Ethan Hartley

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Aloha,

Please consider my application to the NBER Digital Economics and AI Tutorial. I am a fourth-year PhD student in Economics advised by Dr. Michael Roberts at the University of Hawai‘i at Mānoa (a federally designated minority-serving institution). I have completed three years of PhD-level coursework, including core Macroeconomic and Microeconomic courses and have passed all qualifying examinations with the highest commendation. I have completed all required field courses in Resource and Environmental Economics and Econometrics with additional graduate-level coursework in Machine Learning. In addition to my academic studies, I spent Summer 2024 interning at Amazon where I focused on experimental validation of high-dimensional causal machine learning methods. My areas of specialization include Environmental and Energy Economics, Causal Inference, and Machine Learning.

My research emphasizes the use of computational methods—specifically linear programming, machine learning, and causal inference techniques—to explore challenges related to environmental and energy economics. I am currently supported by the Department of Energy’s IBUILD Fellowship, a competitive national fellowship awarded annually to 7-8 graduate students. I am, to date, the only social scientist (more specifically, non-engineer) ever to be awarded this fellowship. At IBUILD, my research centers on national energy sector modeling using capacity expansion models. I assess the role of policy mechanisms such as variable pricing tariffs, carbon taxes, and subsidies, in improving consumer welfare, promoting renewable energy uptake, and accelerating decarbonization. Additionally, I examine how regional variations in weather, generation mix, and resulting prices affect firm incentives in energy consumption and illustrate how these factors may impact optimal building design and operational strategies.

I also have a deep interest in the exploration of artificial intelligence (AI) for economics. My work in this space largely focuses on the integration of deep learning within the data generating process This work includes super-resolution and predictive modeling of gridded environmental data using Transformer-based architectures to capture spatial and temporal correlations. Specifically, I am developing models taking gridded weather data, land characteristics, and aerosol diagnostics to super-resolute and debias satellite-based estimates of pollution data at a 1km grid for the continental United States from 1980 to present. The overarching goal of this project is to develop an open-source solution that can easily be transferred to countries around the world to improve our understanding of pollution concentrations globally. These sorts of data are invaluable for downstream econometrics, including a project of my own which explores the chronic impacts of airborne pollution exposure on cancer incidence and mortality.

Moreover, I have ongoing work on the application of large language models to extract economically relevant data from text. This project has been submitted to the NBER Digital Economics and AI Meeting, Spring 2025 and the abstract is below:

Despite extraordinary advancements in artificial intelligence for text analysis, these methods are scarcely applied in economics. This study discusses the potential of Large Language Models (LLMs) as tools for extracting economically relevant data from text. I provide insights on fine-tuning LLMs and explore their effectiveness in utilizing text as data through a case study evaluating the well-established Economic Policy Uncertainty index. LLMs provide 53% to 811% relative improvements in performance over dictionary-based alternatives and prove more robust in data constrained environments while better capturing the perceptions of underlying economic agents.

I am passionate about integrating AI into economic analyses to further our understanding of the world. My work explores numerous dimensions of using AI for more robust data generation and for leveraging high-dimensional data for causal inference. I am excited by the prospect of collaborating with like-minded peers and learning from leading experts in the field through the NBER Digital Economics and AI Tutorial. Participation in the NBER Digital Economics and AI Tutorial would be an opportunity to engage with cutting-edge research at the intersection of AI and digital economics beyond what is available at my home institution.

Mahalo Nui Loa,

Ethan Hartley