AI Institute for Advances in Optimization

Opt-In Newsletter | May 2025

AI4OPT is always exploring new ways to innovate and bring cutting-edge technology to society. I'm thrilled to share that we recently hosted our first "Parent's Guide to AI" event at the local library, an effort to directly engage with the community. It's just one example of how AI4OPT is stepping beyond the lab and into everyday life. More educational events are planned this summer as we continue our mission to make AI both accessible and impactful.

Beyond community outreach, AI4OPT research is also making exciting strides in industry. In partnership with Kinaxis, we've developed an AI-powered tool for supply chain planning that's already being tested on real-world data. This technology is not only pushing the boundaries of what's possible but is finding its way into commercial products.

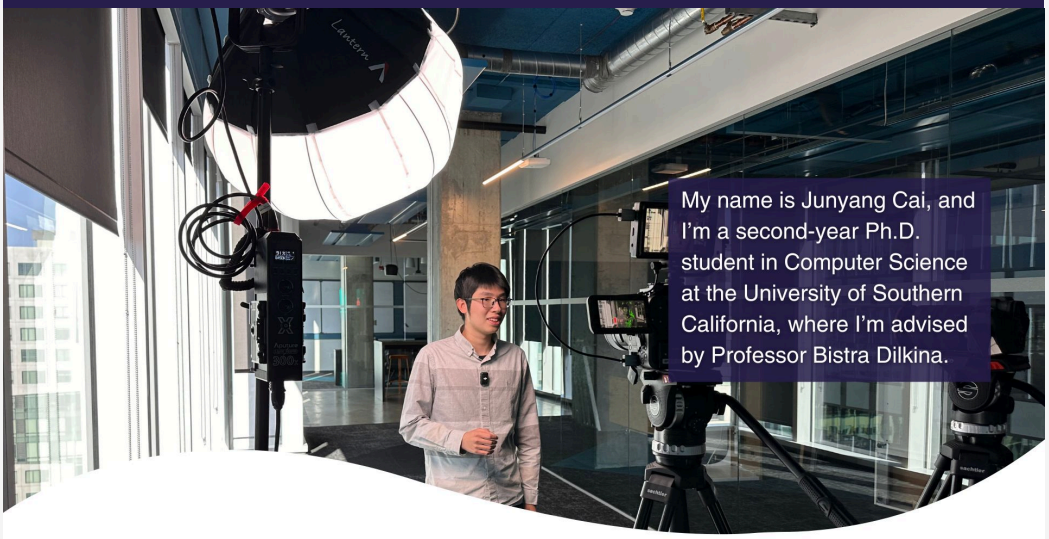
These advancements are made possible by the collective efforts of nearly 100 researchers and our now award-winning team of staff. Building on this momentum, we are also turning our attention to what comes next. Over the past two months, we've been deeply engaged in shaping the future of AI4OPT through retreats, internal seminars, and student exchanges between Georgia Tech, UC Berkeley, and USC. These activities are sparking new ideas and collaborations. Our recent External

Advisory Board meeting was a key part of this process, where researchers like Juba Ziani—spotlighted in this issue—shared inspiring visions for AI in engineering.

Lastly, you can watch or listen to *What About AI?*, our new podcast co-hosted by Breon Martin and me, on all major streaming platforms. Each episode offers insights into how AI is evolving and impacting real-world challenges. We hope you'll join the conversation—see you in the comments!

- Pascal Van Hentenryck

AI4OPT Student Spotlight



Bridging Machine Learning and Optimization

I completed my undergraduate studies at Bucknell University, where I had the opportunity to work closely with Professor Thiago Serra. That experience sparked my interest in the intersection of machine learning and optimization, ultimately inspiring me to pursue a Ph.D. in the field.

Since joining Professor Bistra Dilkina's lab, I've been actively involved with AI4OPT. As part of the solver thrust, I participate in monthly research meetings where students share their latest work and ideas. These gatherings are a great way to stay connected with the broader AI4OPT community. I also take part in the annual AI4OPT retreat and Student Day, which allow us to travel, exchange knowledge with peers and faculty from other institutions, and build lasting collaborations. Student competitions and team-building activities further strengthen our network and sense of community.

Recently, I had the opportunity to participate in a two-week research exchange with Pascal Van Hentenryck and El Mehdi Er Raqabi at Georgia Tech. It was an exciting and enriching experience.

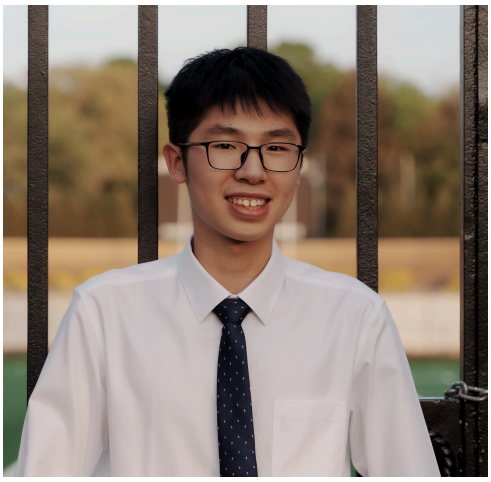
As a Ph.D. student, my primary responsibility within AI4OPT is to conduct impactful research and contribute to our shared knowledge through publications and presentations. I regularly share my work at conferences and seminars to help promote AI4OPT's mission. Additionally, I serve as a student representative on the Student Leadership Council for USC, helping organize events and ensure student perspectives are heard.

Key Contributions and Findings

My research focuses on accelerating mixed-integer programming (MIP) solvers, such as Gurobi, by integrating machine learning techniques into the solving process. MIP problems are central to many real-world applications, including path planning, scheduling and network design. However, even the most advanced solvers can be computationally expensive, especially for large-scale or complex problems.

To address this, I develop data-driven strategies that guide the solver's internal decision-making. By learning from historical problem data and solver behavior, our machine learning models can predict effective branching strategies and other key actions. This leads to a more informed and efficient search process, reducing overall solution times.

Our approach functions as a black-box module that can be applied on top of any existing solver. Experimental results show it improves solver performance by 10 to 20 percent across a diverse set of benchmark problems. This plug-and-play design makes our method practical and widely applicable in real-world optimization workflows.



Outside the Office

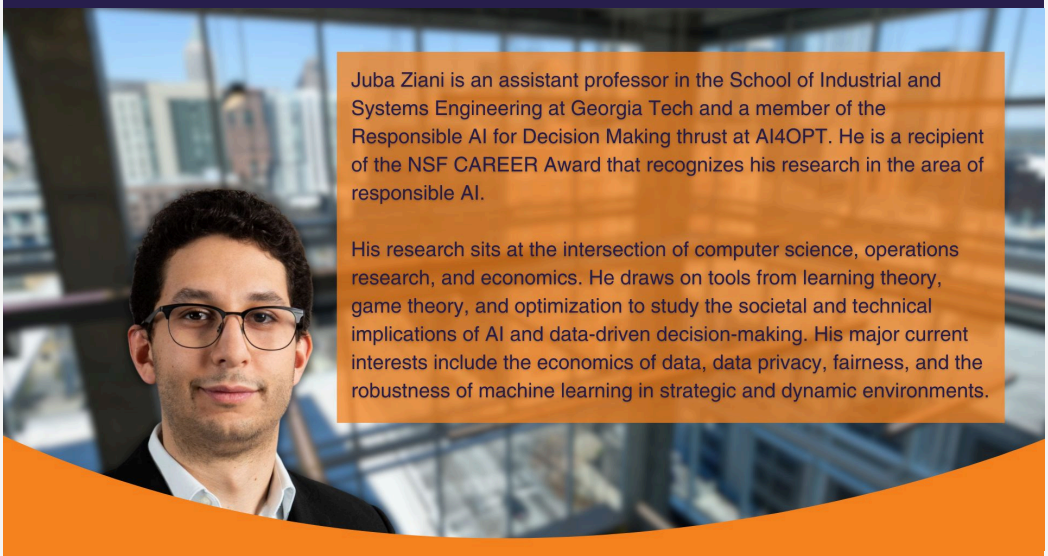
Outside of work, I enjoy building Lego sets, playing board games, and diving into computer games. I also love to travel and have a particular fascination with the unique transportation systems of different cities around the world.

Words To Live By

"Always believe that good things will come to you."

Watch Junyang Cai's Award-Winning 3-Min Research Pitch

AI4OPT EAB Member Spotlight



Juba Ziani is an assistant professor in the School of Industrial and Systems Engineering at Georgia Tech and a member of the Responsible AI for Decision Making thrust at AI4OPT. He is a recipient of the NSF CAREER Award that recognizes his research in the area of responsible AI.

His research sits at the intersection of computer science, operations research, and economics. He draws on tools from learning theory, game theory, and optimization to study the societal and technical implications of AI and data-driven decision-making. His major current interests include the economics of data, data privacy, fairness, and the robustness of machine learning in strategic and dynamic environments.

Prior to this, Ziani was a Warren Center postdoctoral fellow at the University of Pennsylvania with Sampath Kannan, Michael Kearns, and Aaron Roth, and received his Ph.D. in computer science from Caltech under Katrina Ligett and Adam Wierman, where he got a best dissertation award.

Responsible AI for Decision Making

AI systems are playing an increasingly important role in high-stakes decisions. To make sure that we can safely use these tools, my research focuses on building algorithms that are guaranteed to make responsible decisions and protect your privacy, even when data is noisy or incomplete. This work aligns closely with the mission of AI4OPT, and I was fortunate to be invited into the collaboration by colleagues working in this area.

Although I officially joined AI4OPT in 2023, I have been involved since the early days. One highlight was leading a multi-part tutorial on advanced data privacy techniques for the Faculty Training Program. I also contribute to the development of guidelines and metrics for building responsible AI systems.

My main role in the Institute is to contribute high-quality research to the “Responsible AI for Decision Making” research thrust, supported by my exceptional Ph.D. students Krishna Acharya, Diptangshu Sen, Srikanth Avasalara, and Samuel Hood. Recently, I also had the opportunity to represent the thrust to the external advisory board. We discussed both theoretical advances and real-world applications in areas such as facility location, traffic planning, and electric power systems. I am especially interested in robust decision-making under uncertainty, which I hope to explore further in future work.

Life Beyond the Office

I am a major fan of soccer, this is probably a combination of being both French and Algerian, two major soccer nations! I’ve been watching and playing the sport my whole life. To this day, I still play twice a week, even though my knees and leg muscles are starting to protest. I also enjoy tennis, volleyball and squash, which I picked up recently thanks to my friend and AI4OPT colleague Jake Abernethy.

I lead the Georgia Tech Friday happy hour, a weekly gathering of professors and postdocs. Let me know if you’d like to join.

I’m also an “intermediate” guitar player, an activity I dedicated significant time to during my Ph.D. and postdoc years. Somehow, I haven’t improved much since 2021 (tenure-track life, perhaps.) I can sort-of play drums if you keep it simple, and bass. I picked up music because, as a Ph.D. student, I was the only one of my roommates who didn’t play an instrument, and my type-A personality took over.

Finally, if you ever need video game advice, I’m your person.

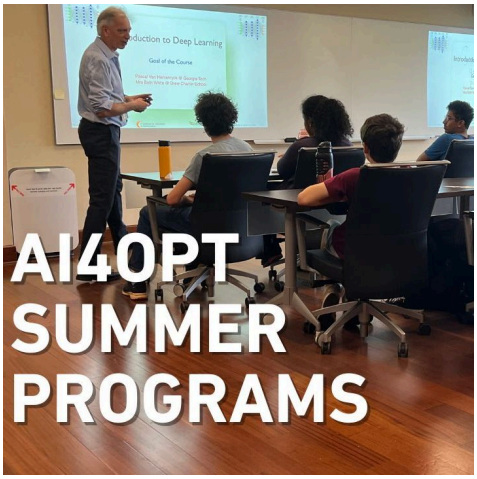
Words of Inspiration

“Perfection is achieved, not when there is nothing more to add, but when there is nothing left to take away.”---Antoine de Saint-Exupery. I have always been a strong supporter of “simple, elegant, and powerful” over “complex yet narrow”.

The other main thing that I always say is: do not take yourself too seriously, no matter how successful you are. Success may bring the respect of your peers and might give you gratification, but will not bring you internal happiness; being true to yourself and doing what you really believe in will.

News and Featured Events

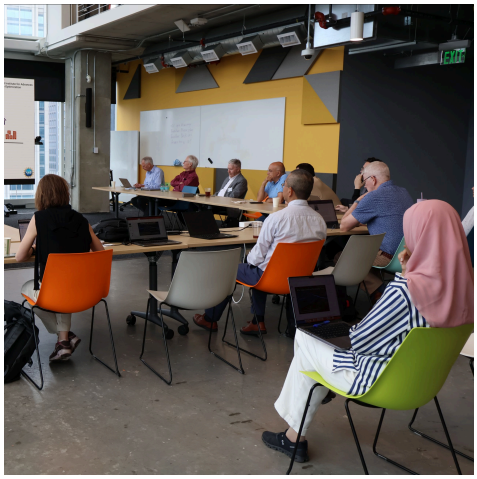
AI-Powered Tool Slashes Supply Chain Planning Time and Cost



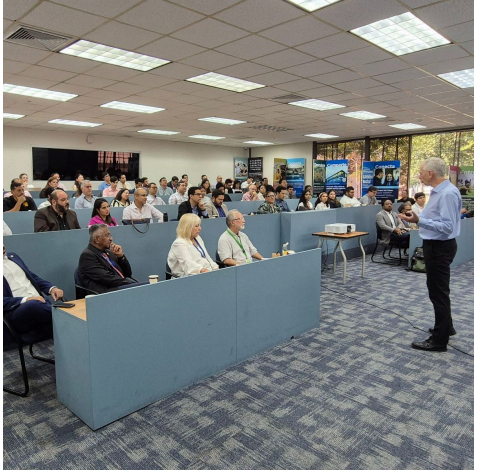
AI4OPT Launches Lineup of Programs to Advance AI Education Nationwide

Tech AI Launches “What About AI?” Podcast

AI4OPT Team Honored With Georgia Tech Excellence Award



AI4OPT’s External Advisory Board Explores Future of the Institute



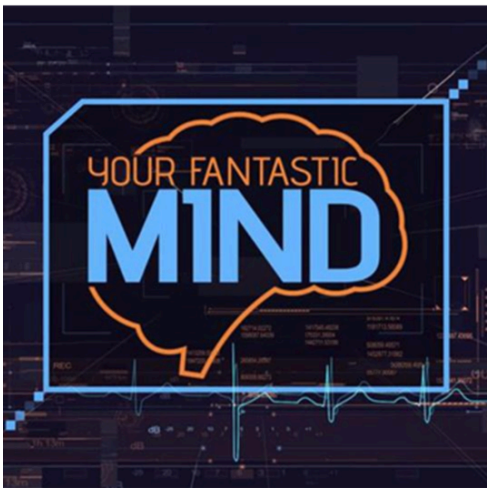
Pascal Van Hentenryck Strengthens Ties with Panama's AI Infrastructure

AI4OPT PhD Students Compete, Learn, and Lead at Student Day

AI4OPT Retreat Unites Researchers to Shape the Future of AI in Optimization

Kinaxis and AI4OPT Announce Co-Innovation Partnership

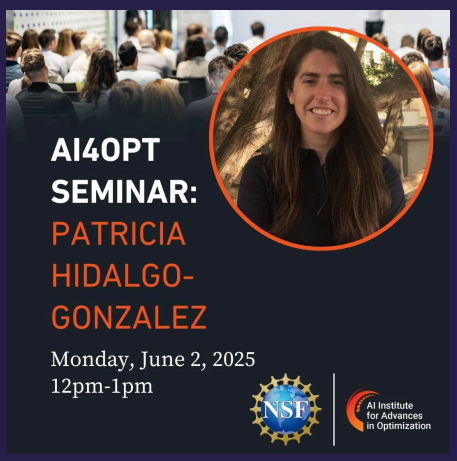
AI4OPT Engages in Energy Innovation at the ARPA-E Annual Summit



AI4OPT Members Featured on GPB's Your Fantastic Mind

Upcoming Events

Seth Bonder Camps 2025



Seminar: Patricia Hidalgo-Gonzalez

QUAD-AI ENGAGE Workshop

Publications

*AI4OPT publications available on **Google Scholar***

Engage with the NSF AI4OPT Institute on Social Media