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Dear Sir or Madam,

I am writing this letter in application for the graduate student NSF grant for the NBER Digitization Tutorial. I believe that attending this meeting will enrich my understanding in the many fascinating research fronts of this area, as well as bring me in contact with leading research scientists and potential future colleagues and collaborators.

I am a fifth year Ph.D. candidate at the IOMS Department of NYU Stern majoring in Information Systems, with an expected graduation date of May 2018. During my studies I have pursued course work spanning a variety of areas including theoretical foundations (optimization, stochastic processes, real analysis), economics (microeconomics, game theory and mechanism design, economics of digital platforms, econometrics), organizational theory, and machine learning (natural language processing, theoretical foundations of machine learning).

My research programme centers on the digital economy, and more specifically on online marketplaces. In my dissertation proposal, co-advised by professors Arun Sundararajan, John Horton, and Srikanth Jagabathula, I investigate the challenges posed and the opportunities afforded by the burgeoning peer-to-peer marketplaces. The proposed dissertation consists of three separate lines of inquiry:

- *Is Airbnb Efficient?* (with John Horton)

A large part of the heated Airbnb debate focuses on the fact that hosts benefit at the expense of their neighbors, on whom they impose uninternalized externalities. This situation potentially creates a market failure and suggests the need for a regulatory intervention. We consider four public policy regimes where the decision rights reside with (a) individual tenants (b) building owners (c) cities that consider the aggregate welfare of city residents (d) a social planner that takes into account the welfare of both city residents and guests. Through equilibrium analysis we show that the efficient social planner's solution coincides with the equilibrium where building owners are allowed to individually decide on building-specific Airbnb policies. We also develop an agent-based computational model to incorporate additional factors such as moving costs to our analysis.

- *How should peer-to-peer online marketplaces be mediated?* (with Arun Sundararajan and Srikanth Jagabathula).

Peer-to-peer marketplace providers are selfish agents that make their resources available whenever they decide - platforms often lack the behavior-enforcing power that traditional firms possess. While this allows such platforms to trade off high capacity costs for the flexibility that providers of this nature afford, an immediate problem is how these peers should be coordinated across the variety of different situations that pertain to the properties of the supply, the demand, as well as the application at hand. The commonly proposed dynamic pricing schemes offer but partial solution for only a subset of such

applications. In this work we attempt to model this problem, and extract insights on this issue that lies at the core of the online peer-to-peer marketplace business model.

- *How do providers price on Sharing Economy platforms? (with Arne Rogde Gramstad)*
We develop a model of dynamic pricing under awareness-generating adoption dynamics. Our model incorporates insights from the behavioral economics literature in an attempt to capture the non-professional nature of peer-to-peer marketplace suppliers. Our results explain common phenomena on such platforms, such as penetration pricing policies, and the emergence of “superstar” and niche providers.

Other than the economics of digital platforms, I am broadly interested on machine learning and its applications. I provide a short description my work on this area below.

- How can big data be used for simple and interpretable sentiment classification? (with Theodoros Lappas).

Sentiment classification, the task of assigning a positive or negative label to a text segment, is a fundamental component of mainstream applications such as reputation monitoring, sentiment summarization, review mining, and recommender systems. This critical task has motivated numerous classification methods based on the Chomskian view that natural language has a common underlying computational structure which admits mathematical modeling. Even though the performance of these methods has steadily improved over time, their ever-increasing algorithmic complexity has made them accessible only to firms that can afford the required infrastructure and technical talent. In addition, these highly complex methods deliver black-box predictions that cannot be easily communicated to managers and decision-makers who lack a specialized technical background. Motivated by these shortcomings, we build on recent theoretical advances in usage-based language learning to present a far simpler method that delivers accurate and interpretable results by substituting algorithmic complexity with Big Data. We then utilize our methodology toward a study on the limits of Big Data for sentiment classification. Our study finds that, after a certain point, predictive performance tends to converge and does not benefit by the availability of more data. Our data-over-computation paradigm lowers the barrier to entry for firms that want to mine their growing data repositories but cannot afford the infrastructure and talent required by state-of-the-art machine learning algorithms.

Should you have any questions, please feel free to contact me.

Sincerely,
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