Holly Wiberg

120 E 90th St #9H, New York, NY 10128
hwiberg@andrew.cmu.edu | 781-686-6849
Web: hwiberg.github.io

Academic Appointment

Carnegie Mellon University, Heinz College, Pittsburgh, PA
Incoming Assistant Professor of Public Policy and Operations Research, Fall 2023

Education

Massachusetts Institute of Technology, Cambridge, MA
PhD in Operations Research, May 2022. GPA: 5.0/5.0
Thesis: Data-driven healthcare via constraint learning and analytics
Advisor: Dimitris Bertsimas

Cornell University, College of Engineering, Ithaca, NY
BS in Operations Research and Engineering, May 2016.
Summa Cum Laude; Cumulative GPA 4.17/4.3, Major GPA 4.24/4.3

University of Edinburgh, Edinburgh, Scotland
Semester Abroad, May 2015.
Coursework in Mathematics and Statistics

Research Areas Analytics, Healthcare, Machine Learning, Optimization

Honors and Awards

2019-2022 National Science Foundation Graduate Student Research Fellowship
2020 William Pierskalla Best Paper Award, 2020 INFORMS Annual Meeting
2017 Henry Gabbay Fellowship, MIT Sloan School of Management
2016 Byron W. Saunders Prize, Cornell University
2015 Omega Rho Honor Society, Cornell University ORIE Department
2014 Tau Beta Pi, Cornell University

Publications

Soenksen, L., Ma, Y., Zeng, C., Boussioux, L., Villalobos Carballo, K., Na, I., Wiberg, H., Li, M., Fuentes, I., & Bertsimas, D. (2022). Integrated Multimodal Artificial Intelligence Framework for Healthcare Applications. *npj Digital Medicine*, 5, 149.

Bertsimas, D., Margonis, G. A., Huang, Y., Andreatos, N., Wiberg, H., Ma, Y., ... Wolfgang, C. L. Towards an Optimized Staging System for Pancreatic Ductal Adenocarcinoma: A Clinically Interpretable, Artificial Intelligence-Based Model. *JCO Clinical Cancer Informatics, 5,* 1220-1231.

Wiberg, H., Yu, P., Montanaro, P., Mather, J., Birz, S., Schneider, M., & Bertsimas, D. (2021). Prediction of Neutropenic Events in Chemotherapy Patients: A Machine Learning Approach. *JCO Clinical Cancer Informatics*, 5, 904–911.

Bertsimas, D., Borenstein, A., Mingardi, L., Nohadani, O., Orfanoudaki, A., Stellato, B., Wiberg, H., Sarin, P., Varelmann, D., Estrada, V., Macaya, C., & Gil, I. N. (2021). Personalized Prescription of ACEI/ARBs for Hypertensive COVID-19 Patients. *Health care management science,* 1-17.

Bertsimas, D., Boussioux, L., Cory-Wright, R., Delarue, A., Digalakis, V., Jacquillat, A., Kitane, D.L., Lukin, G., Li, M.L., Mingardi, L., Nohadani, O., Orfanoudaki, A., Papalexopoulos, T., Paskov, I., Pauphilet, J., Lami, O.S., Stellato, B., Bouardi, H.T., Villalobos Carballo, K., & Zeng, C. (2021). From predictions to prescriptions: A data-driven response to COVID-19. *Health care management science*, 1-20.

Bertsimas, D., Lukin, G., Mingardi, L., Nohadani, O., Orfanoudaki, A., Stellato, B., Wiberg, H., Gonzalez-Garcia, S., Parra Calderón, C.L., The Hellenic COVID-19 Study Group, Robinson, K., Schneider, M., Stein, B., Estirado, A., a Beccara, L., Canino, R., Dal Bello, M., Pezzetti, F., & Pan, F. (2020). COVID-19 mortality risk assessment: An international multi-center study. *PLOS One,* 15(12), e0243262.

Bertsimas, D., & Wiberg, H. (2020). Machine learning in oncology: Methods, applications, and challenges. *JCO Clinical Cancer Informatics*, 4, 885-894.

Bertsimas, D., Orfanoudaki, A., & Wiberg, H. (2020). Interpretable clustering: an optimization approach. *Machine Learning*, *110*(1), 89-138.

Bertsimas, D., Masiakos, P. T., Mylonas, K. S., & Wiberg, H. (2019). Prediction of cervical spine injury in young pediatric patients: an optimal trees artificial intelligence approach. *Journal of pediatric surgery*, *54*(11), 2353-2357.

Jian, N., Freund, D., Wiberg, H. M., & Henderson, S. G. (2016). Simulation optimization for a large-scale bike-sharing system. In *2016 Winter Simulation Conference (WSC)*(pp. 602-613). IEEE.

Under Review

Waskom, M. L., Tan, K., Wiberg, H., Cohen, A. B., Wittmerhaus, B., Shapiro, W. A hybrid approach to scalable real-world data curation by machine learning and human experts. Under Review.

Maragno, D., Wiberg, H., Bertsimas, D., Bilber, S. I., den Hertog, D., & Fajemisin, A. Mixed-Integer Optimization with Constraint Learning. Major Revision, *Operations Research.*

Luckhurst, C., Wiberg, H., Masiakos, P., & Bertsimas, D. Pediatric Cervical Spine Injury Following Blunt Trauma in Children Younger Than 3 Years Old; A Multi-Center Follow Up Study and a Novel Prediction Model. Revision, *JAMA Surgery.*

Books in Preparation

Bertsimas, D., Orfanoudaki, A., & Wiberg, H. *The Analytics Edge in Healthcare*.

Selected Talks

A hybrid approach to scalable real-world data curation by machine learning and human experts
- IMSI Workshop: Mathematics, Statistics, and Innovation in Health Care (May 2023)

Optimizing Virtual Care for Chronic Disease Patients: A Case Study in Diabetes
- INFORMS Annual Meeting (October 2022)

Optimization with Constraint Learning
- Cornell ORIE Young Researchers Workshop (October 2021)

From Data to Prescriptions: An Optimization Framework for Treatment Personalization
- INFORMS Annual Meeting (October 2021)
- INFORMS Healthcare (July 2021)

COVID-19 Mortality Prediction: A Data-Driven Risk Assessment Tool
- SwissRe COVID-19 Summit: Moving from Reacting to Managing (November 2020)
- INFORMS Annual Meeting (October 2020)
- University of Cambridge Public Health Seminar (October 2020)

An Optimization Approach to Roster Creation
- Sloan Sports Analytics Conference (March 2020)

A Network-Based Approach to Drug-Target Interactions in Cancer
- INFORMS Annual Meeting (October 2019)
- INFORMS Healthcare (July 2019)

Predicting Cervical Spine Injury in Pediatric Trauma Patients
- INFORMS Annual Meeting (November 2018)

Research Experience

2017-Present **Massachusetts Institute of Technology**, Cambridge, MA
Research Assistant
Advisor: Dimitris Bertsimas
Building a prescriptive framework for leveraging machine learning in optimization via constraint learning. Leveraging clinical data to improve treatment response predictions and prescriptions using data-driven algorithms, specifically applied to oncology, pediatric trauma, and COVID-19. Developing interpretable machine learning methods that allow for greater model transparency and utility to practitioners.

2015-2016 **Cornell University**, Ithaca, NY
Research Assistant
Advisors: David Shmoys, Shane Henderson
Collaborated with doctoral students in design of a simulation optimization model to improve the allocation of docks and bikes across stations in a New York City bike-sharing system using gradient-like heuristic methods. Improved model runtime and constructed a fluid model starting solution based on historical data.

Teaching Experience

2021 **Massachusetts Institute of Technology**, Cambridge, MA
(Fall) *Instructor* for 15.003 Software tools
Instructor for graduate-level computing course to ramp up incoming Master of Business Analytics students on core computing competencies. Developed and taught material on R and Julia/JuMP.

2021 **Massachusetts Institute of Technology**, Cambridge, MA
(January) *Teaching Assistant* for 15.S60 Computing in Optimization and Statistics
Instructor for graduate-level computing seminar. Taught lecture on machine learning in Python.

2019-2020 (Spring) **Massachusetts Institute of Technology**, Cambridge, MA
Teaching Assistant for 15.727 The Analytics Edge
TA for an Executive MBA course in Spring 2019 and Spring 2020. Led recitations and weekly office hours. Advised student teams on final projects and technical topics. TA evaluation: 6.95/7.0.

2020 (January) **Hartford HealthCare**, Hartford, CT
Teaching Assistant for The Analytics Edge in Healthcare
Co-developed an Executive Education course introducing analytics methods to 100 healthcare professionals (medical and administrative) at Hartford Hospital. Created course syllabus and lecture content and worked on course administration. Co-wrote an accompanying textbook detailing analytics methods and case studies with a focus on healthcare applications.

2016 (Fall) **Cornell University**, Ithaca, NY
Teaching Assistant for ENGR 1101: Engineering Applications of Operations Research
TA for an introductory undergraduate OR course. Led lab sessions and weekly office hours. Graded homework and exams.

Industry Experience

2022-Present **Flatiron Health**, New York, NY
Senior Machine Learning Operations Researcher (Post-doctoral role)
Led analysis to design and implement hybrid human-algorithm method for curating clinical data at scale from unstructured data. Developed framework for evaluating performance of such hybrid systems in longitudinal settings.

2018-2019 **MIT Sloan Healthcare Lab | Massachusetts General Hospital**, Boston, MA
Team Member, MIT Healthcare Lab
Developed targeted recommendations to improve operational efficiency of MGH's Pathology Department. Built Python simulation model to evaluate the impact of various staffing and process variations. Collaborated on a multi-disciplinary team with MBAs and pathology department leadership.

2017-2019 **Swiss Re**, Zurich, Switzerland
Research Assistant
Developed a health insurance cost prediction tool to provide visibility into claimant pool risk for prospective and existing clients. Leveraged machine learning to improve the contract pricing process, in close collaboration with actuarial and data science teams. Adapted model to multiple information settings and delivered a deployable dashboard for underwriter use.

2016-2017 **athenahealth**, Watertown, MA
Member of Technical Staff, Data Science
Served as an analytics liaison for a major product release. Built self-serve reporting tools to provide key stakeholders with high visibility into provider performance and migration progress for the project, enabling targeted support for clients and facilitating smooth completion of the migration.

2015 (Summer) **athenahealth**, Watertown, MA
Intern, Data Engineering

Developed a metric to quantify the productivity of healthcare providers, and established benchmarks for productivity based on identified key drivers. Delivered recommendations for application of the metric in both internal reporting and client-facing evaluation.

Service & Outreach

Journal Reviewer: INFORMS Journal on Optimization, JAMIA, JCO Clinical Cancer Informatics, NPJ Digital Medicine, Scientific Reports,

Conference Reviewer: Pierskalla Award Committee (2021, 2022), Sloan Sports Analytics Conference Research Competition (2021, 2022), MSOM (2022)

Search committee member, Schwarzman College of Computing Assistant Dean for Diversity, Equity, and Inclusion (2021)

ORC Seminar Series Coordinator (Spring 2021)

ESL Tutor (2018-2022)

MIT INFORMS Chapter President (2017-2018)

MIT Graduate Student Council Representative (2017-2018)

Skills

Software: Julia, R, Python, SQL, Excel.

References

Professor Dimitris Bertsimas (Advisor)
Boeing Leaders for Global Operations Professor of Management, Professor of Operations Research
MIT Sloan School of Management
Email: dbertsim@mit.edu
Contact Email: gadduci@mit.edu

Professor Cynthia Barnhart
Ford Foundation Professor, Professor of Operations Research
MIT Sloan School of Management
Email: cbarnhar@mit.edu

Dr. Barry Stein
Vice President, Chief Clinical Innovation Officer and Chief Medical Informatics Officer
Hartford HealthCare
Email: barry.stein@hhchealth.org