2024 International Workshop on Modern Optimization and Applications

June 22 - 25, 2024

Beijing, China

https://lsec.cc.ac.cn/~moa2024

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Information for Participants

Workshop Site

Workshop Site:	Siyuan Building, Academy of Mathematics and Systems Science (AMSS), Chinese Academy of Sciences (CAS)
Address:	No. 55, Zhong Guan Cun East Road, Hai Dian District, Beijing, CHINA

Registration

Registration will take place on **June 22 from 14:00 to 20:00 at Conference Hall (1st floor), Siyuan Building of AMSS**. If you want to register at other time, please contact our workshop secretary Dr. Liang Chen, chenliang@lsec.cc.ac.cn.

Wifi Connection

The WiFi is available in the workshop room. To use it, first search the wireless connection, find "**AMSS**" and click it; then input the workshop code "**MOA2024**" and your personal information.

Contact Information

If you need any help, please contact the conference secretaries:

- Dr. Liang Chen, chenliang@lsec.cc.ac.cn, wechat/phone number: 18201589126
- Ms. Yang Li, liyang@lsec.cc.ac.cn

Sponsors

- Academy of Mathematics and Systems Science (AMSS), Chinese Academy of Sciences (CAS)
- Institute of Computational Mathematics and Scientific/Engineering Computing, AMSS, CAS
- State Key Laboratory of Scientific and Engineering Computing
- National Natural Science Foundation of China
- Beihang University
- Center for Optimization and Applications, AMSS, CAS

Committees

Organizing Committee

- Frank Curtis, Lehigh University
- Coralia Cartis, Oxford University
- Yu-Hong Dai (**Co-Chair**), Academy of Mathematics and Systems Science, Chinese Academy of Sciences
- Deren Han, Beihang University
- Thorsten Koch, Zuse Institute Berlin & Technische Universitaet Berlin
- Xin Liu, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
- Ya-Feng Liu, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
- Junjie Ma, Academy of Mathematics and Systems Science, Chinese Academy of Sciences
- Zhi-Quan Luo (**Co-Chair**), Chinese University of Hong Kong, Shenzhen
- Jiming Peng, University of Houston
- Defeng Sun, The Hong Kong Polytechnic University

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- Xiaojun Chen, The Hong Kong Polytechnic University
- Tiande Guo, University of Chinese Academy of Sciences
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- Stephen Wright, University of Wisconsin
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- Ya-xiang Yuan (**Co-Chair**), Academy of Mathematics and Systems Science, Chinese Academy of Sciences
- Shuzhong Zhang, Shenzhen Research Institute of Big Data
- Yin Zhang, The Chinese University of Hong Kong, Shenzhen

Local Map


保福寺桥
中国科学院自然科学史研究所
晨兴数学中心
Siyuan Building of AMSS
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大学中关村校区
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中国科学院
大学A座
北京物科酒店
Wuke Hotel
Hengxing Hotel
恒兴大厦
中科院中关村
小区北区
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中国科学院
物理研究所

2024 International Workshop on Modern Optimization and Applications

Schedule

Time: June 22-25, 2024
Venue: Lecture Hall (1st floor), Siyuan Building of AMSS

June 22, 2024	
Short Course, 14:00 - 17:00, Chair: Minru Bai	
14:00-17:00	**Jiawang Nie** (University of California) Moment and polynomial optimization
17:00	Dinner (4th floor of Wuke Restaurant)
June 23, 2024	
Opening Ceremony, 8:30 - 9:10, Chair: Xin Liu	
8:30-8:50	Welcome Address (Feimin Huang, Xiaojun Chen, Yu-Hong Dai)
8:50-9:10	Photo Taking
Session 1, 9:10 - 10:00, Chair: Defeng Sun	
9:10-10:00	**Yin Zhang** (The Chinese University of Hong Kong, Shenzhen) Before optimizing deep transformers: How they behave at initialization
10:00-10:20	Coffee Break

June 23, 2024	
Session 2, 10:20 - 12:00, Chair: Deren Han	
10:20-11:10	**Xiaojun Chen** (The Hong Kong Polytechnic University) Nonsmooth nonconvex-nonconcave min-max optimization problems
11:10-12:00	**Jiawang Nie** (University of California) Two stage stochastic polynomial optimization
12:00	Lunch (4th floor of Wuke Restaurant)
Session 3, 14:00 - 15:40, Chair: Xiaojun Chen	
14:00-14:50	**Huifu Xu** (The Chinese University of Hong Kong) Multistage utility preference robust optimization
14:50-15:40	**Xin Liu** (Academy of Mathematics and Systems Science, CAS) Projected gradient descent algorithm for ab initio crystal structure relaxation under a fixed unit cell volume
15:40-16:00	Coffee Break
Poster Session 1, 16:00 - 18:00	
16:00-18:00	Poster Session (Part I)
18:00	Banquet (4th floor of Wuke Restaurant)

June 24, 2024	
Session 4, 8:20 - 10:00, Chair: Ya-Feng Liu	
8:20-9:10	**Defeng Sun** (The Hong Kong Polytechnic University) Accelerating preconditioned ADMM via degenerate proximal point mappings
9:10-10:00	**Jiming Peng** (University of Houston) Quantitative models and techniques for optimal deployment of mobile health clinic service to underserved vulnerable communities
10:00-10:20	Coffee Break
Session 5, 10:20 - 12:00, Chair: Huifu Xu	
10:20-11:10	**Liwei Zhang** (Dalian University of Technology) Primal-dual algorithm for distributed optimization with coupled constraints
11:10-12:00	**Hongchao Zhang** (Louisiana State University) An affine-scaling active set algorithm for polyhedral constrained optimization: Complexity and practical performance
12:00	Lunch (4th floor of Wuke Restaurant)

June 24, 2024	
Session 6, 14:00 - 15:40, Chair: Jiming Peng	
14:00-14:50 (Online)	**Ambros Gleixner** (HTW Berlin and Zuse Institute Berlin) Branch and cut for partitioning a graph into a cycle of clusters (Tencent Meeting/VooV Meeting: 726-434-104)
14:50-15:40 (Online)	**Sergiy Butenko** (Texas A&M University) A hierarchy of nonconvex continuous reformulations for discrete optimization problems (Tencent Meeting/VooV Meeting: 726-434-104)
15:40-16:00	Coffee Break
Poster Session 2, 16:00 - 18:00	
16:00-18:00	Poster Session (Part II)
18:00	Dinner (4th floor of Wuke Restaurant)

June 25, 2024	
Session 7, 8:20 - 10:00, Chair: Liang Chen	
8:20-9:10 **(Online)**	**Guanghui (George) Lan** (Georgia Institute of Technology) Efficiency and robustness for reinforcement learning (Tencent Meeting/VooV Meeting: 526-258-061)
9:10-10:00	**Zhaosong Lu** (University of Minnesota) First-order methods for bilevel optimization
10:00-10:20	Coffee Break
Session 8, 10:20 - 12:00, Chair: Wei-Kun Chen	
10:20-11:10	**Thorsten Koch** (Zuse Institute Berlin&Technical University of Berlin) Benchmarking novel approaches on hard discrete optimization problems
11:10-12:00	**Qi Huangfu** (Cardinal Operations) Recent development of Cardinal Optimizer
12:00	Lunch (4^{th} floor of Wuke Restaurant)

June 25, 2024	
Session 9, 14:00 - 15:40, Chair: Thorsten Koch	
14:00-14:50	**Anthony Man-cho So** (The Chinese University of Hong Kong) Spurious stationarity and hardness results for Bregman-type algorithms
14:50-15:40	**Caihua Chen** (Nanjing University) Adaptive sampling strategies for stochastic composite optimization
15:40-16:00	Coffee Break
Session 10, 16:00 - 16:50, Chair: Junjie Ma	
16:00-16:50	**Ya-Feng Liu** (Academy of Mathematics and Systems Science, CAS) One-bit precoding in massive MIMO: Algorithm design and performance analysis
Closing Ceremony, 16:50 - 17:10, Chair: Junjie Ma	
16:50-17:10	Closing Address and "Best Poster Award" Announcement (Xiaojun Chen, Yu-Hong Dai)
17:10	Dinner (4th floor of Wuke Restaurant)

Abtract

Part I

Short Course

Moment and polynomial optimization

Jiawang Nie
University of California

This short course introduces basic theory and recent advances in moment and polynomial optimization. It will cover topics of sum of squares, nonnegative polynomials, ideals and quadratic modules, localizing matrices and vectors, flat extension and flat truncation, Moment-SOS relaxations, and the asymptotic and finite convergence. We will also introduce recent advances in Lagrange multiplier expressions, tight relaxations, Nash equilibrium problems, bilevel optimization, multi-objective optimization and data science optimization.

Part II

Invited Talks

Before optimizing deep transformers: How they behave at initialization

Yin Zhang
The Chinese University of Hong Kong, Shenzhen

Since its introduction in 2017, the transformer architecture has revolutionized AI and beyond, in which the key innovation is a self-attention mechanism. However, it has been extremely difficult to optimize deeper transformers of the original design. In this work, we present an analysis to show that the root cause is due to a phenomenon that we call token similarity escalation or TSE. We prove that, upon random initialization, token similarity escalates with depth at a linear rate, driven by spectral properties of attention matrices. Based on this insight, we propose a simple remediate scheme which, unlike existing remedies, removes excessive token similarity from deep models without diminishing the role of self-attention.

Nonsmooth nonconvex-nonconcave min-max optimization problems

Xiaojun Chen
The Hong Kong Polytechnic University

This talk considers nonsmooth nonconvex-nonconcave min-max optimization problems with convex feasible sets. We discuss the existence of local saddle points, global minimax points and local minimax points, and study the optimality conditions for local minimax points. We show the existence of local saddle points and global minimax points of the convex-concave saddle point problem with cardinality penalties and the relations with its continuous relaxation problems. Moreover, we give an explicit formula for the value function of the inner maximization problem of a class of robust nonlinear least square problems and complexity bound for finding an approximate first order stationary point. A smoothing quasi-Newton subspace trust region algorithm is presented for training generative adversarial networks as nonsmooth nonconvex-nonconcave min-max optimization problems. Examples of retinal vessel segmentation in fundoscopic images are used to illustrate the efficiency of the algorithm.

Two stage stochastic polynomial optimization

Jiawang Nie
University of California

This talk discusses how to find global optimal solutions for two-stage stochastic optimization problems. We introduce a two-phase approach. The first phase constructs a polynomial lower bound for the recourse function, by solving a linear conic optimization problem over the nonnegative polynomial cone. Given the complex structure of this cone, we employ semidefinite programming relaxations with quadratic modules to facilitate the computations. In the second phase, we solve a surrogate first-stage problem by substituting the original recourse function with the polynomial lower approximation obtained in the first phase. By doing this, we not only get a global lower bound for the nonconvex stochastic optimization, but also obtain an explicit polynomial approximation for the recourse function, where the number of variables is independent of the support of the underlying random vector. Therefore, this method is particularly suitable when the random vector obeys a continuous distribution or has a large number of discrete scenarios. Numerical experiments are conducted to demonstrate the effectiveness of this approach.

Multistage utility preference robust optimization

Huifu Xu
The Chinese University of Hong Kong

We consider a multistage expected utility maximization problem where the decision maker's utility function at each stage depends on historical data and the information on the true utility function is incomplete. To mitigate adverse impact arising from ambiguity of the true utility, we propose a maximin robust model where the optimal policy is based on the worst-case sequence of utility functions from an ambiguity set constructed with partially available information about the decision maker's preferences. We then show that the multistage maximin problem is time consistent when the utility functions are historical-path dependent and demonstrate with a counter example that the time consistency may not be retained when the utility functions are historical-path independent. With the time consistency, we show the maximin problem can be solved by a recursive formula whereby a one-stage maximin problem is solved at each stage beginning from the last stage. Moreover, we propose two approaches to construct the ambiguity set: a pairwise comparison approach and a zeta-ball approach where a ball of utility functions centered at a nominal utility function under zeta-metric is considered. To overcome the difficulty arising from solving the infinite dimensional optimization problem in computation of the worst-case expected utility value, we propose piecewise linear approximation of the utility functions and derive error bound for the approximation under moderate conditions. Finally, we use the stochastic dual dynamic programming (SDDP) method and the nested Benders' decomposition method to solve the multistage historical-path dependent preference robust problem and the scenario tree method to solve the historical-path independent problem, and carry out comparative analysis on the efficiency of the computational schemes as well as out-of-sample performances of the historical-path dependent and historical-path independent models. The preliminary results show that the historical-path dependent preference robust model solved by SDDP algorithm displays overall superiority. This is a joint work with Jia Li and Zhiping Chen.

Projected gradient descent algorithm forab initiocrystal structure relaxation under a fixed unit cell volume

Xin Liu
Academy of Mathematics and Systems Science, CAS

This talk is concerned withab initiocrystal structure relaxation under a fixed unit cell volume, which is a step in calculating the static equations of state and forms the basis of thermodynamic property calculations for materials. The task can be formulated as an energy minimization with a determinant constraint. Widely used line minimization-based methods (e.g., conjugate gradient method) lack both efficiency and convergence guarantees due to the nonconvex nature of the feasible region as well as the significant differences in the curvatures of the potential energy surface with respect to atomic and lattice components. To this end, we propose a projected gradient descent algorithm named PANBB. It is equipped with (i) search direction projections onto the tangent spaces of the nonconvex feasible region for lattice vectors, (ii) distinct curvature-aware initial trial step sizes for atomic and lattice updates, and (iii) a nonrestrictive line minimization criterion as the stopping rule for the inner loop. It can be proved that PANBB favors theoretical convergence to equilibrium states. Across a benchmark set containing 223 structures from various categories, PANBB achieves average speedup factors of approximately 1.41 and 1.45 over the conjugate gradient method and direct inversion in the iterative subspace implemented in off-the-shelf simulation software, respectively. Moreover, it normally converges on all the systems, manifesting its unparalleled robustness. As an application, we calculate the static equations of state for the high-entropy alloy AlCoCrFeNi, which remains elusive owing to 160 atoms representing both chemical and magnetic disorder and the strong local lattice distortion. The results are consistent with the previous calculations and are further validated by experimental thermodynamic data.

Accelerating preconditioned ADMM via degenerate proximal point mappings

Defeng Sun
The Hong Kong Polytechnic University

We aim to accelerate a preconditioned alternating direction method of multipliers (pADMM), whose proximal terms are convex quadratic functions, for solving 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 and the fast Krasnosel'skiĭ-Mann iteration into it, achieving asymptotic $o(1/k)$ and non-asymptotic $O(1/k)$ convergence rates. Subsequently, building upon the accelerated dPPM, we develop an accelerated pADMM algorithm that exhibits both asymptotic $o(1/k)$ and non-asymptotic $O(1/k)$ nonergodic convergence rates concerning the Karush–Kuhn–Tucker residual and the primal objective function value gap. Preliminary numerical experiments validate the theoretical findings, demonstrating that the accelerated pADMM outperforms the pADMM in solving convex quadratic programming problems. [This is a joint work with Yancheng Yuan, Guojun Zhang and Xinyuan Zhao.]

Quantitative models and techniques for optimal deployment of mobile health clinic service to underserved vulnerable communities

Jiming Peng
University of Houston

Mobile health clinics (MHC) play an instrumental role in providing healthcare services to underserved communities in both urban and rural areas. However, it is challenging to develop quantitative models and techniques to improve the operational efficiency for MHC programs. In this talk, we will introduce a few models in MHC applications including demand forecasting and operation scheduling, and discuss how to effectively solve these models to obtain meaningful solution.

Primal-dual algorithm for distributed optimization with coupled constraints

Liwei Zhang
Northeastern University

This talk focuses on distributed consensus optimization problems with coupled constraints over time-varying multi-agent networks, where the global objective is the finite sum of all agents' private local objective functions, and decision variables of agents are subject to coupled equality and inequality constraints and a compact convex subset. Each agent exchanges information with its neighbors and processes local data. They cooperate to agree on a consensual decision vector that is an optimal solution to the considered optimization problems. We integrate ideas behind dynamic average consensus and primal-dual methods to develop a distributed algorithm and establish its sublinear convergence rate. In numerical simulations, to illustrate the effectiveness of the proposed algorithm, we compare it with some related methods by the Neyman-Pearson classification problem. (This is a joint work with Mr. Kai Gong)

An affine-scaling active set algorithm for polyhedral constrained optimization: Complexity and practical performance

Hongchao Zhang
Louisiana State University

Large-scale polyhedral constrained optimization has important applications in modern optimization. Polyhedral Active Set Algorithm (PASA) provides an algorithm framework based on active set strategies to solve polyhedral constrained smooth nonlinear optimization. In this talk, we will show how the second-order Hessian information combined with affine-scaling techniques could be used to accelerate the convergence speed as well as ensure the convergence to a second-order stationary point. We will discuss these results from both theoretical convergence and practical implementation point of view. Some preliminary results show that the Affine-Scaling PASA (AS-PASA) using Hessian information has potential significant numerical performance improvement over gradient based PASA as well as IPOPT.

Branch and cut for partitioning a graph into a cycle of clusters

Ambros Gleixner
HTW Berlin & Zuse Institute Berlin

In this paper we study formulations and algorithms for thecycle clustering problem, a partitioning problem over the vertex set ofa directed graph with non-negative arc weights that is used to identifycyclic behavior in simulation data generated from nonreversible Markovstate models. Here, in addition to partitioning the vertices into a setof coherent clusters, the resulting clusters must be ordered into a cyclesuch as to maximize the total net flow in the forward direction of thecycle. We provide a problem-specific binary programming formulationand compare it to a formulation based on the reformulation-linearizationtechnique (RLT). We present theoretical results on the polytope associated with our custom formulation and develop primal heuristics andseparation routines for both formulations. In computational experimentson simulation data from biology we find that branch and cut based onthe problem-specific formulation outperforms the one based on RLT.

A hierarchy of nonconvex continuous reformulations for discrete optimization problems

Sergiy Butenko
Texas A&M University

Many discrete optimization problems can be formulated can be formulated as binary integer programs. Some of the most powerful general-purpose approaches for solving binary linear programs are based on hierarchies of successive convex (linear or semidefinite) relaxations that converge to an exact solution of the original formulation in a finite number of steps (given by the number of variables in the original formulation). The well-known examples of such approaches include Sherali-Adams, Lovasz-Schrijver and Lasserre hierarchies. Each next level of these hierarchies requires additional variables and constraints, eventually yielding an exact exponential-size convex reformulation of the original model. The excessive size of the reformulations limits the practical applicability of this methodology to a few initial levels of the hierarchies. We propose a fundamentally different approach to designing hierarchies of continuous formulations for discrete and combinatorial optimization problems. It shifts the focus from convexifying a given formulation to establishing equivalent non-convex reformulations of the original problem. The aim is to move towards an "equi-maximal" reformulation in which every local optimum is global. This property is eventually achieved at the final level of the hierarchy. In terms of computational complexity, the improved quality of local maxima in the proposed approach comes with an increased cost of objective function evaluation, as opposed to the increase in the number of variables and constraints in the existing hierarchies. The approach is demonstrated by extending the Motzkin-Straus formulation for the maximum clique problem to a hierarchy of standard polynomial programming formulations with the above-described properties. This talk is based on joint work with Mykyta Makovenko and Miltiades Pardalos

Efficiency and robustness for reinforcement learning

Guanghui (George) Lan
Georgia Institute of Technology

Reinforcement Learning (RL) has attracted considerable interest from both industry and academia during the past few years. The study of RL algorithms with provable rates of convergence, however, is still in its infancy. In this talk, we discuss some recent progresses that bridge RL with stochastic nonlinear programming. More specifically, we introduce a new and general class of policy mirror descent (PMD) methods and show that they achieve linear convergence for the deterministic case and optimal sampling complexity for the stochastic case for discounted Markov decision processes. We then consider the problem of solving robust Markov decision process (MDP) with the goal to find a robust policy that optimizes the worst-case objective values against the transition uncertainties. For a certain class of uncertainty sets, we develop a robust policy mirror descent (RPMD), and establish its linear rate of converge for the deterministic setting. We further develop a stochastic variant of the robust policy mirror descent method, named SRPMD, when the first-order information is only available through online interactions with the nominal environment. We establish the best known so far sample complexity for solving RMDP problems.

First-order methods for bilevel optimization

Zhaosong Lu
University of Minnesota

Bilevel optimization, also known as two-level optimization, is an important branch within mathematical optimization. It has found applications across various domains, including economics, logistics, supply chain, transportation, engineering design, and machine learning. In this talk, we will present first-order methods for solving a class of bilevel optimization problems using either single or sequential minimax optimization schemes. We will discuss the first-order operation complexity of these methods and present preliminary numerical results to illustrate their performance.

Benchmarking novel approaches on hard discrete optimization problems

Thorsten Koch
Zuse Institute Berlin & Technical University of Berlin

New hardware approaches besides classical digital computers are emerging, with quantum computers being at the forefront, along with other systems such as data-flow machines, mem-computing, and bifurcation chips. What all these approaches have in common is their claim to “solve” difficult, i.e., NP-hard, combinatorial optimization problems more effectively and rapidly than traditional methods. NP-hard problems are referred to as “intractable” in the literature and are considered very challenging to solve. However, this characterizes the theoretical worst-case complexity for the entire class of problems. The assertion that finding a solution is exceedingly difficult pertains to the decision problem. In contrast, identifying some feasible solution to the optimization version of the problem is often relatively straightforward. For instance, any permutation of cities constitutes a valid tour in the Traveling Salesperson Problem (TSP). The challenge lies in discovering the optimal tour and proving its optimality. The new approaches are capable of providing “good” solutions but fall short of proving optimality. The theoretical debate extends to whether, and to what extent, these problems can be approximated in polynomial time. However, the assurance offered by an approximation algorithm is merely a lower bound on the solution’s quality. Numerous questions remain unanswered, and ultimately, the only method to evaluate the practical performance of heuristic algorithms is to benchmark them against relevant instances. We will present our insights on this topic, a set of model independent benchmark problems and some observations on the performance of classical systems.

Recent development of Cardinal Optimizer

Qi Huangfu
Cardinal Operations

In this talk, we present the recent developments in the Cardinal Optimizer (COPT). We discuss some key techniques that contributed to the performance improvements of our LP and MIP solvers. We also introduce our latest GPU development experiences.

Spurious stationarity and hardness results for Bregman-type algorithms

Anthony Man-cho So
The Chinese University of Hong Kong

Although Bregman-type algorithms have been extensively studied over the years, it remains unclear whether existing stationarity measures, often based on Bregman divergence, can distinguish between stationary and non-stationary points. In this talk, we answer this question in the negative. Furthermore, we show that Bregman-type algorithms are unable to escape from a spurious stationary point in finite steps when the initial point is unfavorable, even for convex problems. Our results highlight the inherent distinction between Euclidean and Bregman geometries and call for further investigation of Bregman-type algorithms.

Adaptive sampling strategies for stochastic composite optimization

Caihua Chen
Nanjing University

In this talk, we focus on the stochastic composite problems where the objective function comprises both smooth and nonsmooth components. When only an estimate of the gradient of the smooth component is available, we introduce adaptively sampling strategies for proximal gradient methods and its acceleration counterpart. The sample size used to estimate the gradients in each iteration is selected according to the observed trajectory of the algorithm. We develop convergence rate guarantees for unaccelerated and accelerated schemes for convex, strongly convex, and nonconvex problems, which show that the stochastic accelerated proximal gradient algorithms with adaptive sampling strategies can achieve the optimal convergence rate of first order methods. Further, under some mild conditions, we also show the asymptotic behavior of the iteration sequences. In particular, for strongly convex objectives, the iteration sequences generated by the proposed algorithms enjoy linear convergence in distribution. Our numerical experiments demonstrate the effectiveness of the proposed algorithms in both machine learning and operation management problems.

One-bit precoding in massive MIMO: Algorithm design and performance analysis

Ya-Feng Liu
Academy of Mathematics and Systems Science, CAS

One-bit precoding is a promising way to achieve hardware-efficiency in massive MIMO systems and has gained growing research interests in recent years. However, the one-bit nature of the transmit signal poses great challenge to precoding design as well as performance analysis. In this talk, we will present some recent results on one-bit precoding. We will focus on both nonlinear and linear-quantized precoding schemes. In particular, for nonlinear precoding, we introduce a new negative $\ell 1$ penalty approach, which is based on an exact penalty model that penalizes the one-bit constraint into the objective with a negative $\ell 1$-norm term. The negative $\ell 1$ penalty approach achieves a better trade-off in complexity and symbol error rate (SER) performance than existing approaches. For linear-quantized precoding, we give an aysmptotic performance analysis for a wide class of precoders and derive the optimal precoder within the considered class. Different from existing Bussgang-decomposition-based analyzes, our analytical framework is based on random matrix theory (RMT), which is more rigorous and can be extended to more general cases.

Poster List

June 23-24, 2024, 16:00-18:00 Lecture Hall (1st floor), Siyuan Building of AMSS	
A1	**Xindong Tang** (Hong Kong Baptist University) Solving robotic control problems with safety constraints using moment and SOS relaxations
A2	**Chunfeng Cui** (Beihang University) Non-convex pose graph optimization in SLAM via proximal linearized Riemannian ADMM
A3	**Ruijin Zhang** (Academy of Mathematics and Systems Science, CAS) IPRSDP: a primal-dual interior-point relaxation algorithm for semidefinite programming
A4	**Yue Wang** (The Hong Kong Polytechnic University) An augmented Lagrangian method for training recurrent neural networks
A5	**Yuchao Tang** (Guangzhou University) Solving monotone inclusions involving the sum of three maximally monotone operators and a cocoercive operator with applications
A6	**Kun Huang** (The Chinese University of Hong Kong, Shenzhen) Distributed stochastic optimization under a general variance condition
A7	**Zhijie Xie** (Beijing University of Posts and Telecommunications) Cyclic stochastic gradient descent methods
A8	**Kai Tu** (Shenzhen University) A max-min-max algorithm for large-scale robust optimization
A9	**Jinling Zhou** (Xiangtan University) The rank-1 completion problem for cubic tensors

June 23-24, 2024, 16:00-18:00 Lecture Hall (1st floor), Siyuan Building of AMSS	
B1	**Manlan Li** (Hunan First Normal University) Randomization of spectral risk measure when decision maker's preference is random and robust formulation
B2	**Feifei Shen** (Xiangtan University) Distributionally robust mean-risk optimizationwith shortfall risk constraints with applications
B3	**Xin Chen** (Beihang University) Convergence of ADMM for "weakly + strongly + strongly" convex optimization problems
B4	**Wei Hu** (Academy of Mathematics and Systems Science, CAS) A low computation cost cubic regularized Quasi-Newton method for distributed optimization: LC3RQN
B5	**Bin Zhou** (Nanjing Normal University) Accelerated dynamic stochastic primal-dual method for multistage stochastic optimization
B6	**Kaixiang Hu** (Beijing University of Posts and Telecommunications) An exact column generation algorithm for load balancing in capacity sharing networks
B7	**Lingzi Jin** (The Hong Kong Polytechnic University) Complexity towards D-stationarity of nonconvex optimization for RNNs
B8	**Hao Luo** (Chongqing Normal University) A family of ODE-solver based fast alternating direction methods of multipliers with applications to sparse regression
B9	**Yi Zhang** (Academy of Mathematics and Systems Science, CAS) Symplectic extra-gradient type method for solving general non-monotone inclusion problem
B10	**Ying Gao** (Beihang University) Extended alternating structure-adapted proximal gradient algorithm for nonconvex nonsmooth optimization

June 23-24, 2024, 16:00-18:00 Lecture Hall (1st floor), Siyuan Building of AMSS	
C1	**Min Zhang** (Southwest Petroleum University) Improved LCPSO-KM clustering algorithm based on density radius
C2	**Ruoyu Diao** (Academy of Mathematics and Systems Science, CAS) Stability for Nash equilibrium problems
C3	**Yun Zeng** (Beihang University) On adaptive stochastic extended iterative methods for solving least squares
C4	**Zhonglin Xie** (Peking University) ODE-based learning to optimize
C5	**Yang Liu** (University of Oxford) Efficient adaptive regularized tensor methods
C6	**Feihu Huang** (Nanjing University of Aeronautics and Astronautics) Optimal Hessian/Jacobian free Nonconvex-PL bilevel optimization
C7	**Jian Chen** (National Center for Applied Mathematics in Chongqing) Objective imbalances: A challenge for descent methods in multiobjective optimization
C8	**Lin-xin Yang** (The Chinese University of Hong Kong, Shenzhen) PDHG-unrolled learning-to-optimize method for large-scale linear programming
C9	**Yu-Yang Tang** (Academy of Mathematics and Systems Science, CAS) A dynamic relaxation framework for AC optimal power flow
C10	**Guangming Li** (Beijing University of Posts and Telecommunications) Valid inequalities for the edge disruptor problem

The organizing committee wishes you a pleasant stay in Beijing!