Svenja Spanuth
MIT Sloan School of Management
E62-365
100 Main Street
Cambridge, MA 02142
sspanuth@mit.edu, +1 (617) 417 5809

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NBER Digitization Tutorial application

Dear Prof. Shane Greenstein, dear Prof. Avi Goldfarb,

I am Svenja Spanuth, a second-year graduate student from RWTH Aachen University, Germany. Currently, I am visiting the MIT Sloan School of Management TIES group for a 12-month research stay. As a part of this leading-edge research institution, I could greatly advance my research skills and deepen my passion for the economics of digitization. By participating in the NBER Digitization Tutorial, I hope to learn more about trends in this area and discuss my own approaches with professors and participating graduate students.

For the past eight months, I have been working on two projects with Prof. Neil Thompson. The first one is titled "Deep Learning, Hardware Specialization, and the Fracturing of a General Purpose Technology" and will be submitted by the end of this academic year. In the past, computer processors used to be universal and their technological advancements benefitted a wide range of users. Now, the stalling of Moore's Law incentivizes some users to employ specialized processors, resulting in huge performance gains for certain tasks and applications, such as deep learning. However, others cannot afford their own specialized processors or prefer universal processors. This fracturing of the hardware market will lead to rising inequalities in terms of performance speed-ups.

The second project aims at connecting the rise of deep learning to hardware availability and predicts limitations to the steep trajectory it has been following the past years. The underlying concepts of neural networks trace back to the late 1950s. But deep learning has only become superior to other machine learning approaches since implementations, such as AlexNet, leveraged the excellent match between the hardware parallelism of GPUs and the algorithmic parallelism of deep learning. We will track the rise of deep learning across multiple fields and analyzes whether decreasing marginal improvements in computer hardware are likely to stall the progress.

During my undergraduate studies, I majored in electrical engineering and laid emphasis on building a technological mindset. At the same time, as part of my economics minor, I enjoyed a solid education in Statistics, Econometrics, Micro- and Macroeconomics. In 2015, I graduated amongst the top 3% of my cohort. After interning as a consultant at McKinsey & Company and at Henkel AG & Company's strategy department, I decided to pursue the consecutive Master's program at RWTH Aachen University. In my course work, I focused on Technology and Innovation Management. In Prof. Frank Piller's courses "Managing the Innovation Process", "Principles of Technology and Innovation Management" and "Strategic Technology Management", I gained great insights into current state-of-the-art research in this field. I passed all these courses with an A+ and was invited to join the Innovation Honor's Program of RWTH Aachen University. Albeit this success, I was missing a strong connection to my technical studies. I therefore decided to pursue my own research guided by a professor with similar background.

At MIT, I greatly enjoy the topics I am working on. I am encouraged to dive into the details of technical developments and hold exciting discussions with computer scientists. Being part of this inspiring and ambitious community, I am more certain than ever that, after graduating in my Master's degree next March, I will pursue a PhD at the intersection of economics and digitization. I hope to focus on the effects artificial intelligence has on our society. In order to already extend my knowledge in this field, I decided to take on voluntary course work. This year, I participated in a two-week intensive course about big data analytics that was offered at a summer school organized by the German National Academic Foundation. This course complemented my deep learning knowledge I had acquired during the first four month of my stay at MIT with further machine learning algorithms.

To get further insights, I am auditing Prof. Erik Brynjolfsson's course "Economics of Information and Technology". Listening to and discussing with leading guest speakers every week has shown me various facets of digitization and the span of challenges it imposes on the economy. Besides learning about the economic value of broadband internet, what I really enjoyed about your presentation, Prof. Shane Greenstein, was getting to know about the impact your research has had on decision makers. I expect to get to more advice on how to conduct high-level research and how to choose relevant topics at the NBER Digitization Tutorial.

I am looking forward to hearing from you.

Yours sincerely,
Svenja Spanuth