PhD Position in Generating Cutting Planes by Exploiting Symmetry

In the Combinatorial Optimization group at Eindhoven University of Technology (The Netherlands), there is a vacancy for a 4 year PhD-position within the NWO project "Local Symmetries for Global Success". This PhD position is supervised by Christopher Hojny.

The vacancy can be found at here. The vacancy remains open until a suitable candidate has been found and closes definitively on March 5, 2023.

Starting date: preferably first half of 2023

Project Description

Cutting planes and symmetry handling techniques are two of the most powerful components of mixed-integer programming (MIP) solvers and there exists a vast amount of literature on both topics. However, despite the success of both components, there seems to be almost no research on combining these two fields. This is an unused potential: if a MIP admits symmetries, then they also carry over to cutting planes.

The goal of this project is to transfer the positive effect of symmetry handling for an entire MIP to the generation of cutting planes. Among others, we will explore how symmetries can be used to generate cutting planes faster and to strengthen weak cutting planes in general MIP software. This project also gives the opportunity to evaluate the practical performance of the developed techniques in the state-of-the-art MIP software SCIP.

The successful candidate for this PhD position will work under the supervision of Christopher Hojny in the group Combinatorial Optimization of the department of Mathematics and Computer Science of TU/e. Your responsibilities include to perform scientific research on the topic of the above-mentioned project and to publish your results at international conferences and in international journals. For a small percentage of your time, you will be asked to assist with educational tasks (course support and supervision of students).

Job Requirements

You have a master degree in (Applied) Mathematics or a related field.

- You have a strong background in Integer Programming, Discrete Optimization, and Combinatorial Optimization.
- You are enthusiastic about programming, preferably in C.
- You have good communication skills.
- You are creative, ambitious, as well as self-motivated, proactive, and goal-oriented.
- You have a good command of the English language (knowledge of Dutch is not required).

Further Information

For more information about the project or about the working conditions, please contact Christopher Hojny (c.hojny@tue.nl).

How to Apply

Applications should be done through this following website. Besides personal and contact information, you should upload the following documents as PDFs:

- A cover letter in which you describe your motivation, research experience, interests, and qualifications for the position.
- A curriculum vitae, including a list of publications (if existing) and two academic references. We do not need reference letters at this stage.
- BSc and MSc transcripts

Do not upload any other documents.