

Keynote #2

Computational Sustainability: Computing for a Better World and a Sustainable Future

Carla P. Gomes
gomes@cs.cornell.edu
Dept. of Computer Science
Cornell University

Artificial Intelligence (AI) is a rapidly advancing field. Novel machine learning methods combined with reasoning and search techniques have led us to reach new milestones: from computer vision, machine translation, and Go and Chess world-champion level play using pure self-training strategies, to self-driving cars. These ever-expanding AI capabilities open up new exciting avenues for advances in new domains. I will discuss our AI research for advancing scientific discovery for a sustainable future. In particular, I will talk about our research in a new interdisciplinary field, Computational Sustainability, which has the overarching goal of developing computational models and methods to help manage the balance between environmental, economic, and societal needs for a sustainable future. I will provide examples of computational sustainability problems, ranging from biodiversity and wildlife conservation, to multi-criteria strategic planning of hydropower dams in the Amazon basin and materials discovery for renewable energy materials. I will also highlight cross-cutting computational themes and challenges for AI at the intersection of constraint reasoning, optimization, machine learning, multi-agent reasoning, citizen science, and crowd-sourcing.

Bio



Carla Gomes is the Ronald C. and Antonia V. Nielsen Professor of Computing and Information Science and the director of the Institute for Computational Sustainability at Cornell University. Gomes received a Ph.D. in computer science in the area of artificial intelligence from the University of Edinburgh. Her research area is Artificial Intelligence with a focus on large-scale constraint reasoning, optimization, and machine learning. Recently, Gomes has become deeply immersed in research on scientific discovery for a sustainable future and more generally in research in the new field of Computational Sustainability. Computational Sustainability aims to develop computational methods to help solve some of the key challenges concerning environmental, economic, and societal issues in order to help put us on a path towards a sustainable future. Gomes is the lead PI of an NSF Expeditions in Computing award Gomes has (co-)authored over 150 publications, which have appeared in venues spanning Nature, Science, and a variety of conferences and journals in AI and Computer Science, including five best paper awards. Gomes is the recipient of the Association for the Advancement of Artificial Intelligence (AAAI) Feigenbaum Prize (2021) for “high-impact contributions to the field of artificial intelligence, through innovations in constraint reasoning, optimization, the integration of reasoning and learning, and through founding the field of Computational Sustainability, with impactful applications in ecology, species conservation, environmental sustainability, and materials discovery for energy.” Gomes is a Fellow of the Association for the Advancement of Artificial Intelligence (AAAI), a Fellow of the Association for Computing Machinery (ACM), and a Fellow of the American Association for the Advancement of Science (AAAS).