Cynthia Zeng

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Academic Position

NYU Stern School of Business at NYU Abu Dhabi — Abu Dhabi, UAE
Assistant Professor of Technology, Management and Statistics — 2024 - Present

Education

Massachusetts Institute of Technology — Cambridge, USA
Ph.D. in Operations Research — 2019 - 2024
· Advisor: Dimitris Bertsimas
· Thesis: Multimodal Machine Learning for Climate Adaptation

Imperial College London — London, UK
BSc in Mathematics — 2014 - 2017
· 1st-Class Honours, top 15% class rank

Awards

· Honorary mention, MIT Envisioning the Future of Computing Prize — 2024
· 2nd place, Doing Good with Good OR Award, INFORMS — 2023
· Zetta Prize, Best Application of Artificial Intelligence in Industry, MIT MIMO Symposium — 2023
· 1st place, William Pierskalla Paper Award, INFORMS Health Applications Society — 2020
· 1st place, MIT Cognex Poster Competition — 2022

Publications

[1] Léonard Boussioux*, **Cynthia Zeng***, Théo Guénais, and Dimitris Bertsimas. *Hurricane Forecasting: Novel Multimodal Machine Learning Framework*. Weather and Forecasting, 37(6): 817–831, 2022.

[2] Luis R. Soenksen*, Yu Ma*, **Cynthia Zeng***, Leonard Boussioux*, Kimberly Villalobos Carballo*, Liangyuan Na*, Holly M. Wiberg, Michael L. Li, Ignacio Fuentes, and Dimitris Bertsimas. *Integrated Multimodal Artificial Intelligence Framework for Healthcare Applications*. NPJ Digital Medicine, 5(1): 149, 2022.

[3] Dimitris Bertsimas, Leonard Boussioux, Ryan Cory-Wright, Arthur Delarue, Vassilis Digalakis, Alexandre Jacquillat, Driss Lahlou Kitane, Galit Lukin, Michael Li, Luca Mingardi, Omid Nohadani, Agni Orfanoudaki, Theodore Papalexopoulos, Ivan Paskov, Jean Pauphilet, Omar Skali Lami, Bartolomeo Stellato, Hamza Bouardi, Kimberly Carballo, Holly Wiberg, and **Cynthia Zeng** (alphabetical). *From Predictions to Prescriptions: A Data-Driven Response to COVID-19*. Health Care Management Science, 24: 253–272, 2021. Springer.

[4] Jack Reid, **Cynthia Zeng**, and Danielle Wood. *Combining Social, Environmental and Design Models to Support the Sustainable Development Goals*. In: 2019 IEEE Aerospace Conference, pp. 1–13, 2019. IEEE.

Working Papers

[5] **Cynthia Zeng** and Dimitris Bertsimas. *Catastrophe Insurance: An Adaptive Robust Optimization Approach*. Under review at Manufacturing & Service Operations Management.

[6] **Cynthia Zeng** and Dimitris Bertsimas. *Global Flood Prediction: A Multimodal Machine Learning Approach*. Appeared at 2023 ICLR Machine Learning for Climate Change Workshop

[7] Dimitris Bertsimas, Léonard Boussioux*, and **Cynthia Zeng*** (alphabetical). *Reducing Air Pollution Through Machine Learning*. To be submitted to INFORMS Journal on Applied Analytics.

[8] Kimberly Villalobos Carballo, Yu Ma*, Liangyuan Na*, Léonard Boussioux*, **Cynthia Zeng***, Luis R Soenksen, and Dimitris Bertsimas. *TabText: A Systematic Approach to Aggregate Knowledge Across Tabular Data Structures*. Under review at Nature Machine Intelligence.

Research Experience

Massachusetts Institute of Technology Cambridge, US
Doctoral Candidate at Operations Research Center 2019 - Present
· Led the team effort to design the unifying multimodality methodology to leverage multiple data sources and modalities to improve machine learning forecasting skills [1, 6, 2].
· Developed a data-driven framework to recommend operational decisions to reduce air pollution impact through improved wind forecasting. Implemented since 2022 with industry collaborator in Morocco [7].
· Developed a data-driven Adaptive Robust Optimization framework for catastrophe insurance premium pricing. Applied to flood insurance in the US to demonstrate improved efficiency and fairness [5].
· Contributed to a flexible tabular data processing technique by treating data as language [8].
· Developed a machine learning based early detection system for chronic deceases using insurance data. Adopted as challenge material for an MIT undergraduate Hackathon event with 50+ participants.
· Contributed to the global effort to mitigate COVID-19 by providing accurate forecasts to the CDC, improving patient triage in hospitals, and policy recommendations on ventilators allocation [3].
· Supervised four Master level students, two undergraduate students on research projects.

École Polytechnique Fédérale de Lausanne (EPFL) Lausanne, Switzerland
Visiting Researcher July 2023
· Risk Analytics and Optimization lab of Professor Daniel Kuhn, the College of Management Technology.

Massachusetts Institute of Technology Cambridge, US
Research Associate at Media Lab Jun. - Aug. 2018
· Developed a computational social science framework to study urban planning through agent-based modeling, contributions appeared in a conference paper [4].

Industry Experience

BlackRock Inc. San Francisco, US
Research Associate | Scientific Active Equities Jun. - Aug., 2022
· Developed a signal to predict stock prices of pharmaceutical companies using drug information, conducted extensive back-testing on signal performance, and the signal is currently being implemented.
· Developed an alternative company segmentation method through matrix decomposition, using language data on broker reports.

SoftBank Vision Fund China Shanghai, China

Investment Analyst Feb. - Aug. 2019

· Founding team member of five, helped set up the new Vision Fund China team. Conducted and organized interviews for candidates.

· Conducted research and due diligence research for artificial intelligence companies, cryptocurrencies, and presented in company-wide meetings.

· Project manager and white paper lead author of an internal project on differential privacy and data sharing platform.

BlackRock Inc. London, UK

Investment Analyst | Active Equities Jul. 2017 - Jun. 2018

· Conducted fundamental analysis for retail, automobile sectors.

· Group leader and winner of BlackRock Hackathon EMEA Category Championship on the development of a tool to combine insights throughout teams.

Teaching

MIT Analytics Tools Workshop Cambridge, US

Instructor Aug. 2023

· Two-day 8-h workshop for computing tools, 90+ students.

· For incoming Master of Business Analytics students on core computing competencies. Developed and taught material on R and Julia/JuMP.

MIT Introduction to Operations Management Cambridge, US

Teaching Assistant Spring, 2023

· MBA Analytics Track core course; 50+ students.

· Introduces MBA students to analytical tools related to manufacturing and service operations. Topics include: production control, risk pooling, quality management, process design, and revenue management. · Led weekly recitations, assisted students, wrote and graded assignments.

MIT Machine Learning Under a Modern Optimization Lens Cambridge, US

Teaching Assistant Fall, 2022

· Master of Business Analytics core course; 100+ students.

· Provided Master and Ph.D. students with a unified, insightful, and modern treatment of machine learning using the lenses of convex, robust, and mixed-integer optimization. Introduced students to optimization coding in Julia.

· Led recitations once a week, assisted students over weekly office hours, created course material, developed Julia tutorials, wrote and graded assignments and exams.

MIT Data, Models, and Decisions Cambridge, US

Teaching Assistant Fall, 2021

· MBA core course; 430+ students, first "pandemic cohort".

· Introduced MBA students to fundamental data-driven analytics and management science tools, techniques and concepts.

· Helped develop course materials towards the hybrid learning setup, such as weekly recordings of supplementary lectures, created course material and computational tools tutorials, assisted students during weekly office hours, wrote and graded assignments and exams.

MIT Analytics for a Better World Cambridge, US

Guest lecturer for one lecture on multimodal machine learning Apr. 2021

· Undergraduate course; 40+ students.

Talks

CONFERENCE

Catastrophe Insurance: an Adaptive Robust Optimization Approach
· INFORMS Annual Conference — Oct. 2023

Reducing Air Pollution Through Machine Learning
· INFORMS MSOM Conference — Jun. 2023
· INFORMS Annual Conference Doing Good with OR Student Paper Competition — Oct. 2023

Hurricane Forecasting: A Novel Multimodal Machine Learning Framework
· INFORMS Annual Meeting — Oct. 2022
· NeurIPS Tackling Climate Change with AI Workshop (virtual) — 2022
· Montreal AI Symposium (virtual) — 2021

Global Flood Prediction: a Multimodal Machine Learning Approach
· ICML Tackling Climate Change with AI workshop (virtual) — 2022
· Women in Data Science (WiDS) Cambridge Conference — 2023

Holistic Chronic Risk Modeling using Medical Health Records
· INFORMS Annual Meeting, The Future of Analytics and Operations Research Workshop — 2022

SEMINAR

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability
Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability
· MIT ORC Student Seminar — May 2023
· Écolep Polytechnique Fédérale de Lausanne (EPFL), Management of Technology — Jul. 2023
· Technical University of Munich (TUM), Data Science in Earth Observation Lab — Jul. 2023
· Harvard Law School, Climate Justice Working Group — Jul. 2023
· Cornell Young Researchers Workshop (poster) — Sept. 2023

Machine Learning, Optimization and Climate Change (Job Talk)
· MIT Operations Management Seminar — Nov 2023
· MIT ORC Student Seminar — Nov 2023

OTHERS

Why You Will Be a Weather Person?
· TEDx Boston on Artificial Generative Intelligence — Mar. 2023

Machine Learning, Optimization and Climate Change
· MIT Energy and Climate Night (poster) — Oct. 2023

Talks

CONFERENCES

INFORMS Annual Meeting

Catastrophe Insurance: An Adaptive Robust Optimization Approach — Oct. 2023
· Doing Good with OR Student Paper Competition

Hurricane Forecasting: A Novel Multimodal Machine Learning Framework — Oct. 2022
· Spotlight talk at the Future of Analytics and Operations Research Workshop

INFORMS MSOM Conference

Catastrophe Insurance: An Adaptive Robust Optimization Approach — Jun. 2024

Reducing Air Pollution Through Machine Learning — Jun. 2023

ICLR Tackling Climate Change with AI Workshop

Global Flood Prediction: A Multimodal Machine Learning Approach May 2024

Applied Machine Learning Days

Global Flood Prediction: A Multimodal Machine Learning Approach Mar. 2024

NeurIPS Tackling Climate Change with AI Workshop

Hurricane Forecasting: A Novel Multimodal Machine Learning Framework (Virtual) 2022

ICML Tackling Climate Change with AI Workshop

Global Flood Prediction: A Multimodal Machine Learning Approach (Virtual) 2022

Stanford Trans-Pacific Sustainability Dialogue 2024

Multimodal Machine Learning for Climate Adaptation

Montreal AI Symposium

Hurricane Forecasting: A Novel Multimodal Machine Learning Framework (Virtual) 2021

Cornell Young Researchers Workshop Sept. 2023

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability (Poster)

Women in Data Science (WiDS) Cambridge Conference

Global Flood Prediction: A Multimodal Machine Learning Approach 2023

MIT Energy and Climate Night (Poster) Oct. 2023

Machine Learning, Optimization, and Climate Change

SEMINARS

National University of Singapore Dec. 2023

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability

Singapore University of Technology and Design Dec. 2023

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability

École Polytechnique Fédérale de Lausanne (EPFL), Management of Technology Jul. 2023

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability

MIT Operations Management Seminar Nov. 2023

Machine Learning, Optimization, and Climate Change

Technical University of Munich (TUM), Data Science in Earth Observation Lab Jul. 2023

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability

Harvard Law School, Climate Justice Working Group Jul. 2023

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability

MIT ORC Student Seminar

Multimodal Machine Learning: Applications to Climate Adaptation and Sustainability May 2023

Machine Learning, Optimization, and Climate Change Nov 2022

PUBLIC LECTURES

Stanford Energy Seminar Feb. 2024

Multimodal Machine Learning and Climate Change Adaptation

NYUAD Institute Public Lecture Nov. 2024

Multimodal Machine Learning and Climate Change Adaptation

TEDx Boston on Artificial Generative Intelligence Mar. 2023

Why You Will Be a Weather Person?

Leadership, Service and Outreach

MIT Energy Conference Oct. 2023 - Mar. 2024

· Panel director. Largest student-led energy & climate conference in North America, across industry professionals, investors, scholars and policymakers over 1000 attendees.

MIT Operations Research Center Student Seminar Oct. 2019 - Jun. 2021

· Founder of the student seminar series, organized weekly seminars from students to students.

MIT European Club Feb. - Jun. 2023

· Secretary, organized weekly meetings, the annual European career fair with 1000+ student attendee.

MIT Social and Ethical Responsibilities of Computing (SERC) Scholar

· Contributed to the SERC research handbook, weekly discussions on MIT-wide course designs.

MIT Operations Research Center INFORMS Officer Oct. 2019 - Jun. 2020

· Organized monthly social events, the annual two-day retreat in Maine.

Imperial College London Hiking Club

· Social chair, organized monthly social events.

Imperial College Mathematics Society Oct. 2015 - Jun. 2016

· Vice president, organized annual department dinner with 300+ attendee.

Nepal Mountain School Aug. 2015

· Volunteer, taught science and mathematics to grade 1-5 students, sponsor of a disadvantaged student.

Panda Honey Social Enterprise Jun. - Aug. 2014

· Organized honey harvesting trips, set up online sales platform, organized fundraising event of 500+.

Taiwan Sustainable Rice Farm Jul. 2014

· Learned about sustainable rice social enterprise, shareholder entity structure to agriculture.

Animal Shelter Club Aug. 2012 - Jun. 2014

· Founder of a high school society, organized weekly visits to an animal shelter, fund-raising events.

Skills and Interests

Programing Languages

· Python, PyTorch, Julia, TensorFlow, R, Matlab, LaTeX

Hobbies

· Hiking, Yoga, Tennis, Skiing, Golf, Classical Music, Volunteering.

References

Dimitris Bertsimas

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Nikolaos Trichakis

· MIT Sloan School of Management

· Email: ntrichakis@mit.edu

Jónas Oddur Jónasson

· MIT Sloan School of Management

· Email: joj@mit.edu