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CORVINUS INSTITUTE FOR ADVANCED STUDIES

Activity summary of CIAS research fellow in Budapest

Grant category: ☐ junior ☐ senior ☒ non-resident senior

Name: Zsolt Darvay

Home institute (name, position, country): Babeș-Bolyai University, Cluj-Napoca, Associate Professor, Romania

Academic Year / Semester: 2022-2023 / Second Semester

Duration: 5 months (1 February 2023 – 30 June 2023)

Project title: Deepening of the analysis of the algebraic equivalent transformation technique for interior-point algorithms

Project description*:
We analyze interior-point algorithms (IPAs) to solve linear optimization (LO) problems and linear complementarity problems (LCPs). We use the algebraically equivalent transformation (AET) technique to determine the search directions.

Achieved result(s)*:
In a joint paper with Petra Renáta Rigó (Corvinus University of Budapest, Hungary), we generalized a recent paper [Tibor Illés, Petra Renáta Rigó and Roland Török: Unified approach of primal-dual interior-point algorithm for a new class of AET functions, Corvinus Econ. Work. Paper 2022/02] to symmetric cone horizontal linear complementarity problems. We extended and modified the class of algebraically equivalent transformation functions presented in the previous paper. In this way, we proved polynomial complexity of a class of interior-point algorithms obtained using the algebraically equivalent transformation technique.

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In a second paper, we extended a large-step interior-point algorithm for linear optimization to the class of P*(kappa) linear complementarity problems. Search directions were determined using the method of algebraically equivalent transformations. We introduced a new wide neighborhood of the central path for linear complementarity problems and proved that the complexity of our algorithm is identical to the complexity of the best-known short-step algorithms. We presented some numerical results to demonstrate the efficiency of the algorithm.

Connected publications*
1.
Title: Interior-point algorithm for symmetric cone horizontal linear complementarity problems based on a new class of algebraically equivalent transformations
Date of submission/acceptance/publication: 25 May 2023
Journal: Optimization Letters
Journal category (if applicable): ☐ Q1 ☒ Q2 ☐ Q3
Status: ☒ accepted/published ☐ in progress ☐planned
2.
Title: Large-step algorithm for linear complementarity problem with new search direction
Date of submission/acceptance/publication: 30 June 2023
Journal: Optimization
Journal category (if applicable): ☒ Q1 ☐ Q2 ☐ Q3
Status: ☐ accepted/published ☒ in progress ☐planned

Professional collaborations, partnerships*

1.
Name: Tibor Illés
Institution: Corvinus Center for Operations Research, Corvinus University of Budapest
Field of research: Optimization, Interior-point algorithms
Future plans for joined research: collaboration, joint papers

2.
Name: Petra Renáta Rigó
Institution: Corvinus Center for Operations Research, Corvinus University of Budapest
Field of research: Optimization, Interior-point algorithms
Future plans for joined research: collaboration, joint papers

3.
Name: Marianna Eisenberg-Nagy
Institution: Corvinus Center for Operations Research, Corvinus University of Budapest
Field of research: Optimization, Interior-point algorithms
Future plans for joined research: collaboration, joint papers

4.
Name: Anita Varga
Institution: Budapest University of Technology and Economics
Field of research: Optimization, Interior-point algorithms

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Future plans for joined research: collaboration, joint papers
5.
Name: Roland Török
Institution: Corvinus University of Budapest
Field of research: Optimization, Interior-point algorithms
Future plans for joined research: collaboration, joint papers

Additional activities* (public lectures, presentations, professional meetings, media connections etc.):
1. Presentation on the 7th CIAS International Workshop, Corvinus Institute for Advanced Studies, Corvinus University of Budapest, 11 May 2023. Title of the talk: New type of algebraically equivalent transformation techniques
2. As a member of the Program Committee of the 20th EUROpt Workshop: Continuous Optimization Working Group, to be held at Corvinus University of Budapest, August 23-25, I organized a special stream on interior-point algorithms, with three sessions.

Future plans, planned return (if any):
☒ I plan to return to Hungary later
☒ I plan to maintain my professional contacts via e-mail
☐ Any other comment:

*Please give us a properly detailed summary.

Date: 30 June 2023

Signature: