SUPROTEEM SARKAR

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I am applying to the NBER Digitization Tutorial to build on my research interests in the economics of digitization, engage with leading faculty, and meet with and learn from other students in the field.

I am currently enrolled in the PhD program in Economics at Harvard, where I completed my second-year course requirements in December 2019. I also graduated with a Bachelor's in Computer Science, a Master's in Applied Mathematics from Harvard, and spent time at Microsoft and Google conducting research on machine learning and its social scientific implications.

My research interests are centered around the economics of technology, and I have a series of completed and ongoing projects in the space. My previous work had a more algorithmic, technical flavor, and my more recent work focuses on classical economic questions, while building upon my technical and professional background.

In response to the ongoing growth of machine learning in social systems, one strand of my work aims to better understand the effects of machine learning on financial systems and public policy. My early research in this area was more technical in nature. One project studied the fragility of deep learning models used for financial applications, and proposed both methodological and practical changes that might make these models more robust in practice,[1] while another developed methods for increasing the consistency of machine learning-informed causal inference research.[2] I also studied risk assessment technologies in criminal justice using tools from law, economics, and computer science.[3]

[1]Sarkar, S.K., Giebisch, D., Oshiba, K., Singer, Y. (2018). Robust Classification of Financial Risk. *NeurIPS, AI in Financial Services Workshop.*

[2]Lin, A., Merhant, A., Sarkar, S.K., and D'Amour, A. (2019). Universal Causal Evaluation Engine. *Proceedings of Machine Learning Research.*

[3]Brenner, M., Gersen, J.S., Haley, M., Lin, M. Merchant, A., Millett, R.J., Sarkar, S.K., and Wegner, D.

More recently, I have begun to take an economic approach to studying machine learning in healthcare. In one paper, I study the evolution of machine learning in medicine and document how downstream effects of these technologies may impact health equity.[4] In another project, I study the distributional effects of machine learning-informed health policy, using information from the health impact of mammogram screening policy changes in Denmark,[5] in joint work with my mentors Sendhil Mullainathan and Ziad Obermeyer.

Another major strand of my current research agenda focuses more generally on the economics of innovation and technology. One project, advised by Scott Duke Kominers at HBS, examines how the structure and content of patent applications evolve in response to external innovations and shocks to the regulatory environment. We then use advances in high-dimensional instrumental variables methods to measure the effects of these patent acceptances on firm outcomes, with a focus on technology patents.[6] Another project uses natural language methods to document how the evolution of technical innovation affects product mixes and competition within industries.[7] Additionally, I am working on a project studying how innovations in digital media may exacerbate polarization in beliefs about the economy, and how these changes in beliefs may also drive changes in household financial behavior.[8] Throughout this strand of my research, I aim to understand how digitization changes the way we think about economic systems and economic behavior.

(2020). Constitutional Dimensions of Predictive Algorithms in Criminal Justice. *Harvard Civil Rights-Civil Liberties Law Review.*

[4]Sarkar, S.K., Alsentzer, E., and McDermott, M. (2020). Advancing Equity and Access in Machine Learning for Medicine. Working Paper.

[5]Daysal, M., Mullainathan, S., Obermeyer, Z., Sarkar, S.K., Trandafir, M. (2020). Welfare Effects of Machine Learning in Health Policy. In preparation.

[6]Suzgun, M., Sarkar, S., Chen, J. and Kominers, S.D. (2020). Raising the Innovation Bar: Evolving Standards for Patent Acceptance in Technology. Work in progress.

[7]Machine learning component published as "A Semantic Approach to Financial Fundamentals" in *IJCAI Workshop on Financial Technology and Natural Language Processing*. Economics paper in preparation

[8]Sarkar, S.K., and Tang, J. (2020). Technology, Media, and the Political Economy of Household Finance. Work in progress.

I strongly believe taking part in the NBER Digitization Tutorial will help me develop as a researcher in this field. The content of the tutorial has a large overlap with my interests and future research goals, and I am enthusiastic about the opportunity to interact with and learn from other researchers in the discipline. I enjoyed my experience at last year's tutorial very much, and was able to learn more about the field and the state of ongoing work. Now that I have done some more research, I hope to have more productive discussions with graduate students during the tutorial and engage further with the speakers. Thank you very much for your consideration.

I am thankful for the support of a National Science Foundation Graduate Research Fellowship for some of the research discussed in this application.