



THE MONTHLY OPT-IN



AI4OPT Monthly Newsletter

Table of Contents

-
- Page 01**
Director's Letter
 - Page 02**
Management Member
Spotlight
 - Page 03**
SAIL Summit
 - Page 04**
Student Highlights
 - Page 05**
News & Publications
 - Page 06**
Upcoming Event &
Conferences

ai4opt.org

FROM THE DIRECTOR

In any application area, disparate treatment, disparate impact, and resulting unintended outcomes are a reality across the spectrum. These are expected to be further exacerbated by the scale and adoption of cutting-edge technologies and the aftermath of the pandemic. AI4OPT is dedicated to taking the right measures to mitigate the harm of socio-economic trends and historic disparities embedded in the data, to ensure that the developed systems are fair, ethical, and transparent to the greatest extent possible, and reduce a deeper propagation of biases in future datasets. To reach this goal, AI4OPT is integrating ethics and research both in its daily operations and in its research activities. The Ethics Advisory Board led by Raluca Scarlat is tasked with integrating ethics and research and leading the conversation about the ethical implications of technologies developed by the Institute.



The complementary Ethical AI research thrust is fusing AI and optimization to expand the toolkit for ethical and socially conscious design of large-scale deployments across all the AI4OPT application areas. This includes work on fairness in facility location problems (supply chains) and fair and reliable reconnections for power disruptions (power systems). This newsletter features a spotlight on two of the people who are making ethics a priority within the AI4OPT Institute: Professor Justin Biddle and student Jai Moondra. We hope you enjoy our latest monthly newsletter.

- **Pascal Van Hentenryck**

MEMBER RESEARCH SPOTLIGHT

WORK AND CONTRIBUTIONS OF AI4OPT RESEARCHERS

Justin Biddle co-leads AI4OPT's Ethical AI thrust. He is also an associate professor in the School of Public Policy at the Georgia Tech and director of the new Ethics, Technology and Human Interaction Center (ETHICx). Biddle's research interests are in philosophy of science and technology, ethics of emerging technologies (especially AI), and science and technology policy.



AI4OPT's Ethical Response and Design of AI Systems

By Justin Biddle

My background is in the philosophy of science and technology and the ethics of emerging technologies. I'm particularly interested in artificial intelligence and ethical issues in machine learning.

The most common approaches to AI ethics are principle based. Many AI companies and organizations are publishing AI ethics codes that highlight high-level principles like responsibility, fairness, and accountability, which are supposed to guide the design of AI systems. The consideration of these principles should reduce bias, prevent discrimination, and lead to benefits for humanity. But, while these principles are valuable, it's often not clear how organizations interpret these principles and apply them in specific cases. How effective are these principals at improving the design of AI systems?

Some of the work I am doing with Swati Gupta (lead of AI4OPT's Ethical AI and assistant professor and Fouts Family Early Career professor in the H. Milton Stewart School of Industrial & Systems Engineering) and others is identifying practices for designing AI systems in an ethical and responsible way – practices that structure the kinds of questions researchers are asking and whom they are engaging. The Institute of Electrical and Electronics Engineers (IEEE), the world's largest technical professional organization dedicated to advancing technology for the benefit of humanity, has put out a standard that incorporates practices and processes (not just principles) for ethical and responsible design. A paper we are currently working on will show ways in which the IEEE Standard can be adapted into AI4OPT. Though the IEEE standard focuses on AI generally, we think that it can be refined for what AI4OPT is looking to achieve.

This standard focuses on identifying and understanding the ways in which an AI system might impact different dimensions of human well-being. Oftentimes, systems are developed to promote some aspects of well-being (e.g., economic benefits for producers that result from efficiency gains), and other dimensions of well-being (e.g., physical or mental health of workers) can be neglected. There are often unintended consequences of AI systems, which can impact different dimensions of well-being. This standard attempts to identify the variety of different dimensions of well-being that are impacted by an AI system, and to articulate ways in which we can gather data that will illuminate these different well-being impacts. Ideally, this standard can help us create a "well-being indicators dashboard" that can be used by researchers to shed light on these impacts and adjust the AI system to better promote human well-being.

A well-being indicators dashboard is created in two phases:

1. The first phase is internal, where researchers themselves try to answer a set of questions about what the AI system does, who might be impacted by it, what the risks and benefits might be for different stakeholders, and so on.
2. The second phase builds on the first by identifying potential stakeholders and engaging them about how the system might impact them. This phase is important, because researchers and designers of AI systems do not necessarily understand the concerns and experiences of those impacted by the systems they are creating.

Both phases can help to better understand how AI systems impact well-being in its variety of dimensions, and this knowledge can in turn be used to redesign the systems to better promote human well-being.

I am motivated to address the vagueness of many AI ethics codes by identifying, implementing, and assessing standards for ethical and responsible design of AI systems, such as the one produced by IEEE. Standards like this can hopefully guide data scientists and researchers to build AI systems in an ethical manner that benefit society.



SAIL SUMMIT RECAP



AI4OPT Director Pascal Van Hentenryck, Managing Director Kevin Dalmeijer, and other AI4OPT team members attended the AI Institutes Virtual Organization (AIVO) Summit for AI Institutes Leadership (SAIL) held in mid-December in California.



The inaugural conference was an opportunity for team interactions, discussions and building connections among each of the 18 NSF and USDA-NIFA funded AI institutes.



Panel sessions featured speakers from the AI4OPT team including Swati Gupta who leads the ethical AI thrust which



aims to provide data scientist, researchers, and stakeholders with guidance when faced with an ethical decision regarding trust, equity, standard, and practice in AI systems. She spoke during the Institute Faculty Addressing Ethics Challenges discussion about ethical issues in automated decision-making.



STUDENT HIGHLIGHTS

GET TO KNOW OUR STUDENTS AND THEIR CONTRIBUTIONS!

Meet **Jai Moondra**, who is entering his third year as a Ph.D. student in the Algorithms, Combinatorics and Optimization (ACO) program at Gregoria Tech and a member of AI4OPT's Ethical AI team. Moondra completed his undergraduate studies in the Department of Computer Science and Engineering at Indian Institute of Technology Delhi (IIT Delhi). He has always been drawn to patterns and numbers, which led to his Ph.D. work in AI and optimization.



Q: Tell us about your work in Ethical AI and how you became involved with AI4OPT?

A: I design fair algorithms for classical combinatorial optimization problems. Traditionally, most theoretical problems have focused on efficiency and optimal resource utilization instead of fairness. New theoretical models and algorithms are needed to strike a balance between these two competing notions. My advisors are both part of the Ethical AI team at AI4OPT, and so it was a natural choice to work with the institute and investigate these questions.

Q: What sparked your interest in the ethics thrust of AI and optimization?

A: Algorithms make all sorts of decisions for us in our daily lives, ranging from scheduling airplanes to recommending items for online shopping, to editing and enhancing our pictures. It is important that we understand the notions of fairness and ethics at a fundamental level and apply any insights to real-world AI systems and optimizers. This presents a fascinating question that has motivated my research—how do theoretical and applied models and algorithms change as we account for fairness, and does that make the technical problems harder?

Q: What is something unique about you?

A: I am interested in classical poetry in two languages: English and Hindi-Urdu, and I think poetry and mathematics have something in common: beautifully arranged ideas and patterns.

Q: What is something fun you do when you're not studying or doing research work?

A: I like going on hikes, particularly in the fall season. There are some beautiful hiking trails, here in Georgia. I also like reading both fiction and non-fiction books.



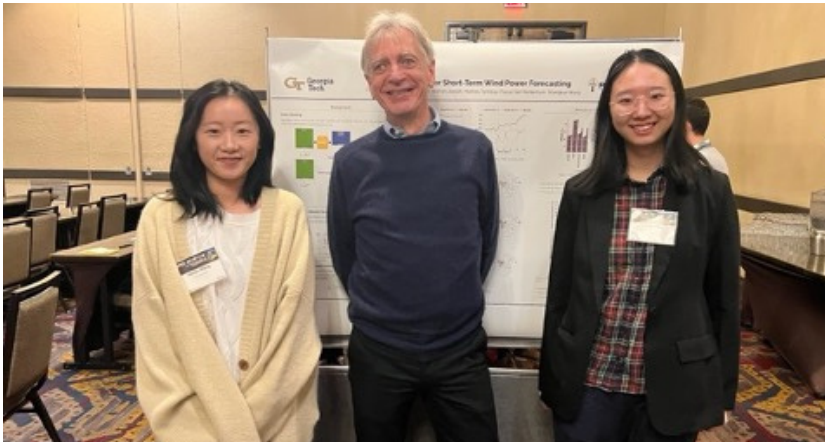
NEWS & PUBLICATIONS

CURATED COVERAGE OF OUR RESEARCH AND EVENT APPEARANCES



During the 2023 Grid Science Winter School and Conference organized by Los Alamos National Lab (LANL), AI4OPT member Bistra Dilkina (University of Southern California) presented, and Pascal Van Hentenryck (Georgia Tech) and Swati Gupta (Georgia Tech) provided keynote talks.

AI4OPT won a number of scholarships, and five students were able to attend the conference: Wenbo Chen, Michael Klamkin, Babak Taheri, Hanyu Zhang, and Haoruo Zhao. Additionally, Zhao won the best poster award.



AI4OPT Director Pascal Van Hentenryck attends workshop on transportation, mobility, and the future of infrastructure in DC featuring U.S. Transportation Secretary Pete Buttigieg.



PUBLICATIONS

AI4OPT is expanding the toolkit for ethical and socially conscious AI design simultaneously with optimizing systems for multiple fairness metrics and providing tools to detect gerrymandering.

- Gupta, S., Jalan, A., Ranade, G., Yang, H., & Zhuang, S. (2020). Too many fairness metrics: Is there a solution? SSRN Electronic Journal. <https://doi.org/10.2139/ssrn.3554829>
- Zhao, Z., Hettle, C., Gupta, S., Mattingly, J. C., Randall, D., & Herschlag, G. J. (2022). Mathematically quantifying non-responsiveness of the 2021 Georgia Congressional Districting Plan. Equity and Access in Algorithms, Mechanisms, and Optimization. <https://doi.org/10.1145/3551624.3555300>

MARK YOUR CALENDAR!

AI4OPT EVENTS

The AI4OPT Seminar Series returns for spring 2023!



This month, we will have Anirbit Mukherjee from the University of Manchester joins us Jan 19 and Fatma Kiliç-Karzan from Carnegie Mellon University will join us Jan 26.

In addition to the series, there will be two week-long tutorial lectures the week of Mar 10 and Apr 17.



To view past seminars, click [here](#).

FULL EVENT LIST

Email, subscribe, and follow us to learn more!



CONFERENCES

The annual AAI Conference on Artificial Intelligence is one of the leading international academic conferences in artificial intelligence. The four-day event includes keynotes by industry leaders and visionaries, and hands-on workshops for data engineers, data scientists, ML engineers and business leaders.



This year's theme is to create collaborative bridges within and beyond AI and AI4OPT is thrilled to be part of the 37th AAI Conference on Artificial Intelligence held Feb 7-14, 2023, at the Walter E. Washington Convention Center in Washington, DC.



*Click icons for conference and program details.

AI4OPT is funded by the [National Science Foundation](#).

