Gentry Johnson | Application
NBER Digitization Tutorial 2019

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Statement of Interest

My name is Gentry Johnson and I am applying for admission to the 2019 NBER Digitization Tutorial. I am a fourth-year PhD candidate in economics at the University of Maryland where I study applications of machine learning to the estimation of structural models in industrial organization as well as to causal inference broadly. I expect to graduate in the spring of 2020. My formal major field is industrial organization and my minor field is econometrics where I'm supervised by Andrew Sweeting, Ginger Jin, Dan Vincent, and Guido Kuersteiner.

I attended my first NBER digitization tutorial this past Spring and it proved more fruitful than I could have hoped. In addition to engaging with the cutting edge of digitization research thanks to the distinguished speakers and organizers, I quickly forged extremely valuable friendships and academic partnerships.

In particular, Tommaso Bondi, a fifth-year PhD candidate at NYU, has become a very close friend and, now, a co-author. As an example of the ways in which the workshop exposed me to new avenues of research and applications of my own comparative advantages, I am applying my expertise in machine learning to an experimental paper with Tommaso and a third co-author which aims to discern the relative willingness of individuals to delegate tasks to AI as opposed to humans. Outside of this joint work, long email threads about our ideas and frequent chats have become the norm.

Aside from this exciting new experimental arena, the chief focus of my work has been the use of machine learning to accomplish two interrelated tasks central to the expansion of empirical research in digitization:

1. To use ML tools to reduce the dimension of data through novel hybrid techniques that are "aware" of the eventual econometric objective as they do so.

2. To turn (primarily) digital data into usable econometric inputs. This includes text (where work has already been pioneered by Gentzkow and other), images, and audio.

This past summer, I deepened my engagement with these areas while at Microsoft Research in the Office of the Chief Economist. There, I borrowed from the computer science literature to construct a metric learning approach to matching estimation that can ably handle extremely rich data without suffering from the curse of dimensionality. Two working papers with my colleagues at Microsoft Research have emerged from this line of inquiry, and we have plans to use data from Microsoft-owned LinkedIn as part of a labor-themed paper which demonstrates the power of our methods.

Additionally, I pursue both of the above goals in a paper (work in progress) which uses artificial neural nets (ANNs) to augment demand estimation. Broadly, an ANN solves an auxiliary demand prediction problem and, in the process, constructs a modified representation of the input data–for instance, product and individual demographic characteristics. These "learned features" are passed into a downstream structural demand estimation model.

Finally, I am currently proposing a new project which studies the two-sidedness of digital media markets by focusing on the impact on content of different revenue models–some of which have not yet been explored in the two-sided-market-context due to their uniqueness to the digital media space (e.g. ads sold through instantaneous auction).

As I have established a deeper connection to the burgeoning economics presence within the technology sector–I also have worked as a data scientist for nearly two years at a start-up co-founded by Phil Leslie and my advisor Ginger Jin–I am floored by the possibilities of the digitization program of research. It would be hugely valuable to continue to interface with both existing experts and my peers alike who share this excitement. It is my hope that I can do this again at the NBER Digitization Workshop in 2019.