View this email in your browser

AI Institute for Advances in Optimization

The Monthly Opt-In Newsletter | March 2024

LETTER FROM THE DIRECTOR

The mission of AI4OPT has always been to fuse AI and optimization to deliver new breakthroughs and address important societal challenges. As the research advances, more and more applications emerge that can benefit from this approach. One application that I am particularly excited about is the potential of AI to improve our health systems.

AI4OPT recently started collaborating with Shriners Hospitals for Children, and we are building the partnerships necessary to make a difference in this space.

This newsletter highlights two people who are also expanding their research into new and interesting areas. Constance Crozier, a faculty member working at the intersection of power systems and supply chains. These are both core areas of AI4OPT, and their intersection has become increasingly important due to the interaction between electric vehicles and the power grid.

Regarding our educational program, I want to mention that we are once again organizing the Seth Bonder Camps this summer, including the new Level 3 camp on deep learning. I highly recommend high school students to sign up, and more information is provided in this newsletter.

Finally, I want to congratulate the new 2024 cohort of the AI4OPT Faculty Training Program. These professors at minority-serving institutions will take on the challenge of learning AI and data science so that they can, in turn, teach their students. See you all in Atlanta this summer!

- Pascal Van Hentenryck

Member Spotlight

Tell us about your work with AI4OPT.

My work focuses on electrified transport. Electric vehicles represent a fundamentally new coupling between energy and transportation networks; two sectors which historically have operated independently. I am interested in how the flexibility from the transport sector can be leveraged to support future energy systems. My research focuses on developing distributed optimization methods for privately owned vehicle charging to minimize their impact on power infrastructure.

How would you say your work with AI4OPT is being used particularly to

Constance Crozier

I am an H. Milton Stewart School of Industrial and Systems Engineering (ISyE) Assistant Professor at Georgia Tech. My interests lie in the operation and composition of future low carbon power systems, especially regarding the integration of large-scale demand response.

Previously, I was a postdoctoral researcher at CU Boulder. Before that I worked in government, at the Department of Business, Energy and Industrial Strategy as a Technical Energy Specialist. I received all of my degrees at the University of Oxford. My Ph.D., in the **Energy and Power Group**, investigated the impacts that wide-spread electric vehicle charging would have on operation of electricity networks; both if consumers charge without intervention, and with smart charging. You can read my thesis **here**.

I have a number of hobbies, which mostly revolve around spending time outside.

Publications

address and optimize supply chain operations, management, etc.?

Various components of supply chains can be electrified to reduce the environmental impact of supply chains. There is natural redundancy within supply chains (both for robustness and because of resource scheduling constraints). My work in part addresses whether this robustness could be used to reduce variability in renewable generation output.

A large focus of my research is how to achieve distributed optimization of privately owned vehicle charging to minimize their impact on power infrastructure. Electric vehicles represent a large, distributed energy storage resource so it is much more cost-effective to shift charging than install additional grid-scale battery storage in the system. Previously I have worked on this problem from both ends: developing data-driven models which capture diversity in individual vehicle behavior, and developing new power system optimization methods which incorporate the option to use vehicle charging.

PostDoc Highlight

Jihye Jung

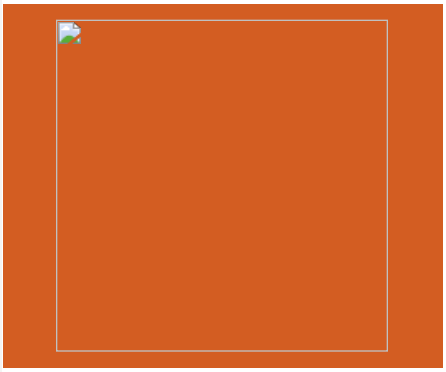
My name is Jihye Jung, and I am a postdoctoral researcher at the H. Milton Stewart School of Industrial and Systems Engineering (ISyE), which is a department in the Georgia Institute of Technology's College of Engineering. I work with Pascal Van Hentenyck, the Director of AI4OPT, within the Supply Chain Team group within the Institute.

Tell us about your recent work on AI for quantum circuit design.

Recently, I've been collaborating with Kevin Dalmeijer, our managing director, on the challenge of quantum circuit design. Our focus has been on refining the optimization model for quantum circuit design, aiming for simplicity and reduced mathematical complexity. This enhancement has significantly improved computational performance compared to previous studies, even when using traditional optimization solvers. However, our aspirations extend beyond these achievements; we are determined to tackle more intricate circuits to enable practical applications of quantum circuit design through optimization. I firmly believe that leveraging AI techniques will be pivotal in realizing this goal.

What keeps your interest in artificial intelligence (AI) and/or optimization?

As I mentioned earlier, in modern times, there are many problems that are becoming increasingly difficult to solve using traditional optimization methods alone. Take, for example, the quantum circuit design problem I was pondering during my doctoral studies. Even for small-scale problems, the mathematical models explode with tons of variables. To find solutions to such problems, I've believed that new methodologies are necessary, and I've considered AI as a possible approach.



Out of all the choices, why did you choose AI4OPT?

To be honest, when I first started looking for postdoc positions in the United States, I searched for "AI and optimization postdoc" on Google, and AI4OPT was at the top of the list. That's how I first found out about it. When I looked at the website, I found the research topics very interesting. They align perfectly with the kind of research I wanted to pursue. We're entering an era where traditional optimization methods alone struggle to solve real-world problems; this prompts me to consider AI as a promising solution to overcome these computational challenges. I was impressed to find a substantial group demonstrating AI for optimization in various aspects. With that in mind, I knocked on AI4OPT's door multiple times with the firm intention of joining them, and fortunately, I ended up here. I'm happy to work here with fantastic colleagues, learn a lot, and enjoy abundant resources for research.

Can you tell us about something you enjoy when you're not studying or conducting research?

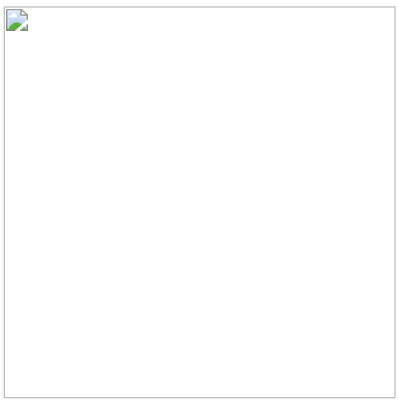
I enjoy cooking Korean and Italian cuisine for myself. You know the saying, 'You are what you eat,' right? I believe that eating healthily is essential for maintaining a good lifestyle, especially when living far from home. Sometimes I invite friends over to my place and treat them to some homemade Korean dishes. If anyone is interested in joining, feel free to reach out anytime.

Share a fun fact about yourself.

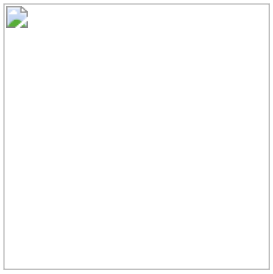
Did you know there's a big ballet center in Atlanta? I learned contemporary dance in Korea, but I started learning ballet after coming to the United States. There's a huge center called the Michael C. Carlos Dance Centre not far from Midtown, spanning 55,000 square feet. Moving gracefully to the music not only relieves stress but also helps with posture correction. Of course, I'm a beginner in ballet, so I'm a student in the "Absolute Beginner" class. Haha!

News

Kevin Dalmeijer kicks off HerWILL Cutting Edge Technology Workshop Series, AI for Optimization



Pascal Van Hentenryck Belgium News Feature



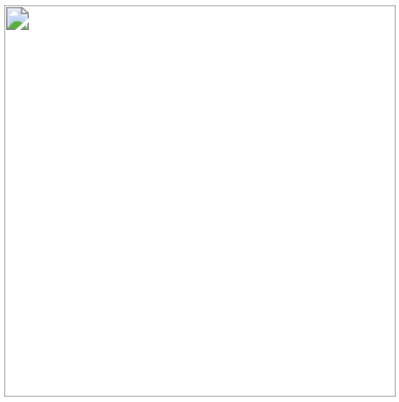
siam
Society for Industrial and Applied Mathematics

Georgia Tech, University of Waterloo Forge Partnership to Advance AI Initiatives

Fusing Artificial Intelligence and Optimization with Trustworthy Optimization Proxies

AI4OPT had eight papers accepted for the PSCC-2024 conference, which is a top power system conference. These papers cover various topics such as primal and dual proxies, risk assessment, expansion planning, forecasting, and more. You can find more information about the conference, here.

Events and Conferences



Events

AI4OPT Tutorial Lectures With Joel Tropp
March 25 - 29, 2024; Noon - 1:00PM

AI4OPT Seminar Series: Lei Ying
April 4, 2024; Noon - 1:00PM

AI4OPT Tutorial Lectures With Aditya Ramdas
April 10 - 11, 2024; Noon - 1:00PM

Conferences

AI/Operations Research Workshop III
March 21-22, 2024

More Events

CCC
Computing Community Consortium
Catalyst

Outreach and Education

Seth Bonder Camp 2024

The Seth Bonder Camp (SBC) is back for 2024, offering exciting opportunities in Computational and Data Science for Engineering! You can see the diverse camps and programs offered by visiting the following link below:

SBC Main Page

The Seth Bonder Camp 2024

Accomplishments and Announcements

AI4OPT participated in the AAAI conference, which covers all areas of artificial intelligence. The conference took place February 2024 in Vancouver, Canada. Pictured are Thomy Phan, Sven Koenig, and Bistra Dilkina (USC).

Read More

Publications

The latest AI4OPT publications are now available on **Google Scholar**.

Follow AI4OPT