BUDAPESTI CORVINUS EGYETEM

CORVINUS INSTITUTE
FOR ADVANCED STUDIES

Activity summary of CIAS research fellow in Budapest

Grant category: ☐ junior ☒ senior

Name: Sorin-Mihai GRAD

Home institute (name, position, country): ENSTA Paris, France, Professor of Optimization

Academic Year / Semester: 2021/2 – summer semester

Duration: 1 month (= 2 x 2 weeks)

Project title: Proximal Point Methods in Vector Optimization

Project description*: The goal of this project is to design, analyse and implement iterative schemes of proximal type for solving nonsmooth convex vector optimization problems. The investigations are planned in several directions: -improving existing algorithms for convex vector optimization problems; -designing and analysing algorithms for structured convex vector optimization problems. One of our aims is to weaken the hypotheses under which the existing algorithms for solving simple vector optimization problems converge, as at the moment they are mostly difficult to verify. On the other hand, we are interested in using the latest advances on solving constrained convex optimization problems in order to solve the intermediate vector optimization problems that appear in each iterative step of these proximal point algorithms (for which currently inefficient external solvers are necessary). The second direction concerns structured convex vector optimization problems, i.e. problems consisting in vector-minimizing sums of cone-convex vector functions, for which currently only the forward-backward method proposed in my paper with Boţ from Optimization (that works only in a limited framework) is available. We are interested in dealing with more general such problems and in providing full splitting approaches for solving them. Our numerical schemes should be not only of theoretical interest, as has been so far the case in the literature, but really capable of solving vector optimization problems. We plan to illustrate their efficiency by testing them on real-life problems arising in fields like Finance Mathematics (Portfolio Optimization), Image Processing or (Multiobjective) Facility Location Optimization.

Achieved result(s)*: During my stay at CIAS, together with T. Illés & P.R. Rigó from CCOR (CIAS) we have achieved several very promising results on new algorithms for solving some classes of multiobjective optimization problems. The most important feature of these methods is that they are fully computable, i.e. one does not need to require to external solvers or strange loops in order to actually solve the considered multiobjective / vector optimization problems, because the involved subproblems are simpler (either linear or quadratic) than the ones usually used in such algorithms.

We are working further on illustrating these theoretical achievements by numerical examples. At the moment, the first joint paper is in preparation, with two more potential articles "on the pipeline".

Moreover, during my stay at CIAS in April 2022 I made the final revision of the paper "Relaxed-inertial proximal point type algorithms for quasiconvex minimization" which has been in the meantime published in the Q1-rated outlet Journal of Global Optimization.

Connected publications*

1.
Title: Relaxed-inertial proximal point type algorithms for quasiconvex minimization
Date of submission/acceptance/publication: published on Aug 26, 2022
Journal: Journal of Global Optimization, DOI: 10.1007/s10898-022-01226-z
Journal category (if applicable): ☒ Q1   ☐ Q2   ☐ Q3
Status: ☒ accepted/published   ☐ in progress   ☐planned

2.
Title: New computable algorithms for smooth multiobjective optimization problems
Date of submission/acceptance/publication: in preparation
Journal: to be submitted to European Journal of Operational Research
Journal category (if applicable): ☐ Q1   ☐ Q2   ☐ Q3
Status: ☐ accepted/published   ☒ in progress   ☐planned

Professional collaborations, partnerships*

1.
Name: Tibor Illés
Institution: CCOR / CIAS
Field of research: algorithms for solving multiobjective optimization problems
Future plans for joined research: continue our joint work on computable algorithms

2.
Name: Petra Renata Rigó
Institution: CCOR / CIAS
Field of research: algorithms for solving multiobjective optimization problems
Future plans for joined research: continue our joint work on computable algorithms

Additional activities* (public lectures, presentations, professional meetings, media connections etc.):
1. talk on "Proximal point type algorithms for solving vector optimization problems" at CCOR / CIAS (April 07, 2022)
2. mini-course (3 x 2h) on "Current Trends in Vector Optimization" for CCOR / CIAS and graduate students in Mathematics / Economics of the Corvinus University of Budapest (April 05-07, 2022)
3. online talk on "Extending the proximal point algorithm beyond convexity" at the Australian Variational Analysis and Optimisation Webinar (April 06, 2022)

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: I would love to be come back to CIAS and to work with my colleagues from CCOR.

*Please give us a properly detailed summary.

Date: October 01, 2022

Signature: