Karthik Rajkumar

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To the organizers of the 2019 Economics of Artificial Intelligence PhD student workshop:

I am a 4th year PhD student in the economics department at Stanford, studying econometrics. My research agenda has aimed at creating transparent statistical methodology using tools from machine learning and artificial intelligence to answer questions of economic importance. For e.g., I created multivariate random forests for heterogeneous treatment effects estimation, which is now used in settings ranging from public economics to health.

I frequently collaborate with the tech industry to answer social problems. In work with Facebook, I created novel methodology using multivariate Gaussian processes—a Bayesian machine learning technique—to borrow signals from multiple sources to reduce search costs in high-noise online ranking algorithms. I am also working with LinkedIn this summer to study the interface of artificial intelligence in job search and the design of effective algorithms that account for peer effects to improve efficacy of the online labor market. I believe the digitization of the modern economy has brought rich new data and methods, which makes answering novel economic questions possible.

At the same time, I believe this digitization is rapidly changing the economy itself, through channels as varied as algorithmic discrimination and the rise of the gig economy. Given my background in the methods behind many of these technologies, I am interested in learning more deeply about their social impact. This is why I am excited about the prospect of attending the Economics of Artificial Intelligence Conference, and the PhD student workshop in particular. After the workshop, ideally, I will have understood this quickly-growing literature better, and have gained new collaborators in the goal of designing people-centric algorithms.

Thank you for considering my application. My CV is attached.

Sincerely,

Karthik Rajkumar

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EDUCATION

Stanford University, Stanford, CA
Ph.D., Economics, 2021 (expected); M.A., Economics, 2018; M.S., Statistics, 2015

Indian Institute of Technology Madras, Chennai, India
B.Tech., Electrical Engineering, 2013; Minor in Theoretical Computer Science

WORKING PAPERS

"Ridge regularization for Mean Squared Error Reduction in Regression with Weak Instruments." 2019.

"Mining the Supreme Court Corpus: Methods, Lessons, and Challenges." 2018.

WORK IN PROGRESS

"Multivariate generalized random forests." With Susan Athey, Stefan Wager, and Julie Tibshirani. R and C++ software available at https://github.com/rajkumarkarthik/mgrf-develop.

"Randomization methods for regression discontinuity designs with manipulation." With Evan Rosenman.

POSTERS AND PRESENTATIONS

"Randomization methods for regression discontinuity designs with manipulation." Atlantic Causal Inference Conference, Montreal, 2019. (forthcoming)

"Ridge regularization for Mean Squared Error Reduction in Regression with Weak Instruments." Atlantic Causal Inference Conference, Montreal, 2019. (forthcoming)

"Multi-task Bayesian Optimization in noisy experiments." At MIT Conference on Digital Experimentation, Boston, 2018. Python software available at https://github.com/cornellius-gp/gpytorch.

EXPERIENCE

Research Intern, LinkedIn, June–September 2019 (forthcoming)
Research on social networks and peer effects.

Research Intern, Facebook, Core data science team, June–September 2018
Researched and designed multi-task Gaussian process models.

HONORS AND AWARDS

- Stanford Enhancing Diversity in Graduate Education (EDGE) doctoral fellowship, 2018–19
  For mentoring junior doctoral students in the economics, and management science and engineering departments.
- Stanford Diversifying Academia, Recruiting Excellence (DARE) fellowship Alternate, 2018
- Amos Warner research fellowship, 2016–17; Graduate student fellowship, 2015–16, both from the Stanford economics department
- Working Internships in Science and Engineering (WISE) scholarship, German Academic Exchange Service (DAAD), 2012
  To do a fully-funded summer research project at TU Berlin, Germany.
- Indian Institute of Technology Madras Merit Award, 2009
  For ranking 143 among 400,000 students nation-wide in the IIT Joint Entrance Examination.
- Central Board of Secondary Education merit scholarship, 2009
  For ranking 179 among over one million students nation-wide in the All India Engineering Entrance Examination.
- Kishore Vaigyanik Protsahan Yojana (KVPY) fellowship Department of Science and Technology, Government of India, 2008
  One of 125 fellows from across the nation.

COURSEWORK

Economics

Core graduate microeconomics, core graduate macroeconomics, advanced econometrics, computational econometrics, public economics, industrial organization, social networks, machine learning for causal inference, economic history.

Statistics & Mathematics

Core graduate probability theory, core graduate mathematical statistics, advanced topics in statistics, modern applied statistics, real analysis, measure theory, time series analysis, graphical models, stochastic processes, ANOVA, applied linear algebra, mathematical logic, complex analysis.

Electrical Engineering & Computer Science

Programming abstractions, analysis of algorithms, graph theory, machine learning, computational methods, theory of computation, information & coding theory, non-linear control & analysis, analog & digital signal processing, networks & systems.

SKILLS

R, MATLAB, C++, Python, Git, Latex, Stata, ArcGIS

Last updated: May 8, 2019.