal gradient strategies, where the proximal step is computed either in closed form or via a weighted ℓ_1 approximation, depending on the regularization function. Numerical examples demonstrate the efficacy of the proposed method.

Nesterov accelerated proximal gradient methods for convex composite optimization on Riemannian manifolds

冯帅铃　　厦门大学

报告摘要：本文研究截曲率有界的黎曼流形上复合优化问题的一类 Nesterov 加速近端梯度算法及其收敛速度估计。在有界域假设下，考虑目标函数由光滑项与非光滑项构成，其中光滑部分分别满足测地凸性与测地强凸性，非光滑部分为限制在切空间中的 ρ-凸函数。在统一的算法框架下，针对测地凸与测地强凸两类情形设计差异化的参数选取策略。进一步地，通过分别构造适配两类情形的势函数，结合测地线与切空间分析工具，得到相应的收敛速度：测地凸情形下为次线性收敛，测地强凸情形下为线性收敛。特别地，当流形退化为欧氏空间时，两类情形下参数选取均可还原为欧氏空间中凸与强凸优化的经典参数形式。

A natural SQP method with potentially infeasible subproblems for nonlinear optimization

付文豪　　苏州科技大学

报告摘要： The sequential quadratic programming (SQP) method has shown remarkable performance for addressing nonlinear optimization problems. However, it typically requires the quadratic programming (QP) subproblems to be feasible. To overcome this limitation, various approaches introducing penalizations or perturbations to the QP subproblems have been developed. In this study, we propose a novel natural SQP algorithm that iterates through a stationary point of the classical QP subproblem, specifically the minimizer closest to the feasible region. This approach ensures global convergence under standard assumptions by identifying a solution with the least constraint violation. The resulting solution minimizes the objective function within the set of minimizers for constraint violation. Furthermore, the proposed method exhibits a quadratic convergence rate. When the original problem is feasible, our assumptions and conclusions align with those of the classical SQP method. Numerical experiments validate the effectiveness and demonstrate the superior performance of the proposed algorithm.

Normalized tensor train decomposition

高斌　　中国科学院数学与系统科学研究院

报告摘要： Tensors with unit Frobenius norm are fundamental objects in many fields, including scientific computing and quantum physics, which are able to represent normalized eigenvectors and pure quantum states. While the tensor train decomposition provides a powerful low-rank format for tackling high-dimensional problems, it does not intrinsically enforce the unit-norm constraint. To address this, we introduce the normalized tensor train (NTT) decomposition, which aims to approximate a tensor by unit-norm tensors in tensor train format. The low-rank structure of NTT decomposition not only saves storage and computational cost but also preserves the underlying unit-norm structure. We prove that the set of fixed-rank NTT tensors forms a smooth manifold, and the corresponding Riemannian geometry is derived, paving the way for geometric methods. We propose NTT-based methods for low-rank tensor recovery, high-dimensional eigenvalue problem, estimation of stabilizer rank, and calculation of the minimum output Rényi 2-entropy of quantum channels. Numerical experiments demonstrate the superior efficiency and scalability of the proposed NTT-based methods.

大规模无线网络优化技术

高杰星　　华为技术有限公司

报告摘要： 本报告将介绍无线网络通信中网络控制和优化的发展方向，以及提高覆盖质量的工程和相关的研究理论。考虑无线网络信号调优问题，通过小区的参数值自动寻优来调整基站发射机的发射功率，天线倾角，频率等可配置参数来优化网络覆盖和传输服务质量，实际上，该问题等效为一个黑盒优化问题。

A decentralized mini-batch variance-reduced gradient tracking method with Barzilai-Borwein step sizes

高娟　　天津理工大学

报告摘要: This paper investigates the problem of minimizing the finite sum of smooth and strongly convex cost functions, where these functions are nested on a decentralized, undirected network of agents. We present a decentralized mini-batch variance-reduced gradient tracking algorithm with Barzilai-Borwein (BB) step sizes, termed DmSVRG-BB. Our method employs the uncoordinated and dynamic step sizes that are automatically computed by using local information. The combination of the mini-batch stochastic variance reduced gradient and the gradient tracking technique facilitates exact convergence of the algorithm. We establish the conditions under which DmSVRG-BB linearly converges to the exact optimal solution in expectation. Owing to the incorporation of the BB step sizes and the mini-batch technique, DmSVRG-BB achieves a faster convergence rate, both theoretically and numerically, compared to the existing decentralized variance-reduced gradient tracking method with the coordinated constant step size (GT-SVRG). Numerical experiments on standard data sets show that DmSVRG-BB is superior to GT-SVRG with best-tuned step sizes, and can outperform several advanced decentralized stochastic gradient algorithms.

Bregman-augmented Lagrangian method for nonconvex nonsmooth optimization with general inequality constraints

高雪　　河北工业大学

报告摘要: This paper studies a class of nonconvex nonsmooth composite optimization problems with general inequality constraints. We propose a Bregman-augmented Lagrangian (BAL) method, which utilizes an appropriate Legendre function and its associated Bregman distance to effectively handle inequality constraints, without imposing feasibility on certain variables. Crucially, unlike conventional ALM combined with barrier methods, BAL ensures convergence without driving the regularization and penalty parameters to zero or infinity. This design significantly enhances numerical stability and eases implementation. To handle the nonsmoothness of the objective, we introduce a sequential optimality condition and prove, under mild constraint qualifications, that any limit point of a bounded sequence generated by the BAL method satisfies the KKT conditions of the original problem. Numerical experiments demonstrate the stable computational efficiency and favorable numerical performance of the proposed method.

Blind hyperspectral and multispectral images fusion: A unified tensor fusion framework from coupled inverse problem perspective

高莹　　北京航空航天大学

报告摘要: Hyperspectral and multispectral images fusion aims at integrating a low-resolution hyperspectral image (LR-HSI) and a high-resolution multispectral image (HR-MSI) to construct a

high-resolution hyperspectral image (HR-HSI). It is generally assumed that spatial blurring operator and spectral response operator are prior-known. However, such an assumption is extremely restrictive in prac tice. To overcome this limitation, this paper formulates blind fusion as a coupled inverse problem, integrating blind deconvolution in the spatial domain with blind unmixing in the spectral domain. From this novel perspective, we propose a unified tensor fusion framework capable of flexible self adjustment and real-time fusion without pre-training. We further introduce an optimization model for the joint estimation of the target HR-HSI, the spatial point spread function, and the spectral response function. To solve this model, we devise a partially linearized alternating direction method of multipliers (ADMM) algorithm with Moreau envelope smoothing, accompanied by the rigorous convergence analysis. An initialization estimator tailored to the specific characteristics of the fusion problem is proposed. Numerical comparisons with state-of-the-art methods on both synthetic and real-world datasets demonstrate the compelling performance of the proposed method.

DI-SARAH: A differential inertial stochastic recursive gradient algorithm for deep neural network training

高子雯　　北方民族大学

报告摘要： To address the issues of slow convergence, high gradient estimation variance,and susceptibility to local optima encountered by stochastic gradient algo rithms in deep neural network training, this paper proposes the Differential Inertia Stochastic Recursive Gradient Algorithm (DI-SARAH). This algorithm introduces dual differential inertia and curvature-aware adaptive learning rates,utilizing first-order and second-order information to construct the inertia term,thereby accelerating escape from saddle points and suppressing oscillations. The oretical analysis confirms its convergence under smooth non-convex functions and achieves linear convergence rates under the Polyak-Łojasiewicz (PŁ) condition. Experiments demonstrate that DI-SARAH significantly outperforms existing mainstream algorithms in convergence speed and accuracy, exhibiting excellent generalization capabilities and robustness.

基于动态窗口机制的 Swin Transformer 在静态手语识别中的应用研究

葛志利　　南京特殊教育师范学院

报告摘要： 与一般的图像识别不同，静态手语识别（手势识别）由于手势全局轮廓具有高度相似性，需要关注局部细节的细微差别，且在实际场景中背景复杂多样，已成为近年来研究人员重点关注的问题。本文基于对 Swin Transformer 改进的 DynaWin - Former 手语识别架构，旨在提升模型的识别精度和鲁棒性，同时优化模型训练的稳定性和特征表现能力。主要工作如下：（1）针对 Swin Transformer 固定窗口网格所导致的特征割裂问题，本文设计了窗口提议网络（Window Proposal Network，WPN）。该网络融合局部位置编码与特征增强感知机，在深层特征空间中，将图像 Patch 动态聚类为契合手势解剖结构的不规则语义区域，打破固定网格的物理切分限制，实现对手势特征的完整包裹与提取。（2）针对动态注意力机制带来的训练不稳定问题，引入自适应门控机制（Adaptive Gating

Mechanism，AG）。该机制利用可学习的标量参数，在训练初期有效抑制未成熟的动态注意力噪声，引导网络优先复用残差先验，并随着训练的推进平滑释放细粒度特征，显著提升模型的稳定性。（3）为解决聚类过程中的退化问题，提出辅助监督训练范式（Auxiliary Supervision Paradigm，ASP）。通过构建原型正交性损失与窗口均衡损失，显式约束 WPN 的聚类过程，强制模型学习多样化的手部部件表征，有效避免聚类退化与模式坍缩。实验结果显示，改进后的模型在 Sign-Language-Digits 和 Spanish Sign Language 数据集上的识别准确率分别达到 98.71% 和 99.00%，相较于基线模型，准确率提升明显、特征表征多样性显著增强，更适宜复杂场景下的静态手语识别。

A two-stage evolutionary algorithm based on hybrid penalty strategy and its application to multi-UAV path planning

郭二杨　　宁夏大学

报告摘要: Constrained optimization problems with complex and dynamic constraints pose significant challenges for evolutionary algorithms, as the constraints reshape the solution space and create conflicts between feasibility maintenance and global exploration. To address this issue, this study proposes TSC-PSODE, a two-stage evolutionary algorithm based on a hybrid penalty strategy. The algorithm employs an external penalty in the early stage to preserve population diversity and enhance exploration, while an internal penalty in the later stage accelerates convergence toward high-quality feasible solutions. In addition, a cooperative strategy combining differential evolution operators strengthens robustness and helps the population escape local optima. Experimental evaluations on the CEC2017 benchmark suite (the IEEE Congress on Evolutionary Computation 2017 benchmark) and multi-Unmanned Aerial Vehicle path planning tasks demonstrate that TSC-PSODE consistently outperforms state-of-the-art algorithms. The results confirm that the proposed method not only provides an effective mechanism for constraint handling, but also achieves a favorable balance between exploration and exploitation by maintaining diversity and accelerating convergence. In practical terms, TSC-PSODE is capable of generating safe and feasible flight paths for multiple UAVs in complex environments, highlighting its adaptability and competitiveness for real-world applications.

Low-rank approximation of correlation matrix for classification tasks

郭媛媛　　厦门大学数学科学学院

报告摘要: 相关矩阵是一类对角元素均为 1 的对称正半定矩阵，它在多元统计分析、无线通信系统和生物系统等多个领域中都发挥着重要作用。在大规模数据的情况下，相关矩阵的高维特性显著影响着数据分析的效率。因此，近年来已经发展了许多方法来加速涉及高维相关矩阵的数据优化算法。我们提出了一个基于 von Neumann divergence 的相关矩阵低秩逼近问题，并设计了一个带预条件的 Riemannian trust-region Newton-tCG 方法来解决这一问题。此外，本文通过对涉及高斯过程的大规模分类任务进行了广泛的数值实验。

Hankel tensor completion via two-layer optimization for functional magnetic resonance images recovery

韩池　　太原师范学院

报告摘要: Functional magnetic resonance images recovery, a critical task in biomedical applications, can be effectively recast into a Hankel tensor completion problem. Yet conventional tensor completion methods generally fail to preserve the Hankel structure during Hankel tensor completion, as they neglect its defining anti-diagonal property. To overcome this limitation, we propose a structure-preserving proximal gradient algorithm based on an enhanced two-layer optimization framework. Notably, our method integrates a Hankelization projection operator during the iterative process, ensuring that every intermediate tensor update strictly satisfies the Hankel structural requirements. Theoretical analysis confirms that the objective function satisfies the Kurdyka-Lojasiewicz (KL) property, thereby guaranteeing global convergence of the algorithm to a locally optimal solution. Numerical experiments on random Hankel tensor completion and functional magnetic resonance images demonstrate that our method maintains structural integrity while delivering competitive recovery accuracy.

Accelerated primal-dual methods in continuous and discrete time

何鑫　　西华大学

报告摘要: This report concerns accelerated primal-dual methods for linearly constrained optimization problems. Motivated by classical heavy-ball and Nesterov acceleration, we describe a unified perspective that links continuous-time inertial dynamical systems with discrete time primal-dual algorithms. Emphasis is placed on how continuous models help explain acceleration mechanisms, guide algorithm design, and support convergence analysis in discrete time. Simple numerical examples are presented to illustrate the main ideas.

A mismatched adaptive anchoring Halpern iteration algorithm for solving linear inverse problems

何演超　　宁波大学

报告摘要: This paper addresses a class of nonsmooth penalized least squares optimization problems that involve a mismatched adjoint operator, arising in linear inverse problems within imaging science. By leveraging the Halpern iteration method, we propose a Mismatched Adaptive anchoring Halpern iteration Algorithm (MAHA) for solving the penalized least squares optimization problems, along with detailed convergence analysis. In particular, our analysis establishes that MAHA not only is strongly convergent in Hilbert space but also achieves sublinear convergence rate. A series of numerical experiments on computed tomography image reconstruction problems show that the proposed MAHA performs well in practice. Our proposed method maintains the convergence rate order while exhibiting superior performance, particularly in terms of running time. These results

strongly support the idea that utilizing the mismatched adjoint is beneficial for solving linear inverse problems.

整数二次规划：局部搜索算法及其在互联网工业的应用

贺翔　　中国科学院软件研究所

报告摘要：整数二次规划是运筹优化中的核心约束优化模型，具有广泛的工程与产业应用。传统完备求解器往往依赖分支定界与松弛推理，在复杂二次或多线性约束下求解效率显著受限。针对这些挑战，我们提出首个面向通用整数二次规划（IQP）的局部搜索求解器，设计了一系列结合约束结构的高效算子体系，实现了对整数二次规划问题的快速高质量求解，其性能达到国际前沿水平。此外，该求解器在非线性规划标准基准库 QPLIB 与 MINLPLIB 中刷新了 6 个难解实例的当前最优已知解纪录。在工业应用方面，我们为阿里巴巴数字广告业务定制了专用求解器，用于大规模库存分配问题，在有限时限内实现亿级规模求解。得益于求解器求解能力的跃升，该业务场景下的数字广告库存利用率提升了 16%，带动了相关品牌营销收益增长 7%。

A fast block coordinate descent method for orthogonal nonnegative matrix factorization

侯良哨　　中山大学

报告摘要：Orthogonal nonnegative matrix factorization (ONMF) extends traditional matrix factorization by incorporating nonnegativity and orthogonality constraints. It has gained significant attention for applications in dimension reduction and data clustering. This paper proposes a novel algorithm for solving ONMF within the block coordinate descent (BCD) framework. Both subsequence and whole sequence convergence of the algorithm are rigorously established, representing a major advancement in ONMF research. Extensive experiments on real-world datasets demonstrate the method's effectiveness and efficiency. Compared with several state-of-the-art ONMF techniques, the proposed algorithm achieves superior performance in terms of computational efficiency, relative error, and optimality gap.

Low rank approximations of symmetric tensors

胡胜龙　　国防科技大学

报告摘要：In this talk, we present a nonlinear semidefinite relaxation method for low rank tensor approximation to a given symmetric tensor. Under mild assumptions, best low rank approximation can be certified. In the general case, quantified quasi-optimal solutions are derived. The discussions are based on primal-dual methods. The theory is verified theoretically for orthogonally decomposable tensors as well as numerically through examples in the general case.

Hankel tensor completion via $L_* - L_F$ optimization model

胡象鑫　　太原师范学院

报告摘要： Abstract: Hankel tensor completion plays a crucial role in various applications, including signal processing and medical imaging. However, due to their intrinsic structured nature, processing Hankel tensors remains challenging. Motivated by the recently proposed nonconvex $L_* - L_F$ optimization model, we develop two structure-preserving algorithms based on the proximal difference-of-convex algorithm with extrapolation (pDCAe).These algorithms incorporate structure-preserving techniques in each iteration to ensure that the Hankel structure is retained. We establish the convergence of the proposed algorithms under the Kurdyka Lojasiewicz (KL) inequality framework. Extensive numerical experiments demonstrate that our methods outperform existing algorithms in terms of recovery accuracy and computational efficiency.

Risk-averse two-stage distributionally robust mixed-integer optimization with decision-dependent ambiguity sets

胡雅伶　　湘潭大学

报告摘要： Distributionally robust optimization (DRO) aims at finding an optimal solution under the worst-case distribution within an ambiguity set, which is built from partial information about the true distribution. In this paper, we investigate a new class of risk-averse two-stage distributionally robust mixed-integer optimization problems where the ambiguity set is decision-dependent. Specifically, we consider distance-based ambiguity sets defined by ϕ-divergence and Wasserstein metric, and these sets are influenced by the first-stage integer decisions. By adopting the Lagrangian dual theory and Slater's condition, we reformulate the problem into tractable mixed-integer nonlinear programming problems. We develop a decomposition method to solve the resulting mixed-integer programming problems especially when the ambiguity set is defined using 1-Wasserstein metric. Furthermore, for cases where empirical data may be contaminated, we demonstrate the quantitative statistical robustness of the optimal value of decision-dependent distributionally robust optimization (D^3RO) problem using the Fortet-Mourier metric. Finally, we conduct numerical experiments to exhibit variations in the optimal value and to illustrate the quantitative statistical robustness results.

Nonconvex federated learning on compact smooth submanifolds with heterogeneous data

户将　　清华大学

报告摘要： In this talk, we consider federated learning over manifold with heterogeneous data. We propose an algorithm that leverages stochastic Riemannian gradients and manifold projection to improve computational efficiency, uses local updates to improve communication efficiency, and avoids client drift.

Robust log-contrast regression for high-dimensional compositional data

华旭科　　河南大学

报告摘要: Microbiome sequencing data are compositional in nature and often exhibit complex subcomposition structure, together with substantial noise and outlying observations. These features pose serious challenges for classical log-contrast regression, which is sensitive to extreme values and cannot fully accommodate the linear constraints inherent to compositional predictors. To address these issues, we propose a robust constrained regression framework that combines the Huber loss with an l1 penalty, thereby improving resistance to outliers while enabling sparse variable selection. General linear constraints are explicitly imposed to preserve the algebraic coherence of compositional and subcompositional covariates. To solve the resulting multi-block coupled optimization problem efficiently, we develop a symmetric Gauss-Seidel based ADMM (sGS-ADMM) algorithm with exact blockwise decomposition and closed-form updates, leading to improved numerical stability and convergence. Simulation studies show that the proposed method achieves strong estimation accuracy, competitive prediction performance, and reliable outlier identification in high-dimensional contaminated settings. An application to an HIV microbiome dataset further demonstrates its practical effectiveness, interpretability, and the stability of the selected microbial signals. Overall, the proposed method provides a useful robust tool for high-dimensional compositional regression under linear structural constraints.

Nonconvex robust quaternion matrix completion for imaging processing

黄宝华　　福建师范大学

报告摘要: One of the tasks in color image processing and computer vision is to recover clean data from partial observations corrupted by noise. To this end, robust quaternion matrix completion (QMC) has recently attracted more attention and shown its effectiveness, whose convex relaxation is to minimize the quaternion nuclear norm plus the quaternion L_1-norm. However, there is still room to improve due to the convexity of the convex surrogates. In this talk, we propose a novel nonconvex robust quaternion matrix completion (QMC) model that enhances low-rank and sparse component estimation through a nonconvex matrix-type MCP function and a quaternion L_p-norm, respectively. An alternating direction method of multipliers (ADMM) algorithm is developed to solve the proposed model, accompanied by a rigorous convergence analysis. Furthermore, a nonlocal self-similarity (NSS) based nonconvex robust quaternion completion method is introduced to efficiently handle large-scale data. Extensive numerical experiments on color image and video inpainting demonstrate the superior performance of the proposed method compared to existing state-of-the-art approaches.

A partially linearized Bregman ADMM for composite nonconvex and nonsmooth optimization

黄雪羽　　广西民族大学

报告摘要： This paper proposes a partially linearized Bregman alternating direction method of multipliers (PLBADMM) for solving a class of composite nonconvex and nonsmooth optimization problems. A key challenge for this class of problems is the non-smoothness of the component function for each variable. This destroys the convergence condition of existing nonconvex ADMMs, i.e., the gradient of the component function of at least one variable is Lipschitz continuous. To address this challenge, we replace the gradient Lipschitz continuity with the proximal regularity in establishing convergence analysis, which automatically holds for convex functions. Algorithmically speaking, the proposed method combines the Bregman distance with partial linearization techniques, effectively reducing the computational difficulty of nonsmooth subproblems while enhancing its adaptability to nonconvex structures. Moreover, the relaxation factor has a larger convergence interval (0,2), significantly improving algorithmic flexibility. Theoretically, under the Polyak-Lojasiewicz-Kurdyka condition, we prove the global convergence and convergence rates measured by the sequences of the potential function values and the iterative points, respectively. Specially, the superlinear convergence can be achieved with suitable parameter choices. To the best of our knowledge, such convergence results are entirely new for the discussed problems. Furthermore, the proposed method is not limited to Euclidean space but also naturally extends to optimization problems on Riemannian manifolds. The analysis relies solely on the proximal regularity, substantially weakening the required condition and providing new convergence results for constrained optimization on manifolds. Numerical experiments validate the effectiveness and robustness of the proposed method.

A multi-stage non-convex relaxation algorithm for the sparse solution of underdetermined linear equations

黄子麟　　闽江大学

报告摘要： This paper introduces a multi-stage non-convex relaxation algorithm for finding sparse solutions to underdetermined linear systems, termed the multi-stage weighted proximal point dual algorithm. We first present a one-stage version of the algorithm that jointly optimizes weights and variables. In this stage, we formulate the dual problem of a weighted proximal point subproblem; by analyzing its first-order optimality conditions and duality gap, this nonsmooth and strongly convex dual problem is efficiently solved using a limited-memory BFGS quasi-Newton method. We prove that the one-stage algorithm converges to a critical point satisfying the weighted range space property. Building on this, we extend it to a multi-stage formulation that ensures solution feasibility. Compared to existing multi-stage convex relaxation methods, the proposed approach achieves higher recovery rates and significantly faster computation, particularly for highly underdetermined sensing matrices. Numerical experiments validate the efficiency of the method.

A variable metric Douglas-Rachford splitting method for nonconvex composite optimization

贾泽慧　　南京信息工程大学

报告摘要： The Douglas-Rachford splitting method (DRSM) has gained significant attentions in structural monotone inclusions over the last decades, and continues its success in composite optimization. However, DRSM occasionally suffers from slow convergence when the iterates reach the vicinity of optima. To ameliorate the efficiency of DRSM on solving composite optimization, we develop a variable metric DRSM (VMDR) by deploying the second-order oracles of objective. Under the KL assumption, we analyze the global convergence of VMDR and establish its convergence rates on the perspectives of merit function and distance to criticality. Alternatively, a latent pitfall of VMDR is the intensively computational effort on solving the weighted proximal operator, which is often handled by internally nested subroutines. Thereby, we propose an inexact VMDR with two criteria. Numerical experiments on binary classification and image reconstruction demonstrate the compelling performance of the proposed method.

On approximation of tensor nuclear norm minimization

江波　　上海财经大学

报告摘要： Tensor nuclear norm minimization can be viewed as the tightest convex approximation of the tensor completion task. It requires a smaller sample size to recover the underlying ground-truth low-rank tensor comparing the that required by the popular tensor matricization technique. However, tensor nuclear norm minimization is proved to a challenging task, and even computing the tensor nuclear norm is a NP-hard problem. We identify the dual of the tensor nuclear norm minimization and propose some tractable convex relaxation based on this dual formulation. We further establish some approximation ratios of our approach with the hitting-set constructed in computing tensor nuclear norm in our previous work.

Approximation algorithms for line planning with multiple resource constraints

江弘亿　　香港城市大学

报告摘要： This paper studies line planning for urban bus networks that face multiple resource limits such as budget, labor, and emission caps while using heterogeneous fleets. The objective is to maximize total reward from serving passengers by assigning buses to candidate routes subject to capacity and resource constraints. The reward parameters are general and can encode diverse user preferences and multi-modal system configurations. Prior work typically assumes single resource constraints and homogeneous fleets, and often relies on methods that lack theoretical guarantees or computational tractability. We develop the first approximation algorithms with provable guarantees for this setting. For the cost-free variant, a randomized rounding scheme attains the optimal ratio $1 - 1/e$ which is tight unless $P = NP$. Leveraging this base algorithm, we derive extensions for the general case with arbitrary cost vectors, obtaining constant-factor approximation guarantees. To support large-scale application, we adapt the base algorithm to ensure computational scalability while preserving rigorous theoretical guarantees. Experiments on Greater Boston transit data demonstrate that our approach achieves 95% to 98% of the linear programming relaxation bound,

whereas Gurobi solver fails on considerably smaller instances. Our experiments further show that heterogeneous fleets significantly outperform homogeneous ones and that multi-resource optimization is required to avoid significant resource limit violations, thereby underscoring the importance of our framework.

Loss landscape and error bound analysis of regularized deep matrix factorization

江如俊　　复旦大学

报告摘要: Deep matrix factorization (DMF) is a fundamental model underlying many applications, including deep linear neural networks. Despite its simplicity, the regularized DMF problem exhibits a highly nonconvex optimization landscape that is not yet fully understood. In this talk, we analyze the loss landscape and local geometry of regularized deep matrix factorization. We characterize all critical points and identify conditions under which a critical point is a local minimizer, a global minimizer, a strict saddle point, or a non-strict saddle point. We further establish an error bound around the critical point set, which leads to linear convergence guarantees for gradient-based methods. Our results provide theoretical insights into why first-order methods perform well for regularized DMF and offer a unified perspective on the optimization behavior of deep linear networks as an important application.

A class of parallel splitting proximal augmented Lagrangian methods with optimal step size

姜帆　　南京信息工程大学

报告摘要: This talk develops a unified framework of a class of parallel splitting proximal augmented Lagrangian methods (ALM) for separable multi-block convex optimization with linear constraints. Different from existing approaches that impose positive semidefinite regularizations or employ correction steps, our framework integrates both strategies to achieve efficiency and flexibility. We significantly relax the algorithm requirements by permitting indefinite regularization matrices while maintaining global convergence and prove an optimal stepsize bound for the correction step. Our algorithm achieves substantial flexibility by naturally including both the classical parallel splitting ALM with optimal step size and the existing proximal-based methods as special cases. Global convergence as well as non-asymptotic convergence rate of the proposed algorithm is established.

A hybrid intelligent algorithm for multi-UAV task allocation and path planning

姜梦琦　　北方民族大学

报告摘要: Efficient task allocation and path planning techniques play a crucial role in enabling multiple unmanned aerial vehicle (Multi-UAV) to collaboratively execute various tasks. This paper

proposes a hybrid intelligent algorithm for multi-UAV task allocation and path planning. First, the Q-learning task grouping strategy is employed to ensure intra-cluster compactness and task-type consistency. The Dynamic Escape Optimization algorithm is applied to match UAV types with tasks and optimize task sequencing, ensuring UAVs efficiently execute tasks aligned with their capabilities. Second, considering realistic communication constraints, obstacles, and resource–energy limitations, a complementary base-station allocation strategy is further designed. By integrating task sequence and environmental information, an improved A∗ algorithm based on cost and obstacle potential is employed for path planning, enabling optimal task execution path planning for UAVs in complex environments. Finally, six distinct environments were designed, varying in Urban map size, obstacle count, task quantity, and UAV numbers. These were validated at both the strategic and algorithmic levels. The results demonstrate that this method achieves superior execution paths across all environments, with path performance improvements of 105.39%, 138.03%, and 1.9975% compared to the three ablation experiments,respectively. It also significantly outperforms the Dijkstra algorithm in terms of path length and runtime.The experimental results validate the comprehensive effectiveness and engineering applicability of the proposed method in addressing multi-UAV task allocation and path planning challenges in complex environments.

From disagreement to robustness: tackling ESG rating disagreement with distributionally robust portfolio selection

蒋恒燕　　西安交通大学

报告摘要: ESG rating disagreement among agencies constitutes a fundamental challenge to sustainable investment, as portfolio construction in ESG investment is critically dependent on the choice of rating agency. In this study, we develop a distributionally robust mean-variance portfolio optimization model using the Wasserstein metric, with the explicit inclusion of ESG rating disagreement as a core consideration. The model is shown to allow tractable reformulation as a convex program, and its solution further yields a modified fund separation theorem. Using ESG scores from four major agencies and historical data from CSI 300 constituents in China between 2019 and 2024, we find that our approach, which incorporates multiple ESG perspectives and attenuates rating noise, outperforms conventional portfolios that ignore ESG considerations as well as those based on averaged or single-agency ratings. The advantage of our model becomes even more pronounced during down-down market states and periods of high ESG disagreement.

A Gauss–Seidel augmented Lagrangian algorithm for Tucker rank tensor completion

靳嘉琪　　太原师范学院

报告摘要: This paper proposes a Gauss–Seidel augmented Lagrangian method for Tucker rank tensor completion. By incorporating a Gauss–Seidel block-updating scheme into the classical HaLRTC framework, the algorithm fully exploits the most recent block information and thereby improves

computational efficiency over Jacobi-type parallel updates while maintaining high recovery accuracy. Under a constant step size, we establish global convergence to an optimal solution within a variational inequality framework. Numerical experiments on synthetic tensors and color images demonstrate that GSHaLRTC converges faster and achieves higher recovery accuracy than several representative tensor completion methods, illustrating its effectiveness and practicality.

Quaternion matrix completion with quasi-nonnegative constraints and sparsity for color image restoration

李成梁　　云南大学

报告摘要：四元数矩阵通过将彩色图像建模为向量场，能够有效刻画不同颜色通道之间的内在相关性，在彩色图像表示方面具有独特优势。近年来，低秩四元数矩阵补全已成为彩色图像复原领域的研究热点。然而，现有大多数方法往往忽视了图像数据本身所固有的非负属性。针对这一问题，本文提出了两种新的四元数矩阵补全模型。所构建模型创新性地融合了拟非负约束、低秩结构与稀疏性特征，并通过拟非负四元数矩阵分解，有效实现了四元数矩阵的拟非负分解与补全。实验结果表明，与现有四元数拟非负分解算法以及多种主流低秩矩阵补全方法（包括基于四元数域与实数域的方法）相比，本文提出的算法在彩色图像重建与复原任务中表现出更优的性能与更强的稳定性。

大规模问题的 GPU 优化算法与国产芯片适配

李泓霈　　Cardinal Operations

报告摘要：随着人工智能与运筹优化的深度融合，求解超大规模数学规划问题已成为突破复杂系统算力瓶颈的关键。针对传统 CPU 求解器在面对海量变量与约束时计算效能衰减的痛点，我们致力于探索并开发基于 GPU 架构的高性能多元优化算法库。在前期工作中，我们深入研究了多种核心底层算法的并行化重构与理论创新。针对线性规划（LP），二次规划（QP），半定规划（SDP）等常见优化问题，我们设计并实现了基于 GPU 的一阶算法求解器，致力于高效求解超大规模优化问题。与此同时，我们将这些算法深度适配至国产 AI 芯片，以实现算力的自主可控。由于国产芯片在指令集、内存层级与线程调度上与主流生态存在异构性，我们并非进行简单的代码搬迁，而是针对国产硬件的底层架构进行算法重构。

基于连续-整数联合分布的 MILP 生成式求解框架

李泓霈　　Cardinal Operations

报告摘要：混合整数线性规划（MILP）是复杂决策问题的基石，但其固有的 NP-hard 特性带来了巨大的计算瓶颈。近年来，基于生成模型的机器学习启发式算法在加速下游求解器方面展现出巨大潜力。然而，现有方法普遍存在一个致命局限：它们仅对整数变量的分布进行建模，完全忽略了整数与连续变量之间强烈的耦合关系。这种信息瓶颈阻碍了模型获取完整的优化反馈，最终导致次优解。在本次报告中，我将介绍我们在 ICLR 2026 的最新工作，FMIP (Joint Continuous-Integer Flow for MILP) 。这是首个对 MILP 中连续与整数变量联合分布进行全面建模的生成式框架。基于这一联合建模范式，我们设计了一种全局引导机制（Holistic Guidance Mechanism）。该机制能够在推理过程

中，利用实例级别的目标函数和约束违规信息，主动引导生成轨迹向最优性和可行性方向演进。广泛的实验表明，在 8 个标准 MILP 基准测试中，FMIP 将 Primal Gap 平均降低了 41.34% 。此外，我将分享 FMIP 如何作为一种高度兼容的框架，与任意图神经网络（GNN）主干以及诸如 Gurobi 等传统精确求解器无缝集成，为解决现实世界的大规模 MILP 挑战提供全新的 AI 范式。

Nonconvex truncated conditional value at risk-based sparse linear regression

李敏　　南京大学

报告摘要： Conditional value at risk (CVaR) is a widely recognized risk measure used to manage data uncertainty within risk management. In this paper, we study a class of sparse linear regression models based on truncated CVaR measure and l0-norm regularization. Due to the nonconvexity and nonsmoothness of the objective functions, we propose an approximation model that employs a tight relaxation of the l0-norm. The solution equivalence between the proposed model and its approximation model is explored. To efficiently solve the approximation model, we develop a semismooth Newton-based proximal majorization-minimization algorithm. Furthermore, the convergence analysis of the proposed algorithm is presented, and extensive numerical experiments conducted on both synthetic and real datasets illustrate the stability and effectiveness of the proposed algorithm.

A robust EDM optimization approach for 3D single-source localization with angle and range measurements

李庆娜　　北京理工大学

报告摘要： Accurate source localization in multi-platform radar networks can be improved by jointly using range and angle measurements. We propose a robust Euclidean distance matrix (EDM) model for 3D single-source localization that combines range data, angle information, and least absolute deviation (l1-norm). A key contribution is a rigorous reformulation of 3D angle measurements as box constraints on Euclidean distances. Each angle measurement is reduced to a two-dimensional nonlinear optimization problem, whose global extrema provide lower and upper bounds on source-to-sensor distances. We then apply an efficient majorization-penalty algorithm for the resulting rank-constrained EDM problem. Numerical results show improved localization accuracy and efficiency, especially at low SNR.

A resampling-free stochastic projection contraction algorithm for solving stochastic variational inequalities

李婷　　江苏师范大学

报告摘要： Sampling is a major computational bottleneck in stochastic algorithms. This paper proposes a stochastic projection contraction algorithm for stochastic variational inequality problems,

significantly reducing runtime by eliminating resampling in the correction step. We introduce an adjustable offset weight to optimize search direction, along with different adaptive step size strategies in prediction and correction steps. We further present discrete differential equation interpretations for specific offset weight values. To address bias due to the absence of resampling in the correction step, we develop an error control scheme and provide convergence guarantees. Numerical experiments demonstrate the algorithm's efficiency.

Learning fused row-sparse structures via Newton methods for linear matrix equations

李小玉　　北京交通大学

报告摘要: This talk focuses on learning fused row-sparse structures in linear matrix equations. Such structures help obtain compact representations from spatiotemporal data with dynamic smoothness and effective compression. The underlying optimization problem is formulated as the minimization of a least squares loss function regularized by the total number of nonzero rows in the matrix formed by consecutive row differences, which is NP-hard in general. We reformulate the problem, derive first-order optimality conditions, and reduce the variable dimension under mild conditions. A subspace Newton algorithm with quadratic convergence rate is then tailored to handle the resulting reformulated problem with row-sparsity regularization. Numerical experiments show that our method is more efficient than traditional first-order methods.

Unsupervised feature selection via nonnegative orthogonal constrained regularized minimization

李妍　　中国科学院数学与系统科学研究院

报告摘要: Unsupervised feature selection has drawn wide attention in the era of big data, since it serves as a fundamental technique for dimensionality reduction. However, many existing unsupervised feature selection models and solution methods are primarily designed for practical applications, and often lack rigorous theoretical support, such as convergence guarantees. In this paper, we first establish a novel unsupervised feature selection model based on regularized minimization with nonnegative orthogonality constraints, which has advantages of embedding feature selection into the nonnegative spectral clustering and preventing overfitting. To solve the proposed model, we develop an effective inexact augmented Lagrangian multiplier method, in which the subproblems are addressed using a proximal alternating minimization approach. We rigorously prove the algorithm's sequence converges to a stationary point of the model. Extensive numerical experiments on popular datasets demonstrate the stability and robustness of our method. Moreover, comparative results show that our method outperforms some existing state-of-the-art methods in terms of clustering evaluation metrics.

ESG 偏好不对称下投资组合研究

李子博　　西安交通大学

报告摘要：本文聚焦投资者 ESG 偏好的不对称性特征，即对棕色资产的厌恶强于对绿色资产的偏好，系统考察其对资产配置与组合绩效的影响。通过将投资者 ESG 偏好拆解为绿色偏好与棕色厌恶两个维度，构建以最大化投资者收益-风险-ESG 综合效用为目标的 ESG 偏好不对称下投资组合模型。基于中国 A 股市场数据进行数值实验，开展绿色偏好与棕色厌恶的参数敏感性分析及组合绩效检验。结果表明：投资者增持绿色资产未必源于主动偏好，亦可能是规避棕色资产后的被动配置结果；存在不可卖空限制时，对棕色资产极端厌恶的投资者，其最优组合等价于主动剔除棕色资产的排除策略所形成的投资组合；ESG 偏好不对称下投资组合能在单位风险下，实现收益与不对称 ESG 效用的最大化。研究为厘清投资者 ESG 偏好的微观作用机制、优化 ESG 投资组合设计提供了理论依据与实践参考。

A two-step Krasnoselskii-Mann algorithm with adaptive momentum and its applications to image processing

林义尊　　暨南大学

报告摘要：In this work, we propose a Two-step Krasnoselskii-Mann (KM) Algorithm (TKMA) with adaptive momentum for solving convex optimization problems arising in image processing. Such optimization problems can often be reformulated as fixed-point problems for certain operators, which are then solved using iterative methods based on the same operator, including the KM iteration, to ultimately obtain the solution to the original optimization problem. Prior to developing TKMA, we first introduce a KM iteration enhanced with adaptive momentum, derived from geometric properties of an averaged nonexpansive operator T, KM acceleration technique, and information from the composite operator T^2. The proposed TKMA is constructed as a convex combination of this adaptive-momentum KM iteration and the Picard iteration of T^2. We establish the convergence of the sequence generated by TKMA to a fixed point of T. Moreover, under specific assumptions on the adaptive momentum parameters, we prove that the algorithm achieves an $o(k^{-1/2})$ convergence rate in terms of the distance between successive iterates. Numerical experiments demonstrate that TKMA outperforms the FPPA, PGA, Fast KM algorithm, and Halpern algorithm on tasks such as image denoising and low-rank matrix completion.

An auto-adjusted stochastic Barzilai-Borwein stepsize for stochastic gradient descent

刘晨晨　　北京邮电大学

报告摘要：The simple stochastic Barzilai-Borwein (BB) stepsize lacks theoretical support for the convergence of stochastic gradient descent (SGD). To address this, we propose an Auto-adjusted stochastic BB (AutoSBB) stepsize for SGD, derived from the stochastic BB stepsize formula. This stepsize is constrained within a critical range that ensures convergence while enabling automatic adaptation to different problem structures. Theoretically, for strongly convex non-smooth problems, SGD with the AutoSBB stepsize (SGD-AutoSBB) achieves a convergence rate of $\mathcal{O}(\log(T)/T)$. For

convex non-smooth problems, it attains a rate of $\mathcal{O}(\log(T)/\sqrt{T})$. Moreover, when the prescribed stepsize interval is periodically halved, SGD-AutoSBB achieves $\mathcal{O}(1/T)$ for strongly convex non-smooth problems and $\mathcal{O}(1/\sqrt{T})$ for convex non-smooth problems. Numerical experiments compare the AutoSBB stepsize with bandwidth-based stepsizes that also vary within a predefined range. The results demonstrate that the AutoSBB stepsize is highly effective, owing to its automatic decay mechanism. Overall, SGD-AutoSBB shows promising performance relative to classical SGD variants.

Purity law for neural routing problem solvers with enhanced generalizability

刘文钊　　中国科学院大学

报告摘要： Achieving generalization in neural approaches across different scales and distributions remains a significant challenge for routing problems. A key obstacle is that neural networks often fail to learn robust principles for identifying universal patterns and deriving optimal solutions from diverse instances. In this paper, we first uncover Purity Law, a fundamental structural principle for optimal solutions of routing problems, defining that edge prevalence grows exponentially with the sparsity of surrounding vertices. Statistically and theoretically validated across diverse instances, Purity Law reveals a consistent bias toward local sparsity in global optima. Building on this insight, we propose Purity Policy Optimization (PUPO), a novel training paradigm that explicitly aligns characteristics of neural solutions with Purity Law during the solution construction process to enhance generalization. Extensive experiments demonstrate that PUPO can be seamlessly integrated with popular neural solvers, significantly enhancing their generalization performance without incurring additional computational overhead during inference.

Plug-and-play proximal block coordinate descent method for hyperspectral anomaly detection

刘晓霞　　华南理工大学

报告摘要： In this talk, we introduce an orthogonal constrained optimization model for hyperspectral anomaly detection. The model represents background information via eigen decomposition and characterizes anomalies using a generalized group sparsity measure. To enhance the robustness against Gaussian noise, we integrate a deep implicit proximal denoiser prior into a plug-and-play (PnP) framework applied to the eigenimages. We solve the resulting nonconvex nonsmooth optimization problem using a PnP-proximal block coordinate descent (PnP-PBCD) method and provide convergence analysis. Experimental results demonstrate that the proposed method effectively detects anomalous objects, even under Gaussian noise contamination.

Solver-aware high-order optimization for large-scale nonconvex problems

刘洋　　大湾区大学

报告摘要： This talk presents a solver-aware perspective on large-scale nonconvex optimization, coupling algorithmic design with matrix- and tensor-free subproblem solvers. First, we discuss second-order methods with full-curvature awareness. By detecting and handling nonpositive curvature on the fly within Krylov-subspace iterations for solving the Newton system, we establish methods with global complexity guarantees and superlinear local convergence under standard regularity conditions. Moving to third-order and beyond (arbitrary order p), we present practical and theoretical results for adaptively regularized tensor methods (ARp). We introduce improved strategies including efficient regularization updates and a novel pre-rejection mechanism. Furthermore, we establish a sharp local pth-order convergence rate for ARp, contingent on the right choice of local subproblem minimizer.

梯度法、共轭梯度法和拟牛顿法的步长及其收敛速率

刘泽显　　贵州大学

报告摘要： 步长是优化算法的重要组成部分，对算法的数值性能和理论分析至关重要。近似最优梯度法指基于近似最优步长的梯度法，它具有优异的数值性能，但其理论结果建立在使用 BB 步长截断的基础上。针对此，挖掘近似最优步长与 BB 步长的关系，建立未使用 BB 步长截断时近似最优梯度法的全局收敛性和线性收敛速率。针对共轭梯度法，推导新的新步长，在凸二次优化情形下建立了使用此步长的共轭梯度的收敛性和收敛速率，并通过数值实验验证算法的有效性。针对拟牛顿法，借助新的度量，建立凸二次优化情形下 PSB 拟牛顿法显式的收敛速率；利用多重更新策略，提出一种求一般凸优化问题的多重更新 PSB 拟牛顿法，建立其显式的超线性收敛速率，并通过数值实验验证算法的有效性。

车路协同下的动态公交信号优先：深度强化学习方法与优化

龙梦　　重庆师范大学

报告摘要： 交通信号优先是缓解大都市交通拥堵、提升公交效率的有效措施。针对现有公交信号优先方法在模型依赖和响应滞后等方面的不足，本工作提出车路协同环境下基于深度强化学习的公交信号优先方法，将工程约束融入学习算法以保证决策合理性，并有效处理多冲突公交优先请求、优先与非优先车辆的权衡以及多交叉口协同控制问题。单交叉口与多交叉口仿真结果表明，该方法能够显著提升公交运行可靠性和道路通行效率，具有良好的工程应用前景。

Stochastic conjugate gradient algorithm with adaptive importance sampling strategy

卢俊宇　　广西大学

报告摘要： Traditional stochastic optimization usually uses uniform data sampling, which can cause high gradient variance and limit performance. Importance sampling helps reduce this variance,

but most existing methods rely on per-sample Lipschitz constants, which are hard to estimate in practice. To overcome this issue, we propose an adaptive importance sampling method based on local first-order information, without requiring Lipschitz constants. We further integrate it into the stochastic conjugate gradient framework, whose complex search direction updates provide a challenging testbed for evaluating the method. The proposed algorithm periodically updates sampling probabilities using squared norms of past gradients. We show that this reduces stochastic gradient variance and guarantees convergence under milder assumptions. Experiments on classical machine learning tasks demonstrate competitive and stable performance across various settings.

非凸二次优化问题的非凸二次重构方法及其应用

路程　　华北电力大学

报告摘要：凸二次重构方法是用于求解器加速的经典方法之一，已在多个领域得到广泛应用。相比之下，非凸二次重构作为一种新兴的求解器加速方法，尚处于探索初期。实际上，相较于传统的凸二次重构方法，非凸二次重构不仅适用于更广泛的问题类型，且在实际求解过程中展现出更为显著的加速效果。本报告首先介绍非凸二次重构方法的基本原理，并阐述如何将其应用于现代优化求解器加速。随后，以箱式约束二次优化问题，0-1 二次优化问题，以及标准二次优化问题为例，探讨非凸二次重构方法在典型非凸二次优化问题中的具体应用。实验结果表明，在使用 Gurobi 等现代求解器求解上述问题时，引入非凸二次重构可显著缩短分支定界算法的求解时间，加速幅度可达数十倍乃至上百倍，表现出优异的加速性能。最后，本报告进一步展望非凸二次重构方法的潜在发展方向，并介绍后续研究思路。

模糊 b 距离空间中一个关于 Cauchy 列的引理介绍

路宁　　内蒙古大学

报告摘要：本报告在模糊 b 距离空间中展开讨论。该空间是对模糊距离空间与 b 距离空间的融合，允许三角不等式带有常数伸缩因子，适用于更广泛的不动点问题。在此框架下，我们证明了一个引理，若某点列在模糊 b 距离意义下被等比数列控制，则其必为 Cauchy 列。该引理为判断收敛提供了简便方法。利用这一原理，可显著简化若干线性压缩不动点定理的证明过程。作为应用，报告中给出了单值 Riech 型压缩与极值 Banach 型压缩的不动点结果。

Strategyproof multi-resource allocation for cloud computing under divisible and indivisible task models

罗俊杰　　北京交通大学

报告摘要：We study multi-resource allocation with Leontief utilities in cloud computing. The canonical mechanism, Dominant Resource Fairness (DRF), satisfies sharing incentive (SI), envy-freeness (EF), strategyproofness (SP), and Pareto optimality (PO), but can be highly inefficient under the classical utilitarian approximation ratio; indeed, under this benchmark, no mechanism satisfying these properties can achieve a better worst-case guarantee. This limitation motivates the recently

introduced fair-ratio benchmark, which compares a mechanism only against optimal allocations satisfying SI and EF. Within this benchmark, we introduce a unified parametric mechanism design framework that captures previous mechanisms as special cases. By tuning the parameters to the instance structure, we obtain new mechanisms that preserve SI, EF, SP, and PO and improve the best previously known asymptotic fair-ratio from 4/3 to 9/8. We also initiate the study of fair-ratio guarantees for indivisible tasks. Since SI, EF, SP, and PO cannot be achieved simultaneously in this setting, we focus on SI, EF1, and SP, and propose a DRF-style mechanism with constant fair-ratio 6. In contrast, we show that several natural extensions of efficient mechanisms for divisible tasks fail to remain strategyproof in the indivisible setting. Joint work with Yunpeng Lou.

Towards large-scale probabilistic set covering problems: An efficient Benders decomposition approach

吕维　　湘潭大学

报告摘要: In this paper, we investigate the probabilistic set covering problem (PSCP) in which the right-hand side is a binary random vector and the covering constraint is required to be satisfied with a prespecified probability. We consider the case with a finite discrete distribution of the random vector, which usually arises in the context of the sample average approximation approach. We develop an effective Benders decomposition (BD) algorithm for solving large-scale PSCPs, which enjoys two key advantages: (i) the number of variables in the underlying Benders reformulation is independent of the scenario size; and (ii) the Benders cuts can be separated by an efficient combinatorial algorithm. For the special case that random vector is a combination of several independent random blocks/subvectors, we explicitly take this kind of block structure into consideration and develop a more efficient BD algorithm. Moreover, to further speed up the two proposed BD algorithms, we develop a class of strong valid inequalities, which are guaranteed to be facet-defining for the polytope induced by the probabilistic constraint. Numerical results on instances with up to one million scenarios demonstrate the effectiveness of the proposed BD algorithms over a black-box mixed integer programming solver's branch-and-cut and automatic BD algorithms and a state-of-the-art algorithm in the literature.

求解鞍点问题的对称 PDHG 算法

马峰　　火箭军工程大学

报告摘要: 原始对偶混合梯度（Primal-Dual Hybrid Gradient，PDHG）算法是求解鞍点问题的经典方法。鞍点问题的原始变量与对偶变量具有对称地位，然而传统的 PDHG 算法在更新步中却采用了非对称策略：仅对原始或对偶变量引入外推操作。相比之下，Peaceman-Rachford 分裂方法（即对称 ADMM）应用于凸可分问题时则在更新步上显式地体现了原始与对偶的对称性，充分利用了问题结构。因此引出一个值得探讨的问题：能否对 PDHG 算法进行结构性修改，使其在原始与对偶变量的更新中均有外推步，从而构造出一种具有更强对称性的改进算法？本报告提出一种新的方法，在原始与对偶更新上均引入外推步，在不增加任何额外假设的前提下，我们证明所提算法的全局收敛性。此外我们也将所提对称算法推广到三算子鞍点问题，并论证解三算子问题的经典 Condat–Vu 算法

与 Asymmetric forward-backward-adjoint 算法 (AFBA) 是其非对称特例。我们也将揭示所提方法与 Peaceman-Rachford 分裂方法之间的关系，并展示其数值表现。

Asymptotic analysis of nonlinear one-bit precoding in massive MIMO systems via approximate message passing

马俊杰　　中国科学院数学与系统科学研究院

报告摘要: Massive MIMO systems with one-bit DACs enable energy-efficient hardware but make precoding a challenging discrete, nonconvex problem. This talk studies a practical convex-relaxation-then-quantization approach for nonlinear symbol-level precoding. We develop a new analytical framework based on approximate message passing (AMP) to characterize its large-system performance under i.i.d. Gaussian channels. The analysis yields a closed-form expression for the symbol error probability (SEP), revealing how system parameters affect performance. Our numerical results suggest that an ℓ_∞^2 regularizer, with optimal tuning, achieves the best SEP within a broad class of convex regularizers, and we prove it for the mixed ℓ_∞^2-ℓ_2^2 regularizer family.

Multi-objective adaptive Nesterov-like acceleration algorithm for multi-task deep learning

孟凡云　　青岛理工大学

报告摘要: With the wide application of multi-task learning in many deep learning problems, how to balance different tasks has become the most important challenge in multi-task learning training. This paper proposes a fast multi objective adaptive momentum algorithm to address the multi-objective characteristics of multi-task learning and the slow descent of adaptive algorithms. Firstly, the algorithm adopts multi-objective adaptive technology to separate the cumulative gradient of each parameter in the adaptive algorithm, thereby separating the learning rate of each target task. Secondly, a Nesterov-like momentum acceleration is added to each task-level gradient, and it avoids the additional overhead of Nesterov acceleration algorithm in calculating gradients at extrapolation points. For the task-dominated problem, we describe the task weights by using the relative loss of the task and the normalized gradient paradigm, and normalize them, which can effectively balance each task. Finally, theo retically, the descending boundary of the multi-task aggregation loss function is characterized. The experimental results show that, compared with usual adaptive algorithms, the proposed algorithm has higher performance and faster convergence in training the scene parsing multi-task learning problems.

Spectral clustering for community detection of multi-layer networks

倪谷炎　　国防科技大学

报告摘要：多层网络的社区提取是一个基础性问题。多层网络的社区提取方法通常依赖于单层网络、各层的权重以及额外的聚类步骤。现有方法通常采用各层的平均或经验权重，这可能并不合理。为解决为各层分配更合理权重的难题，本文提出了一种基于统一相似度矩阵的谱聚类社区检测优化模型，并给出了相应的交替最小化算法，证明了算法的收敛性。最后，对合成数据和现实世界的多层网络进行了数值实验，实验表明了该模型和算法的优越性。

QuatIca: Advanced numerical linear algebra and optimization for quaternionic matrices in Python

潘珺珺　　香港浸会大学

报告摘要：Quaternion-valued representations provide a convenient way to model coupled multi-channel signals (e.g., RGB imagery, polarization data, vector fields, and multi-detector time series). Yet practical and numerically reliable software support remains far less mature than those based on the real/complex setting. Here, we present QuatIca, an open-source Python library for quaternion numerical linear algebra and optimization, designed for both research prototyping and reproducible experimentation. QuatIca provides core quaternion matrix operations and norms; dense decompositions and reductions (QR, LU, Q-SVD, eigendecomposition, Hessenberg/tridiagonal reduction, Cholesky decomposition, and Schur helpers); iterative solvers including quaternion GMRES (with preconditioning) and Newton-Schulz pseudoinverse schemes; and domain-focused routines for signal and image processing such as quaternion Tikhonov restoration. The library also includes OptiQ, which solves quaternion Hermitian semidefinite programs using log-det barrier Newton methods with -continuation. We highlight design choices that preserve quaternion structure, and we provide end-to-end demonstrations including quaternion image deblurring, Lorenz-attractor filtering, and quaternion image completion.

Balancing the data-fidelity: A fair and inexact primal-dual splitting framework for image inverse problems

屈云飞　　中国地质大学（北京）

报告摘要：Image inverse problems are frequently formulated as composite optimization problems involving a smooth data-fidelity term and non-smooth regularization terms. Standard primal-dual splitting methods, such as Condat-Vũ and PD3O, typically handle the smooth term exclusively within the primal update via linearization. This asymmetric treatment often leads to unbalanced computational burdens between primal and dual subproblems, potentially limiting convergence efficiency when the subproblems exhibit disparate complexity. To address this issue, we propose a Fair Primal-Dual (FPD) algorithmic framework that flexibly distributes the information of the smooth data-fidelity term into both primal and dual subproblems, thereby balancing the utilization of data information. Furthermore, as the resulting dual subproblem involving the conjugate of a sum generally lacks a closed-form solution, we develop an Inexact FPD (IFPD) algorithm equipped with a practical stopping criterion for the inner solver. We establish the global convergence of the proposed framework and derive an $\boldsymbol{O(1/N)}$ ergodic convergence rate in terms of the primal-dual gap under

standard assumptions. Extensive numerical experiments on synthetic non-negative Lasso, low-rank total variation (LRTV) based MRI reconstruction, and sparse-view CT reconstruction demonstrate that the proposed fair strategies significantly outperform state-of-the-art primal-dual methods in terms of iteration efficiency and restoration quality.

Quantized signal processing in massive MIMO: identifiability, optimization, and deep learning algorithms

邵明杰　　中国科学院数学与系统科学研究院

报告摘要: In this talk, we introduce quantized signal processing in massive MIMO systems, driven by the need to use low-resolution DACs/ADCs to reduce power consumption. However, coarse quantization results in the loss of amplitude information from communication signals, making signal estimation and detection challenging. We present formulations for maximum-likelihood estimation (MLE) and discuss the associated challenges with integrals and nonsmooth objective functions. Identifiability conditions for quantized signal sensing are introduced, quantifying the relationship between the number of measurements and the parameter dimension. Then, we propose novel global optimization algorithms for both signal detection and channel estimation. To enhance performance and efficiency, we incorporate a deep unfolding adaptation, supported by a theoretical analysis of the activation function. Simulation results demonstrate the effectiveness of our approaches.

Efficient group Lasso regularized rank regression with data-driven parameter determination

史梦娇　　河南大学

报告摘要: High-dimensional regression often suffers from heavy-tailed noise and outliers, which can severely undermine the reliability of least-squares based methods. To improve robustness, we adopt a non-smooth Wilcoxon score based rank objective and incorporate group sparsity regularization. By extending the tuning-free property originally developed for the rank Lasso, we introduce a simulation-based tuning rule and further establish a finite-sample error bound for the resulting estimator. On the computational side, we develop a proximal augmented Lagrangian method for solving the associated optimization problem, for which we establish novel convergence analysis by proving metric subregularity of the underlying KKT mapping, while enabling efficient semismooth Newton updates for the subproblems. Extensive numerical experiments demonstrate the robustness and effectiveness of our proposed estimator against alternatives, and showcase the efficiency and scalability of the proposed algorithm against the state-of-the-art baseline across both simulated and real-data settings.

工业绿色微电网能量管理

司方远　　北京交通大学

报告摘要：高比例可再生能源消纳的工业绿色微电网是我国工业领域深度脱碳的关键载体，其能量管理亟需突破能源-环境-经济-安全复杂耦合这一重大科学挑战，解决不确定性扰动下多能质流非线性动态耦合及多主体多目标高效协同科学难题。报告主要聚焦通过多学科交叉开展的多能质流一体化分析建模、能量管理系统风险优化和多方隐私保护安全计算等理论创新，解决多能质流通用化数学描述、多源不确定性下风险可控优化以及多主体智能协同等基础科学问题。报告同时创新构建了“气象应用-系统工程-运筹管理-人工智能”多学科融合的研究范式，聚焦工业绿色微电网在内外生多重不确定性扰动下的优化规划与运行问题，探索基于多源异构概率风险优化的能量管理新方法，旨在建立一套经济、低碳、高可靠工业绿色微电网能量管理的自主理论体系和科学工具。

基于非欧数据的图异常检测及其应用

宋成蹊　　中国科学院大学

报告摘要：随着金融交易网络、社交网络、生物网络等复杂关联数据的大量涌现，传统基于欧氏空间的异常检测方法已较难充分刻画图数据中复杂的结构依赖与非线性关系，图异常检测因而逐渐成为图机器学习领域的重要研究方向。此次汇报拟对现有图异常检测算法作一综述，重点梳理基于图嵌入、图神经网络、生成模型等主流技术路线，并在此基础上进一步介绍课题组近期在超球空间与机器学习结合方面的一些探索性工作，从非欧几何视角出发，将节点表示映射至超球空间，通过学习中心与半径刻画正常模式与异常模式，以提升异常检测的判别能力与鲁棒性；最后，报告将结合金融欺诈识别、网络安全预警、社交网络异常行为发现和生物信息分析等典型场景，讨论图异常检测的主要应用价值及未来发展方向。

Single loop method for a special mixed integer robust optimization problem in physical layer security

孙聪　　北京邮电大学

报告摘要：The worst case secrecy rate maximization problem is considered for the multiple input multiple output wiretap channel aided by reconfigurable intelligent surface, where the channel coefficients related to the eavesdropper have estimation errors. The corresponding problem is a mixed integer robust problem. It is reformulated as an equivalent bilevel problem. The analytic solution for the lower level problem is deduced and proved. For the upper level problem, a single loop method is proposed, which combines the projected gradient method and the maximum ratio transmission technique in wireless communications. The complexity of the proposed method is only linear in both transmit antenna number and RIS element number. Numerical results verify the effectiveness of the proposed model and the high efficiency of the proposed method.

A modified inertial self-adaptive algorithm for bilevel variational inequalities with applications to signal processing

孙琳淇　　宁夏大学

报告摘要: In this paper, we develop a modified inertial triple self-adaptive algorithm that integrates the inertial method, the subgradient extragradient method, and the hybrid steepest descent method for solving bilevel variational inequality problems, where the upper-level problem involves a strongly monotone variational inequality problem and the lower-level problem comprises a quasimonotone variational inequality problem with split variational inequalities and fixed-point constraints. A distinctive feature of our approach is a triple self-adaptive step-size mechanism that dynamically adjusts parameters without requiring prior estimation of operator norms or Lipschitz constants. We rigorously establish the strong convergence theory for the algorithm under the bilevel framework. Experimental results on two numerical examples and signal recovery applications, including the modified LASSO problem, demonstrate that the proposed algorithm achieves superior performance compared to existing methods.

From absolute value equations to linear inequalities: An efficient reduction-based solution framework via the RGRK method

汤朝霞　　云南师范大学

报告摘要: This paper first proposes a reduction strategy and proves the mathematical equivalence between the absolute value equation (AVE) of a specific form $Ax + |Ax - b| = b$ and the linear inequality system (LIS) $Ax \leq b$. Through this transformation, we reduce the equation-solving problem to the problem of finding linear feasibility.For the transformed system, we propose proposes a relaxation greedy randomized Kaczmarz (RGRK) method. The RGRK method employs an adaptive greedy threshold sampling strategy, which effectively overcomes the row-norm bias inherent in the relaxation randomized Kaczmarz (RRK) method and signiffcantly reduces the strong dependence on the sampling parameter observed in the sampling Kaczmarz-Motzkin (SKM) method. This enables the precise identiffcation of globally large-residual constraints without requiring additional parameter tuning. Theoretically, we establish the expected linear convergence of the RGRK method and prove that its convergence rate surpasses those of RRK and SKM.Additionally, we derive a probabilistic bound for the feasibility certiffcate provided by the iterative points. Numerical experiments on both synthetic datasets (Gaussian and correlated random systems) and real-world applications (such as support vector machine (SVM) classiffcation and linear programming (LP) problems) consistently validate the effectiveness of the proposed method.

稀疏矩-平方和松弛的紧性

唐新东　　香港浸会大学

报告摘要: 我们考虑具有变量稀疏性的多项式优化问题。稀疏矩-平方和松弛是一种利用问题稀疏性将其松弛成半定规划并求取全局最优的数值方法。相较于经典的稠密矩-平方和松弛，稀疏松弛能够被用来求解更大规模的多项式优化问题。在本工作中，我们对该方法的紧性进行了刻画，给出了系数松弛紧性的充分必要条件。与此同时，我们提出了利用平滑截断提取全局最小元的方法，并给出了若干保证稀疏松弛紧性的必要条件，例如凸性假设、可行集实数簇有限性条件等。

When does additional information lead to longer travel time in multi-origin-destination networks?

唐中正　　北京邮电大学

报告摘要： The Informational Braess' Paradox (IBP) illustrates a counterintuitive scenario where revelation of additional roadway segments to some self-interested travelers leads to increased travel times for these individuals. IBP extends the original Braess' paradox by relaxing the assumption that all travelers have identical and complete information about the network. In this paper, we study the conditions under which IBP does not occur in networks with non-atomic selfish travelers and multiple origin-destination pairs. Our results completely characterize the network topologies immune to IBP, thus resolving an open question proposed by Acemoglu et al.

基于多资源约束与遗传算法的复杂车间调度优化

滕娇　　东莞理工学院

报告摘要： 在现代供应链与智能制造中，车间调度问题通常伴随复杂的多维硬约束，传统人工排产容易导致工序同步性差、任务等待时间长与订单逾期。针对上述挑战，本报告针对一类具有多资源协同要求的复杂车间调度问题展开优化研究。该问题的复杂性在于：排产不仅受限于机台与特定模具的同步调用，还包含依赖于加工序列的转产换模时间以及离散的质检日历时间窗约束。为此，本研究提出了一种基于遗传算法（GA）的启发式调度优化方法。算法以最小化订单总逾期时间和降低转产损失为优化目标。在算法架构上，重点构造了一种嵌入多维时间窗与资源状态追踪的解码策略，该解码器能够动态识别机台与模具的联合容量限制，并严格保证工序时序的合法性。计算实例表明，该算法能够快速收敛至高质量的可行解，并通过多维联动甘特图实现调度全景可视化，为求解带有强物理约束的工业级调度难题提供了有效的运筹学模型与算法支撑。

Analysis of an optimal control problem of the backward fractional Feynman-Kac equation with temporal approximation

田文义　　天津大学

报告摘要： This work discuss an optimal control problem governed by the backward fractional Feynman-Kac equation, which depicts the probability density function of functionals of widespread diffusion phenomena in various multiscale fields. In the constrained equation, the time-space coupled nonlocal operator and its non-commutativity with Laplacian bring significant difficulties. The well-posedness, optimality conditions and solution's regularity of the continuous optimal control problem are established. We propose a temporal semi-discrete scheme for the optimal control problem by applying the backward Euler convolution quadrature formula to discretize the Riemann-Liouville fractional substantial derivative in the equation. In addition, the error estimate of the proposed semi-discrete scheme is rigorously established, and almost optimal convergence of $O(\tau|\ln\tau|)$ is obtained depending only on the regularity assumptions on the data and without extra assumptions

on the solution.

Sinkhorn-reparameterized primal-dual optimization for scalable quadratic assignment

王阿康　　深圳市大数据研究院

报告摘要: The Quadratic Assignment Problem (QAP) is a challenging NP-hard problem. Existing methods either suffer from high per-iteration costs or poor exploration. This paper proposes a Sinkhorn-reparameterized primal-dual framework—a differentiable solver that balances low computational complexity with strong global exploration. It reformulates the problem as an unconstrained min-max game, enabling efficient gradient descent-ascent updates with convergence guarantees. A Sinkhorn reparameterization projects optimization trajectories into the Birkhoff polytope, where implicit gradient scaling prevents premature convergence and improves solution quality. Leveraging GPU parallelism, the method supports massive multi-start initialization and trajectory harvesting. Experiments on QAP, graph matching, and graph isomorphism benchmarks show superior performance and scalability over state-of-the-art baselines.

Grouping method based on entropy recursive differential and general separability for large-scale global optimization

王惠敏　　北方民族大学

报告摘要: 分组方法能够有效地降低问题的复杂性，并提高优化效率，其原理是将众多决策变量分解为多个低维子问题，这构成了协同进化算法的一个关键组成部分。基于此方法在大规模全局优化问题中展现出显著优势。所提出的基于熵递归差分与通用可分离性分组方法整合了微分信息该方法源自递归差异分组，通过熵来衡量决策变量的多样性，从而显著降低了计算资源的消耗，同时仍能保持分组的准确性。

面向强约束场景的大语言模型自动建模方法研究——以食品添加剂合规配方优化为例

王鹏　　江南大学

报告摘要: 强监管行业的运筹优化决策需严格满足法律法规的刚性约束，合规偏差可能引发重大安全与法律风险。尽管大语言模型有助于降低建模门槛，但其概率生成机制难以保障法规参数获取的确定性，致使决策的合规风险难以控制。针对该问题，本文提出语义-符号分治（SSOPT）建模框架。该框架依据决策任务的确定性属性，对其进行解耦：将容许概率近似的语义理解过程与要求确定性保障的法规约束获取过程分离，并通过结构化反馈机制实现二者的协同求解。在建模层面，SSOPT 框架区分业务与法规两类异质参数，引入外部刚性约束的形式化表示，建立法规相容性的充分条件，并证明合规风险可被限定于实体识别环节。本文以 GB 2760 食品添加剂合规配方优化为研究对象，对比实验表明，SSOPT 框架的约束可行率达 97%，显著优于主流基准方法。消融实验进一步证实，确定性知识设计对合规决策质量的贡献远超模型推理能力的边际改善。本研究揭示，将确定性保障

嵌入建模架构是提升强监管场景下 AI 辅助决策合规性的关键路径，可为该场景下的合规风险管控提供可验证、可审计的建模范式。

General inertial proximal gradient method with gradient extrapolation for nonconvex nonsmooth optimization problems

王坛兴　　北京航空航天大学

报告摘要： The inertial strategy has been widely utilized to accelerate proximal gradient methods for nonconvex nonsmooth optimization problems. Recently, the gradient extrapolation technique has also been adopted to further enhance the acceleration of these methods. Inspired by the effectiveness of both techniques, in this paper, we propose a general inertial proximal gradient method with gradient extrapolation, named GiPMGE. Compared to existing methods, our proposed GiPMGE not only covers some classic methods, but also offers more general and flexible choices for the inertial, gradient extrapolation, and stepsize parameters. Under the assumption that the merit function satisfies the Kurdyka-Lojasiewicz property, we prove that the sequence generated by GiPMGE globally converges to a critical point and derive the corresponding convergence rates. Additionally, we conduct some numerical experiments to demonstrate the advantage of GiPMGE.

大模型驱动的国产算力算子生成与优化

王祥丰　　华东师范大学

报告摘要： We present AscendOptimizer, an episodic agent that bootstraps this missing expertise by turning execution into experience.

基于昇腾 NPU 算力的一阶 MILP 求解器研究

王源　　深圳市大数据研究院

报告摘要： 近年来，GPU 已被广泛应用于大规模线性规划问题求解，代表性算法 cu-PDLP 已在该领域展现出较强竞争力。然而，如何利用国产 NPU 芯片高效加速大规模混合整数线性规划（MILP）问题求解，仍然是一个具有挑战性的关键问题。为此，本报告提出“基于昇腾 NPU 算力的一阶 MILP 求解器”研究方案。该方案以 PDLP 等一阶方法以及 Fix-Propagate、Feasibility Pump 、Local-MIP 等原始启发式算法为基础，构建面向 GPU/NPU 的 MILP 求解框架，重点研究线性松弛求解、变量固定、领域传播、节点栈维护与预处理等关键模块，并将 SpMV 等矩阵核心计算模块映射到昇腾硬件平台上，实现高效并行加速。项目旨在保证解质量的前提下，显著提升超大规模 MILP 问题获取高质量可行解的速度，同时探索问题适用性判别方法，为昇腾在优化求解领域的工程化落地与规模化应用开辟新路径。

Enhancing presolve in mixed integer programming by combining probing and dual fixing

王兆维　　中国科学院数学与系统科学研究院

报告摘要: In this talk, we investigate how to combine probing and dual fixing to improve presolve in mixed integer programming (MIP) solvers. We first enhance probing by embedding dual fixing. Then, we use probing to detect more generalized dual fixings. Computational results demonstrate the effectiveness.

A gradient guided diffusion framework for chance constrained programming

王治国　　四川大学

报告摘要: Chance constrained programming (CCP) is a powerful framework for addressing optimization problems under uncertainty. In this paper, we introduce a novel Gradient-Guided Diffusion-based Optimization framework, termed GGDOpt, which tackles CCP through three key innovations. First, GGDOpt accommodates a broad class of CCP problems without requiring the knowledge of the exact distribution of uncertainty — relying solely on a set of samples. Second, to address the nonconvexity of the chance constraints, it reformulates the CCP as a sampling problem over the product of two distributions: an unknown data distribution supported on a nonconvex set and a Boltzmann distribution defined by the objective function, which fully leverages both first- and second-order gradient information. Third, GGDOpt has theoretical convergence guarantees and provides practical error bounds under mild assumptions. By progressively injecting noise during the forward diffusion process to convexify the nonconvex feasible region, GGDOpt enables guided reverse sampling to generate asymptotically optimal solutions. Experimental results on synthetic datasets and a waveform design task in wireless communications demonstrate that GGDOpt outperforms existing methods in both solution quality and stability with nearly 80% overhead reduction.

具身智能是智能科学的新范式

吴易明　　西安中科光电精密工程有限公司

报告摘要: 具身智能是以具身认知为指导的人工智能方法，智能主体的物质性、具身性、以及与对应客体的同构性，是智能体可以有效认知并应对外部挑战的基础。具身智能强调智能主体完成“信息感知、表征、处理、输出”过程中，依赖的自身构造是物质的、具体的。在人工智能发展，经历了符号主义、行为主义、连接主义的兴衰，目前以大模型（连接主义）为代表的人工智能引发全球热潮，但大模型的成果难以解决实际物理场景中的自主识别、决策、规划和控制需求。本文具身智能在对已有智能科学成果批判基础上，指出具身智能是智能科学新范式，强调所有智能都具有具身性，人工智能发展需要借鉴哲学认知论以及认知科学成果，用新的范式指导。文章对“智能”、“信息”、“视觉”、“识别”等基本概念给出定义，梳理了具身智能的概念、理论框架、实现要点与基本模型。提出“指、称”问题是具身智能的基础问题。介绍了团队在智能研究理论突破，以及重构智能机器人技术架构以及在离散制造场景中的产业化应用，并给出具身智能未来落地场景的推演与预测。

Data-driven robust multiproduct pricing with fairness concerns

吴钰炜　　南京大学

报告摘要: Data-driven techniques enable customized pricing across customers, times and locations, but face concerns over robustness to demand uncertainty and pricing fairness, hindering their real-world use. This talk presents a tailored data-driven pricing approach with automatic robustness and fairness guarantees, putting forward a Wasserstein ambiguity set-based distributionally robust optimization model with a novel price fairness constraint. Numerical tests will be presented to show the benefits of our approach in enhancing revenue, robustness, and fairness for pricing strategy under uncertainty.

A relaxation method for nonsmooth nonlinear optimization with binary constraints

肖亮海　　暨南大学

报告摘要: We consider a class of unconstrained binary optimization problems with nonsmooth objective functions, motivated by applications in signal processing, robust statistics, and machine learning. Existing approaches, such as semidefinite programming (SDP) relaxations and penalty-based methods, often face scalability challenges or rely on smoothness assumptions that limit their effectiveness. To overcome these issues, we propose a matrix relaxation framework tailored to nonsmooth binary optimization. Starting from a rank-constrained semidefinite reformulation of the original problem, we replace the rank-one constraint with a difference-of-convex (DC) surrogate, leading to an equivalent DC-constrained SDP model. We then introduce a global exact penalty formulation and develop a matrix factorization-based algorithm that avoids costly eigen-decompositions and enables efficient closed-form updates. We establish theoretical equivalence between stationary points of the original and penalized problems, and prove global convergence of the proposed algorithm. Numerical experiments on both synthetic and real datasets show that our method achieves state-of-the-art performance in accuracy and scalability, consistently outperforming existing baselines for nonsmooth binary optimization.

Bilevel programming approach for image restoration problems with automatically hyperparameter selection

谢航　　河南大学

报告摘要: In optimization-based image restoration models, the correct selection of hyperparameters is crucial for achieving superior performance. However, current research typically involves manual tuning of these hyperparameters, which is highly time-consuming and often lacks accuracy. In this paper, we concentrate on the automated selection of hyperparameters in the context of image restoration and present a bilevel programming approach that can simultaneously select the optimal hyperparameters and achieve high-quality restoration results.

A surrogate value function formulation for bilevel optimization

徐梦薇　　河北工业大学

报告摘要: The value function formulation offers a natural single-level representation for bilevel optimization, but its implicit and nonsmooth structure poses significant challenges. We propose a surrogate value function formulation (SVF) that replaces the implicit value function with an explicit surrogate based on lower level stationarity, while avoiding the incorporation of the entire lower level stationary set into the upper level feasible region, as in Karush-Kuhn-Tucker formulations. Under pseudoconvexity of the lower level Lagrangian, SVF is proved to be equivalent to the original bilevel problem. We establish main theoretical properties of SVF by characterizing its stationarity conditions and clarifying their relationships with existing single-level models. To handle complementarity constraints, a smoothing barrier augmented Lagrangian method is developed, and accumulation points of the generated iterates are shown to be Clarke stationary. Numerical experiments on nonconvex and degenerate problems demonstrate the effectiveness of the proposed approach.

Point-wise convergence to the expected equilibrium price in stochastic online Fisher markets: A human-AI collaborative study

杨嘉玟　　南京大学

报告摘要: In scenarios such as cloud computing and digital advertising, a platform sequentially prices and allocates resources to arriving users with stochastic budgets and utilities. We model this problem as a stochastic online Fisher market. While the expected equilibrium price $\boldsymbol{p}^*$ provides a natural benchmark, the necessity and guarantees of an online pricing policy's point-wise convergence to $\boldsymbol{p}^*$ remain underexplored. We study this necessity through a human-AI collaboration paradigm, in which AI generates candidate ideas and the authors formalize the rigorous analysis. This yields an algorithm-independent mathematical framework bounding the expected regret and market-clearing deviation of any online pricing policy by its cumulative point-wise deviation from $\boldsymbol{p}^*$, making point-wise convergence key to performance guarantees. Motivated by this, we analyze two data-driven pricing methods: Sample Average Approximation (SAA) and first-order methods. Assuming structural conditions and bounded iterates, the SAA iterate based on n observations converges to $\boldsymbol{p}^*$ at rate $\tilde{O}(n^{-1/2})$, where $\tilde{O}$ hides logarithmic factors, while the first-order iterate achieves $O(t^{-1/2})$ at step t. The structural conditions that define well-conditioned markets are satisfied by CES and Cobb-Douglas utilities, and economically reflect expected demand sensitivity and stability. Numerical experiments validate our results, together providing a foundation for stable and efficient platform operations.

The generally unitarily decomposable partially symmetric tensors and their approximation

杨庆之　　南开大学

报告摘要： In this talk, I will introduce a class of generally unitarily decomposable partially symmetric tensors, which extend conventional orthogonal tensors while retaining many of their desir able properties. We show that the best low-rank approximation of such tensors may be determined by the terms with largest coefficients in their decompositions. We propose a successive rank-one approximation algorithm and a matrix-based method to compute its decomposition for a given tensor. Finally we demonstrate the effectiveness of the proposed algorithms with numerical experiments.

Inertial randomized subspace regularized Newton method

杨舒婷　　广西大学

报告摘要： For non-convex optimization problems, we propose an inertial randomized subspace regularized Newton method. Under the assumption that the generated sequence converges, we analyze the asymptotic convergence of the algorithm. By leveraging the properties of random projections, we bound the search direction with high probability based on the gradient norm, establishing a high-probability one-step descent inequality. To address the non-monotonicity introduced by the inertial term, we construct a Lyapunov function to prove the monotonic decrease of the energy sequence and the summability of the squared displacements. We show that, conditional on sequence convergence, the algorithm converges to a stationary point of the objective function with high probability. This work combines inertial momentum with randomized second-order subspace techniques, providing an algorithmic framework with convergence guarantees for high-dimensional non-convex optimization.

Improving sketching algorithms for low-rank matrix approximation via sketch-power iterations

杨宇宁　　广西大学

报告摘要： Power iteration can improve the accuracy of randomized SVD, but requires multiple data passes, making it impractical in streaming or memory-constrained settings. We introduce a lightweight yet effective sketch-power iteration, allowing power-like iterations with only a single pass of the data, which can be incorporated into one-pass algorithms for low-rank approximation. As an example, we integrate the sketch-power iteration into a one-pass algorithm proposed by Tropp et al., and introduce strategies to reduce its storage cost. We establish meaningful error bounds: given a fixed storage budget, the sketch sizes derived from the bounds closely match the optimal ones observed in reality. This allows one to preselect reasonable parameters. Numerical experiments on both synthetic and real-world datasets indicate that, under the same storage constraints, applying one or two sketch-power iterations can substantially improve the approximation accuracy of the considered one-pass algorithms. In particular, experiments on real data with flat spectrum show that the method can approximate the dominant singular vectors well.

Low-rank optimization models for spectral compressed sensing in radar and communications

杨在　　西安交通大学

报告摘要： Spectral analysis of signals, also known as spectral compressed sensing or infinite-dimensional compressed sensing, is a core component of modern information techniques. The rapid developments of radar sensing and wireless communications have advanced its research from fast Fourier transform (FFT) in the 1960s, to maximum-likelihood and subspace methods emerging in the 1980s, and then to sparse and compressed sensing methods of this century. In this talk, we present our latest progress on this topic by solving the highly nonconvex maximum-likelihood optimization problem via rank-constrained SDP or a Structured MAtrix Recovery Technique (SMART). SMART is inspired by our high-dimensional extension of the Carathéodory-Fejér Theorem (1911) that also forms the basis of the previous subspace and infinite-dimensional compressed sensing methods.

电力系统机组组合问题的困难案例构建及计算性质初探

杨知方　　重庆大学

报告摘要： 电力系统机组组合问题是一类特色鲜明的离散优化问题，计算难度高但蕴含一定的规律性。作者针对机组组合问题的计算性质开展研究，首先构建了高计算难度的机组组合案例集，开展了机组组合问题的计算难度来源探究。本报告将介绍作者相关工作的初步结论。

Kernel-free quadratic surface SVM for conditional probability estimation in imbalanced multi-class classification

叶俊佑　　新疆大学

报告摘要： For the multi-class classification problems, we propose a new probabilistic output classifier called kernel-free quadratic surface support vector machine for conditional probability estimation (CPSQSVM), which is based on a newly developed binary classifier (BCPSQSVM) combined with the one vs. rest (OvR) decomposition strategy. The purpose of BCPSQSVM is to estimate the positive class posterior conditional probability density and assume it to be a quadratic function. Further, the definition of quadratically separable in probability is given and the optimization problem of BCPSQSVM is constructed under its guidance. The primal problem can be solved directly, because it is a convex quadratic programming problem (QPP) without using kernel functions. However, we design the corresponding block iteration algorithm for its dual problem, which perhaps rendered the device inoperable due to the large constraint size of the primal problem. It is worth noting that our CPSQSVM assigns greater weights to minority samples to mitigate the negative impact of labeling imbalance due to the use of OvR strategy. The existence and uniqueness of optimal solutions, as well as the reliability and versatility of CPSQSVM are discussed in the theoretical analysis. In addition, convergence of the algorithm and upper bound on the margin parameter are analyzed. The feasibility and validity of the proposed method is verified by numerical experiments on some artificial and benchmark datasets.

A predefined-time robust gradient neural network for solving absolute value equations

于冬梅　　辽宁工程技术大学

报告摘要： As optimization problems in fields such as integrated circuit design and artificial intelligence continue to grow in scale and complexity, models centered on the absolute value operator have emerged as powerful tools for capturing sparsity, robustness, and piecewise linear structures. Among these, the system of absolute value equations constitutes a important subclass. In this work, we investigate a predefined-time robust gradient neural network (PRGNN) designed to solve such equations. The proposed PRGNN achieves convergence within a predefined time and demonstrates complete resilience to both bounded vanishing and bounded non-vanishing noise. Moreover, it outperforms several existing continuous-time models in terms of noise tolerance, particularly under large constant noise. Numerical simulations confirm the theoretical results and highlight the effectiveness of the approach.

Some results on optimality theories, methods and applications in (set-valued) equilibrium problems

余国林　　北方民族大学

报告摘要： 介绍本团队在均衡问题最优性理论、算法以及相关应用取得的一些结果：一是最优性理论方面。利用非线性标量化函数和像空间分析方法，构建了集均衡问题的标量化定理和最优性条件。二是算法方面。通过增加混合惯性项提出了几类变分不等式问题的加速算法；利用双迭代对不动点问题的求解提出了新方法，并将所得结果应用于图像恢复问题。三是应用方面，针对高维数据问题，提出几类鲁棒自适应无监督降维方法；对大规模数据分类问题，提出几种学习分类和回归方法。

电力系统混合整数规划问题数据集构建方法

袁沐琛　　中国电力科学研究院有限公司

报告摘要： 随着新型电力系统源荷双侧不确定性加剧，机组组合、经济调度、电力市场出清等核心业务对混合整数规划（MILP）求解的实时性与鲁棒性提出更高要求。然而，当前业界缺乏覆盖典型电力场景、标准化、可扩展的 MILP 问题数据集，严重制约了国产求解器研发、算法性能评测及产学研协同创新。本报告基于中国电力科学研究院在电力优化出清与调度领域的工程实践，结合连续三届能源电子产业创新大赛国产求解器技术专题赛事命题经验，系统阐述电力系统 MILP 问题数据集的构建方法。重点探讨：1）IEEE 标准算例、实际电网运行数据（拓扑参数、负荷曲线、新能源出力、机组特性）到数学规划模型的抽象映射与脱敏处理；2）适配主流求解器接口的标准化数据格式与测试基准集构建；3）问题规模可控性与计算难度可调性设计。本报告旨在建立连接电力业务场景与优化算法研究的桥梁，为国产求解器性能测评、算法鲁棒性验证及工程化落地提供高质量数据支撑。

电力系统优化调度中的几个模型化简及变换技术

翟桥柱　　西安交通大学

报告摘要：电力系统优化调度是实际应用中一类典型的大规模混合整数规划问题，由于变量及约束众多，且包含一些复杂约束，导致其高效求解算法设计是一个长期研究热点。本报告将介绍针对调度问题特点设计的一些模型化简、变换方法，包括冗余传输约束识别、约束合并、积分约束变换等等。这些变换及化简技术对一般混合整数规划也有参考价值。

Computing equilibria in network formation games

占杨　　南京大学

报告摘要：Networks are at the forefront of research in economics and operations research as powerful tools to model social and economic interactions. While computing pairwise stable networks or equilibria in network formation games is generally very hard, we combine the concept of pairwise stability and correlated equilibria and propose the notion of correlated pairwise stability. We show that correlated pairwise stable networks can be a Pareto improvement of pairwise stable networks, and their computation is formulated as a mixed integer programming problem.

Memory-efficient correlated noise for locally differentially private momentum in distributed learning

张娇娇　　大湾区大学

报告摘要：We propose a locally differentially private (LDP) distributed momentum algorithm with correlated noise, given that each data sample participates multiple times in training. Therein, correlated noise improves the utility over independent noise, whereas momentum accelerates the convergence compared to stochastic gradient descent (SGD). Existing correlated noise mechanisms for momentum incur high memory costs, hindering large-scale distributed learning. We address this issue via a buffer linear Toeplitz (BLT) mechanism that enables memory-efficient correlated noise injection, having a privacy guarantee while achieving a small approximation error. Theoretical analysis and numerical experiments validate the effectiveness of the proposed algorithm.

General group-sparse factorization for Schatten-q quasi norm and its regularization for low-rank matrix recovery

张立平　　清华大学

报告摘要：Matrix factorization effectively scales low-rank recovery problems, yet existing bifactor Schatten-q norm formulations lack generality for arbitrary $q \in (0, 1]$ and suffer from analytical complexities due to nonconvexity. This paper introduces a universal group-sparse factorization for the Schatten-q norm. We demonstrate a unique property: the Schatten-q norm implicitly endows critical points with column orthogonality, a feature not shared by the nuclear norm. Based on this, we define S-critical points, establish their proximity to the true matrix via error bounds, and prove

that the resulting least-squares objective possesses the KŁ property with exponent 1/2. To solve the model, we develop an inexact proximal alternating minimization method with robust convergence guarantees. Numerical results confirm the efficiency of the algorithm and the validity of the theoretical model.

Polynomial iteration complexity of a path-following smoothing Newton method for symmetric cone programming

张瑞进　　南开大学

报告摘要: Whether polynomial iteration complexity can be established for smoothing Newton methods (SNMs) in symmetric cone programming (SCP) remains a long-standing open problem. A key difficulty lies in the lack of an analogue of the self-concordant convex framework in interior-point methods (IPMs). We address this problem by introducing a reduced smoothing barrier augmented Lagrangian (SBAL) function and proving that it is self-concordant convex-concave, which extends the classical self-concordant theory beyond the convex setting. In addition, the parameterized smooth equations associated with SNMs are shown to be equivalent to the first-order optimality conditions of a minimax problem whose objective is the reduced SBAL function. Motivated by this equivalence, we propose a path-following smoothing Newton method (PFSNM). The reduced SBAL function induces a central path and an associated neighborhood, which provide the estimates of the Newton decrement needed for the path-following analysis. As a result, the method is proven to achieve an iteration complexity of $(\sqrt{\nu}\ln(1/\varepsilon))$, matching the best-known short-step bound for IPMs. Numerical results on standard benchmarks show that PFSNM is competitive with several well-known interior-point solvers, providing computational support for the polynomial iteration complexity.

Distributed projection neurodynamic approaches for solving absolute value equations

张思宇　　辽宁工程技术大学

报告摘要: This study proposes a novel distributed projection neurodynamic framework for solving continuous-time absolute value equations, leveraging the flexible block structure of the measurement matrix A. By integrating the primal-dual dynamical system, projection operator, and second-order multiagent consensus condition, we design a continuous-time distributed projection neurodynamic approach (DPNA-CT-AVE) to accommodate large-scale distributed scenarios. We rigorously prove the equivalence between the consensus optimal solution of the proposed distributed projection neurodynamic approach and the optimal solution of AVE. Furthermore, we conduct numerical experiments on sparse signal recovery, where the proposed approach is compared with existing algorithms. The experimental results fully verify the effectiveness of the proposed algorithm in solving large-scale AVE problems under distributed scenarios.

Two-stage distributionally robust optimization of EV charging stations under demand and disruption uncertainties

张一鸣　　辽宁工程技术大学

报告摘要： Electric vehicles (EVs) are rapidly advancing due to their proven benefits in enhancing energy efficiency and reducing emissions. However, their widespread adoption is hampered by an insufficient and unevenly distributed charging infrastructure. We develop a two-stage distributionally robust optimization model (TDROM) for the optimal location and sizing of EV charging stations under uncertainties in both travel demand and charging facility disruptions. TDROM is reformulated as a mixed-integer linear program. For efficient solution, we propose a modified exact algorithm based on column-and-constraint generation (C&CG) and introduce a robust Benders cut generation strategy to accelerate convergence. Based on the actual road network of Tiexi District, Shenyang, China, we integrate a temperature attenuation coefficient for demand estimation. Further sensitivity analyses on key parameters provide valuable managerial insights.

STNAdam: A stochastic two-track Nesterov-accelerated Adam method for nonconvex composite optimization

赵志华　　西安电子科技大学

报告摘要： We propose STNAdam, a novel stochastic optimization algorithm, designed for "nonconvex + weakly-convex" composite problems. Unlike existing Adam variants, STNAdam introduces a two-track iteration framework that maintains intertwined trajectories: an extrapolation track driven by Nesterov momentum and a regular update track governed by Adam-style adaptive conditioning. We show that STNAdam seamlessly integrates various variance-reduced stochastic gradient estimators, such as SAGA, SVRG, SARAH and SPIDER, and the generated sequence converges to a stationary point of original problem under expectation, achieving state-of-the-art oracle complexities. We also provide the global convergence rate under the Kurdyka-Łojasiewicz (KL) property. Empirical results on low-light image enhancement tasks are presented to demonstrate the superior performance of STNAdam in both convergence speed and image quality metrics.

华为天筹求解器技术进展与规划

郑迥之　　华为技术有限公司

报告摘要： 天筹求解器是一款由华为公司研发的高性能数学优化求解器，支持大规模线性规划（LP）、混合整数线性规划（MILP）、二次规划（QP）、二次锥规划（SOCP）、一般非线性规划（NLP）及约束规划（CP）等复杂问题求解。在过去一年中，天筹求解器在国际权威数学优化求解器 Hans Mittelmann 榜单上斩获六项业界第一，获第三届能源电子产业创新大赛-国产求解器技术专题赛数学赛道第一、CVRPLib BKS 全球挑战赛第一等成绩。本报告将讲述天筹求解器近期的技术进展，主要包括 LP 及 MILP 的各个子模块，以及基于大模型的智能决策引擎；还将介绍天筹求解器的一些未来规划，其中一项关键举措是推出开源学术版本，为求解器、运筹优化领域的学术研究贡献一份力量。

基于 SOR 展开的学习型绝对值方程求解方法

周睿智　　中国农业大学

报告摘要：绝对值方程（AVE）在理论与应用中均具有重要价值。现有 AVE 求解方法中 SOR-like 算法因形式简洁、理论性质优良受到关注，其性能依赖参数精细调节。本文提出基于 SOR-like 迭代的深度展开神经网络——SOR-Net，以实现 AVE 高效求解。理论上，我们验证了利用神经网络展开 SOR-like 逼近 AVE 解的可行性；实践中，SOR-Net 将可学习参数与非线性激活函数嵌入网络结构，网络层由 SOR-like 迭代展开构建。为进一步提升精度并发挥神经网络优势，设计了两阶段框架：先通过 SOR-Net 完成 AVE 符号预测，将原问题简化；再用传统数值算法高精度求解简化后的系统。实验表明新方法在效率与精度上均表现优异。

次梯度流影法

朱之翰　　北京航空航天大学

报告摘要：We identify and analyze a fundamental limitation of the classical projected subgradient method in nonsmooth convex optimization: the inevitable failure caused by the absence of valid subgradients at boundary points. We show that, under standard step sizes for both convex and strongly convex objectives, the method can fail after a single iteration with probability arbitrarily close to one, even on simple problem instances. To overcome this limitation, we propose a novel alternative termed the subgradient gliding method, which remains well defined without boundary subgradients and avoids premature termination. Beyond resolving this foundational issue, the proposed framework encompasses the classical projected subgradient method as a special case and substantially enlarges its admissible step-size design space, providing greater flexibility for algorithmic design. We establish optimal ergodic convergence rates, $O(\frac{1}{\sqrt{t}})$ for convex problems and $O(\frac{1}{t})$for strongly convex problems, and further extend the framework to stochastic settings. Notably, our analysis does not rely on global Lipschitz continuity of the objective function, requiring only mild control on subgradient growth. Numerical experiments demonstrate that, in scenarios where the classical projected subgradient method fails completely, the proposed method converges reliably with a 100% success rate and achieves orders-of-magnitude improvements in accuracy and convergence speed. These results substantially expand the scope of subgradient-based optimization methods to non-Lipschitz nonsmooth convex problems.

LMask: Learn to solve constrained routing problems

邹海军　　中国科学院数学与系统科学研究院

报告摘要：Routing problems are canonical combinatorial optimization tasks with wide-ranging applications. However, solving these problems becomes significantly more challenging when complex constraints are involved. In this talk, we introduce LMask, a novel learning framework that utilizes dynamic masking to generate high-quality feasible solutions for constrained routing problems. LMask introduces the LazyMask decoding method, which lazily refines feasibility masks with the backtracking mechanism. In addition, it employs the refinement intensity embedding to encode the

search trace into the model. We provide theoretical guarantees for the validity and probabilistic optimality of our approach. Extensive experiments demonstrate that LMask achieves state-of-the-art feasibility rates and solution quality.

福州大学简介

福州大学是国家“双一流”建设高校、国家“211 工程”重点建设大学、福建省人民政府与教育部共建高校。学校创建于 1958 年，现已发展成为一所以工为主、理工结合，理、工、医、经、管、文、法、艺等多学科协调发展的重点大学。

建校以来，一代代福大人秉承“明德至诚博学远志”校训，践行以张孤梅同志为代表的艰苦奋斗的创业精神、以卢嘉锡先生为代表的严谨求实的治学精神、以魏可镁院士为代表的勇于拼搏的奉献精神等“三种精神”，营造“守正创新、彰显特色、开放包容、追求卓越”的新时代福州大学校园文化，积累了丰富的办学经验，形成了鲜明的办学特色，已为国家培养了全日制毕业生 33 万余人。

办学规模与学科实力。学校设有 27 个学院（含 1 个独立学院和 1 个中外合作办学学院）和 1 家附属省立医院，现有在校普通本科学生 40358 人（含至诚学院学生 13667 人）；各类博、硕士研究生 18968 人。学校现有在招本科专业 83 个；39 个硕士一级学科学位授予点，25 个硕士专业学位授权类别；19 个博士一级学科学位授予点，5 个博士专业学位授权类别，12 个博士后科研流动站。学校拥有 1 个国家重点学科、1 个国家重点 (培育) 学科，化学学科再次入选世界一流学科建设名单。13 个学科进入 ESI 学科全球排名前 1%，其中化学、工程学、材料科学 3 个学科进入 ESI 学科全球排名前 1‰。学校综合实力在“2025 软科世界大学学术排名”位居全球第 319 名，内地高校 60 名；在 U.S.News2025-2026 世界大学排行榜位居全球第 383 名，内地高校第 54 名；在 2026 泰晤士高等教育世界大学排名位居全球第 801-1000 名，内地高校第 60 名；在 2025QS 亚洲大学排名位居第 313 名，内地高校并列 65 名。

师资队伍与团队建设。学校现有教职工 3518 人（专任教师 2547 人）, 其中国家级人才 157 人次（109 人）、省级人才 1229 人次（944 人）。在高层次人才（团队）中，拥有院士 11 人（含特聘讲席教授 7 人），“长江学者奖励计划”人选 17 人，国家级高层次引进人才 23 人（含青年项目 17 人），国家“万人计划”入选者 30 人（含国家教学名师 1 人、青年项目 11 人），国家杰出青年科学基金（含青 A）获得者 14 人，全国杰出专业技术人才 1 人，“百千万人才工程”国家级人选 12 人，国家有突出贡献中青年专家 9 人，国家优秀青年科学基金（含海外）获得者 19 人，科技部中青年科技创新领军人才 5 人，文化名家暨“四个一批”人才 3 人。1 支团队入选“全国专业技术人才先进集体”，2 支团队入选“全国高校黄大年式教师团队”，2 支团队入选教育部“长江学者和创新团队发展计划”，2 支团队入选科技部“创新人才推进计划”重点领域创新团队，2 支团队入选“国家自然科学基金创新研究群体”。1 个学院入选国家“高校国际化示范学院推进计划”，4 个学院入选国家“高等学校学科创新引智计划”(“111 计划”)，1 个学院入选“国家引才引智示范基地”。

教育教学与创新创业。学校拥有 2 个国家级人才培养基地、6 个国家级实验教学示范中心、1 个国家虚拟仿真实验教学中心、1 个国家人才培养模式创新实验区、6 个校企合作的国家工程实践教育中心、1 个全国工程专业学位研究生联合培养示范基地、1 个教育部首批“三全育人”综合改革试点学院，1 个教育部基础学科拔尖学生培养计划 2.0 基地，1 个教育部涉外法治人才协同培养创新基地，1 个教育部基础学科“101 计划”学科，1 个国家级虚拟教研室，1 个国家教学团队，7 个国家特色专业，37 个国家一流本科专业建设点，23 个专业通过工程教育专业认证及专业评估，其中 20 个专业通过教育部工程教育专业认证，3 个专业通过住建部专业评估, 获评 56 门国家一流本科课程、3 门国家精品课程、1 门国家双语教学示范课程、3 门国家级精品资源共享课、2 门国家级精品视频公开课、7 个教育部“新工科”研究与实践项目，4 个教育部“新文科”研究与改革实践项目，获批教育部课程思政示范课程 1 门、国家级课程思政示范教学团队 1 个、全国思政课程教学名师工作室 1 个，入选高等学校思想政治理论课教学指导委员会委员 1 人、省级课程思政研究与实践中心 2 个、省级一流本科课程 182 门、省级课程思政示范课程 8 门（本科）。入选 4 个省级现代产业学院、3 个

省级基础学科拔尖人才培养基地。学校是全国专业学位研究生教育综合改革试点单位和全国工程硕士研究生教育创新高校、教育部“卓越工程师教育培养计划”改革试点高校和教育部“国家大学生创新创业训练计划”实施高校、全国“英才计划”实施高校。“十四五”以来，学校获国家级教学成果奖 3 项，省级教学成果奖 34 项；学生参加各类学科竞赛获 265 项国际奖，1932 项国家级奖。学校入选“首批国家级创新创业学院建设单位”“全国首批深化创新创业教育改革示范高校”“国家级众创空间”“国家大学生创业示范园”。在十一届中国国际大学生创新大赛全国总决赛中获 20 金 34 银 58 铜。近五年荣获“挑战杯”赛事特等奖 7 项、金奖 4 项，连续三年获得团体“优胜杯”。曾荣获“全国高校毕业生就业工作 50 强”。

社会服务与科技成果。学校现有 1 个国家级大学科技园，15 个国家级、147 个省部级自科科技创新平台、30 个省部级社科平台，其中：3 个全国重点实验室、1 个国家重点实验室、7 个国家级工程研究中心、1 个国家工程技术研究中心、3 个国家国际科技合作基地、4 个教育部重点实验室、2 个教育部工程研究中心、2 个省部共建协同创新中心、1 个自然资源部创新服务平台、2 个省创新实验室、7 个省部级智库,1 个省哲学社会科学重点实验室。学校是福建省唯一同时拥有“国家大学科技园”“国家技术转移示范机构”“高等学校科技成果转化和技术转移基地”“国家知识产权试点高校”“国家级众创空间”“全国大学生创业示范园”“全国深化创新创业教育改革示范高校”“全国创业孵化示范基地”的高校。“十四五”以来，学校获各类纵向科技项目 5022 项，科研经费 23.15 亿元；逐步在福建省九地市布点建设科技园网络体系，搭建了“一园三区，联动发展；辐射多点，创新共赢”的发展格局。签订横向合作合同 4496 项，校地企合作到校经费 20.98 亿元。获省部级以上奖项 118 项，其中，国家科技奖 4 项。获国家专利授权 6614 件，科技论文被三大检索收录 20292 篇，其中在 Nature 期刊发表论文 6 篇，在 Science 期刊发表论文 4 篇，16 名（36 人次）学者入选“全球高被引科学家”名单；24 名（98 人次）学者入选“中国高被引学者”名单。

国际合作与对外交流。学校深入开展对外合作交流，与德国亚琛工业大学、美国加州大学戴维斯分校、新加坡国立大学、香港理工大学等境外 50 个国家、地区的 140 多所高校、科研机构和知名企业建立了合作关系。学校建立国际科教合作交流平台，培育建设国际暨台港澳合作联合实验室；积极对接国家“一带一路”倡议，成为中国政府奖学金留学生接收院校，面向 30 余个国家招收来华留学生；推进“一带一路”教育科研合作新范式，与马来西亚拉曼大学共建未来技术联合研究院。学生出国（境）访学项目涵盖本硕博层次，覆盖 95% 以上的学院；聘请 60 余名海外专家学者长期在校任教。现有 1 个中外合作办学机构，3 个中外合作办学项目，涵盖本科及研究生层次。对台交流合作向纵深发展, 成建制联合培养模式成为闽台教育交流合作的新亮点。通过不断优化学习生活环境与服务保障，学校日益成为众多台湾青年来闽求学、追逐梦想的优选之地。

公共服务体系建设。学校校园环境优美、教学和科研设备先进、公共服务体系完善，不断推进文化校园、智慧校园和生态校园建设。办学主体位于旗山校区，在福州、厦门以及泉州等地拥有 7 个校区，校舍建筑面积约 188 万平方米。学校固定资产总值约 86 亿元，其中教学科研仪器设备值 31.45 亿元；运动场地总面积约 22 万平方米；图书馆藏图书 432 万册，电子图书 888 万册。

学校正朝着“建成具有若干世界一流学科的国际知名高水平大学，成为世界一流的东南强校”的宏伟目标大步迈进，努力为国家和区域经济社会发展作出新的更大贡献！

(数据截至 2026 年 3 月 25 日)

福州大学数学与统计学院简介

福州大学创建于 1958 年，是由福建省人民政府与教育部、国家国防科技工业局共建的国家“双一流”建设高校、“211 工程”重点建设大学。福州大学数学与统计学院的前身为福州大学数学力学系，成立于 1958 年福州大学创建之初。1962 年数学力学系更名为数学系；1977 年设置应用数学、计算数学、计算机软件、计算机技术专业；1984 年由数学系相关专业和师资组建了计算机科学与技术系；2003 年 6 月，为坚持理工结合的办学特色、促进基础学科和应用学科融合发展，数学系和计算机科学与技术系合并成立了数学与计算机科学学院；2009 年 10 月，为了优化学科资源和促进学科进一步发展，数学与计算机科学学院和软件学院进一步整合，成立了数学与计算机科学学院（软件学院）；2021 年 5 月，根据学科发展趋势和更好的适应国家经济社会发展需求，学校整合数学学科和统计学科成立了数学与统计学院。学院现有数学一级学科博士学位授权点，数学博士后科研流动站，数学、统计学 2 个一级学科硕士学位授权点，应用统计 1 个专业硕士学位授权点。2005 年应用数学成为福建省省级重点学科，2010 年被列为福建省十个国家重点学科培育建设学科之一，2012 年成为福建省特色重点学科；离散数学及其应用是福州大学“211 工程”三期重点建设学科；2017 年“数学与信息科学”列入福建省“双一流”建设高峰学科计划。学院现有离散数学及其应用教育部重点实验室、福建省应用数学中心、运筹学与控制论福建省高校重点实验室等 3 个省部级科研平台。学院现有教职工 127 人，其中专任教师 112 人；专任教师中，博士生导师 16 人，教授（含研究员）21 人、副教授（含副研究员）47 人，具有博士学位 85 名，占 75.8%。师资队伍中拥有国家杰出青年科学基金获得者 1 人，国家青年科学基金 A 类（原杰青）项目获得者 1 人，国家优秀青年科学基金获得者 1 人，国家高层次青年人才 1 人，国务院政府特殊津贴 2 人，高被引学者 1 人；首届中国计算机学会集成电路 Early Career Award 获得者 1 人；华为高级研究科学家 2 人；入选福建省“闽江学者”特聘教授 2 人，福建省特支人才“双百计划”人选 1 人，福建省“雏鹰计划”人才 1 人，福建省“百千万人才工程”人选 1 人，福建省杰出青年基金获得者 3 人，福建省高等学校新世纪优秀人才 3 人，福建省高校杰出青年科研人才培育计划 3 人，福建省 A、B、C 高层次人才 15 人，福州大学“嘉锡学者”特聘教授 2 人，福州大学“旗山学者”（含海外项目）5 人。学院现有在校本科生 652 人，博士 44 人，硕士研究生 306 人。设有数学与应用数学系、信息与计算科学系、统计与数据科学系等 3 个系；拥有数学与应用数学、信息与计算科学、经济统计学等 3 个本科专业，其中数学与应用数学专业入选国家一流本科专业。学院承担全校数学公共课三大系列十一门课程，目前拥有省级本科教学团队和研究生导师团队各 1 支、国家级线上线下混合式一流课程 2 门、省级线上线下混合式一流课程 5 门、省级精品在线课程 2 门、省级课程思政示范课程 1 门、省级教育教学改革项目 8 个（在研 2 个）；已在国家级出版社出版教材 8 部、行业级出版社出版教材 6 部，入选福建省十四五规划教材 3 部。学院围绕“课赛融合、以赛促学”的培优模式，积极推动学科竞赛成为教学拓展和学风建设的重要载体，近几年在数学类学科竞赛中获国际级奖项 141 项，国家级奖项 290 项。早在上个世纪六十年代初，学院就已建立了以林振声教授为学术带头人的微分方程理论研究队伍，在国内数学界颇具影响力；原数学系主任康金章教授致力于大型结构优化研究及应用工作，取得了突出的研究成果，以他为第一完成人的两个科研项目分别获得 1978 年全国科学大会科技成果奖及 1988 年国家科技进步二等奖。进入二十一世纪，学院凝炼出图论及其应用、运筹优化与统计、微分与动力系统、信息与计算数学等研究方向，主持了国家 973 计划课题、国家自然科学基金重点项目、国家重点研发计划项目课题等各类科研项目 100 余项。在瞄准国际研究前沿、坚持高水平理论研究的同时，学院面向国家科技发展战略需求，开展相关领域的理论和应用研究工作，取得了一系列国内外有影响的研究成果；范更华教授为学术带头人的图论及其应用研究团队，获得国家自然科学二等奖、教育部自然科学一等奖。运筹优化与统计研究团队在芯片设计 EDA 软件上

取得多个科研成果，获第五十四届国际集成电路电子设计自动化最顶级学术会议最佳论文奖（54 年来中国大陆机构首次获奖），中国运筹学会运筹应用奖、中国工业与应用数学学会青年科技奖等多个奖项。学院主办的《应用数学年刊》（Annals of Applied Mathematics）是国内较早创办的数学专业英文期刊之一。学院通过与华为、华大九天、弘扬软件等企业成立联合创新实验室，与上海立芯软件科技有限公司共建成立“福州大学立芯电子设计自动化创新研究院”，构建紧密型的产学研合作机制。立足新时代，把握新机遇，学院将以推进高质量发展为宗旨，面向基础学科发展前沿，聚焦国家和地方战略需求，为积极服务于学校“双一流”建设而团结奋斗!