

SEMINARIUM INSTYTUTOWE

9 kwietnia 2025 r., środa, godz. 12:00
Sala 200

Proximal Stabilized Interior Point Methods and Applications

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In this talk, we present recent advances in the use of Proximal-Stabilization techniques within Interior Point Methods, highlighting both theoretical developments and practical applications across a range of optimization problems. We begin by discussing our work on Proximal Stabilized Interior Point Methods combined with low-frequency-update preconditioning techniques, which enhances numerical stability and computational efficiency in large-scale settings [CG23]. Building on this foundation, we introduce a regularized Interior Point Method tailored for sparse Optimal Transport problems on graphs, demonstrating its effectiveness in managing the sparsity and complexity inherent in network-structured data [CGZ24]. We also extend these stabilization ideas to semidefinite programming, offering new strategies for solving large-scale, structured semidefinite problems with improved robustness [CG24]. Finally, we explore how Proximal-Stabilization techniques can be applied to enforce Katz and PageRank centrality measures in complex networks, opening new perspectives in complex network analysis [CDM25].

References:

[CG23] S. Cipolla and J. Gondzio. “Proximal Stabilized Interior Point Methods and Low-Frequency-Update Preconditioning Techniques”. *J. Optim. Theory Appl.* (2023)

[CGZ24] S. Cipolla, J. Gondzio, and F. Zanetti. “A regularized Interior Point Method for sparse Optimal Transport on Graphs”. *European J. Oper. Res.* (2024)

[CG24] S. Cipolla and J. Gondzio. “Proximal-Stabilized Semidefinite Programming”. *Comput. Optim. Appl.* (2024)

[CDM25] S. Cipolla, F. Durastante, and B. Meini. “Enforcing Katz and PageRank Centrality Measures in Complex Networks”. arXiv:2409.02524 (2025)