Berk Ustun

CURRICULUM VITAE – NOVEMBER 2018

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ACADEMIC POSITIONS	**Harvard University** Postdoctoral Research Fellow Center for Research in Computation and Society Mentors: David Parkes, Flavio du Pin Calmon, Margo Seltzer	2017 – PRESENT

RESEARCH INTERESTS

Topics: Fairness and Interpretability in Machine Learning and Causal Inference
Methods: Discrete Optimization, Stochastic Optimization, Monte Carlo Methods
Applications: Medicine, Credit Scoring, Criminal Justice, Revenue Management

EDUCATION	**Massachusetts Institute of Technology** Ph.D. Electrical Engineering and Computer Science Thesis: Simple Linear Classifiers via Discrete Optimization Advisor: Cynthia Rudin Thesis Committee: Leslie Kaebling, Stefanie Jegelka	2012 – 2017
	Massachusetts Institute of Technology S.M. Computation for Design and Optimization Thesis: MCMC for Importance Sampling in Stochastic Programming Advisor: Mort Webster	2010 – 2012
	University of California, Berkeley B.S. Industrial Engineering and Operations Research B.A. Economics	2005 – 2009

AWARDS & HONORS

Harvard Berkman Klein Center Affiliate	2017 – 2018
INFORMS Computing Society Best Student Paper Award	2017
INFORMS Innovative Applications in Analytics Award	2016
INFORMS Wagner Award for Excellence in O.R. Practice, Finalist	2017
Invenia Labs Social Environmental & Economic Challenges Award, Finalist	2018
MIT Presidential Fellowship	2012 – 2013
MIT Kaufman Teaching Certificate	2014
MIT Externship Award	2012
Alpha Pi Mu IEOR Honors Society	2006 – 2009

PUBLICATIONS

Machine Learning Methods

Actionable Recourse in Linear Classification
Berk Ustun, Alexander Spangher, and Yang Liu.
Forthcoming in ACM Conference on Fairness, Accountability, and Transparency (FAT*), 2019.

On the Direction of Discrimination: an Information-Theoretic Analysis of Disparate Impact in ML
Hao Wang, Berk Ustun and Flavio du Pin Calmon.
IEEE International Symposium on Information Theory (ISIT), 2018.

Optimized Risk Scores
Berk Ustun and Cynthia Rudin.
Proceedings of Knowledge Discovery and Data Mining (KDD), 2017.

Supersparse Linear Integer Models for Optimized Medical Scoring Systems
Berk Ustun and Cynthia Rudin.
Machine Learning, 2015.

Supersparse Linear Integer Models for Predictive Scoring Systems
Berk Ustun, Stefano Tracà and Cynthia Rudin.
Proceedings of AAAI Late Breaking Track, 2013.

Machine Learning Applications

Optimized Scoring Systems: Towards Trust in ML for Healthcare and Criminal Justice
Berk Ustun and Cynthia Rudin.
Interfaces, 2018.

The World Health Organization Adult ADHD Self-Report Screening Scale for DSM-5
Berk Ustun, Lenard Adler, Cynthia Rudin, Stephen Faraone, Thomas Spencer, Patricia Berglund, Michael Gruber, and Ronald Kessler.
JAMA Psychiatry, 2017.

Association of an EEG-Based Risk Score With Seizure Probability in Hospitalized Patients
Aaron Struck, Berk Ustun, Andres Rodriguez Ruiz, Jong Woo Lee, Suzette LaRoche, Lawrence J. Hirsch, Emily J. Gilmore, Jan Vlachy, Hiba Arif Haider, Cynthia Rudin, and Brandon Westover.
JAMA Neurology, 2017.

Interpretable Classification Models for Recidivism Prediction
Jiaming Zeng, Berk Ustun and Cynthia Rudin.
Journal of the Royal Statistical Society: Series A, 2016.

Clinical Prediction Models for Sleep Apnea: Superiority of Medical History over Symptoms
Berk Ustun, Brandon Westover, Cynthia Rudin, and Matt Bianchi.
Journal of Clinical Sleep Medicine, 2016.

Stochastic Optimization

Importance Sampling in Stochastic Programming: A Markov Chain Monte Carlo Approach
Panos Parpas, Berk Ustun, Mort Webster and Quan Kha Tran.
INFORMS Journal of Computing, 2015.

PREPRINTS   Learning Optimized Risk Scores
Berk Ustun and Cynthia Rudin.
In Submission, 2018.

Auditing Discrimination with Counterfactual Distributions
Hao Wang and Flavio du Pin Calmon.
In Submission, 2018.

IN PROGRESS   Fairness in Experimental Design
with Yang Liu, Debmalya Mandal and David Parkes.

Decoupling with Fairness Guarantees
with Yang Liu and David Parkes.

Decoupling with Distributional Guarantees
with Lily Hu and Flavio du Pin Calmon.

Long-Term Fairness in Credit Scoring
with Eric Mibuari and David Parkes.

Learning by Agreeing to Disagree
with Rachel Cao.

Automated Seizure Prediction in ICU with an Interpretable Front-End
with Brandon Westover and Haoqi Sun.

Learning Certifiably Optimal Linear Models for Categorical Data
with Cynthia Rudin, Tynan Seltzer and Margo Seltzer.

PTSD Screening at the US Veterans' Administration
with Ronald Kessler, Terry Keane and Frank Weathers.

INVITED TALKS	Harvard Data Science Conference, Boston, USA	2018
	Cornell University ORIE Department, Ithaca, USA	2018
	Harvard CRCS Colloquium, Cambridge, USA	2018
	INFORMS Annual Meeting, Houston, USA	2017
	Data & Society Research Institute, New York, USA	2017
	INFORMS Annual Meeting, Nashville, USA	2016
	UPENN Criminology Colloquium, Philadelphia, USA	2016
	American Society of Criminology Annual Meeting, Washington D.C., USA	2015
	ASA Conference on Statistical Learning and Data Mining, Durham, USA	2014
	MIT Big Data Initiative, Cambridge, USA	2014
	INFORMS Annual Meeting, San Francisco, USA	2014
	AAAI Conference on Artificial Intelligence, Bellevue, USA	2013
	8th Conference on Computational Management Science, Neuchatel, Switzerland	2010

INVITED PANELS & WORKSHOPS	Cornell Young Researchers in Data-Driven Decision-Making, Ithaca, USA	2018
	NSF Workshop on Trustworthy Decision-Making, Washington DC, USA	2017
	BPDM Panel on Ethics and Fairness in ML, Halifax, Canada	2017
	SAMSI Workshop on the Interface of Statistics and Optimization, Durham, USA	2017
	NSF Data Science Workshop, Seattle, USA	2015

TEACHING EXPERIENCE

MIT Engineering Systems Division   FALL 2011
ESD 862: Modeling Risk Dynamics and Decisions ⬩   RATING: 6.4/7.0
Guest Lecturer & Teaching Assistant
Presented lectures on how to model and solve sequential decision-making problems using stochastic programming. Led recitation sessions, held office hours, designed and graded homework assignments for over 20 Masters and PhD students at Harvard and MIT.

UC Berkeley Student Learning Center   2007 − 2009
Mathematics and Statistics Tutor
Tutored undergraduates in calculus, linear algebra and statistics. Participated in a 6-month program to develop tutoring skills and learn how to frame challenging problems in different ways.

SOFTWARE
🜨 github

actionable-recourse
Tools to audit linear classifiers for actionable recourse.

risk-slim / **slim-python** / **slim-matlab**
Tools to create simple data-driven scoring systems for decision-making and risk assessment.

group-em
Interactive online tool for teachers to easily create student groups.

ACADEMIC SERVICE

Organization

FAT/ML - Fairness, Accountability and Transparency in Machine Learning	2017 − 2018
MIT Machine Learning Tea Talks	2016 − 2017

Program Committee

NIPS - Neural Information Processing Systems	2018
ICML - International Conference on Machine Learning	2019
AISTATS - Artificial Intelligence and Statistics	2019
AAAI - Association for the Advancement of Artificial Intelligence	2019
UAI - Conference on Uncertainty in Artificial Intelligence	2018
FAT* - Conference on Fairness, Accountability and Transparency	2018, 2019
FAT/ML - Fairness, Accountability, and Transparency in ML	2017, 2018
NIPS Machine Learning for Healthcare Workshop	2017, 2018
ICML Workshop for Human Interpretability in ML	2017

Journal Reviewing: Machine Learning Journal, IEEE Transactions on Signal Processing, Statistical Analysis and Data Mining, Information Sciences, Big Data, Artificial Intelligence, Epidemiology, Nature Digital Medicine, Artificial Intelligence and Law, Journal of Quantitative Criminology, IBM Journal of Research and Development.

Session Organizer

INFORMS Session on Interpretable Machine Learning	2017
INFORMS Session on Discrete Optimization and Machine Learning	2016
INFORMS Session on Interpretable Machine Learning	2013

SELECTED PROFESSIONAL EXPERIENCE

Amazon. Seattle, WA   SUMMER 2013
Research Scientist Intern, IPC Buying Strategy Team
Developed scalable algorithms to identify sets of complimentary products. Proposed new inventory and transportation policies for complimentary products to achieve major savings without changing Amazon's current inventory management platform.

Highbridge Capital Managment. New York, NY   SUMMER 2008
Summer Analyst, Corporate Strategy
Researched new trading initiatives to diversify a $30B hedge fund and private equity firm. Interviewed over 20 executives to identify the strengths and weaknesses of each department. Wrote a 160-page report on short-term firm strategy for the JP Morgan Board of Directors.

E.I.M. Lyon, Switzerland   SUMMER 2007
Summer Analyst, Portfolio Management
Investigated data-driven approaches to classify and characterize hedge funds. Created databases to track daily risk statistics for over 500 hedge funds. Audited closed client accounts to identify areas of sub-par performance relative to major global hedge fund indices

SELECTED CONSULTING EXPERIENCE

Massachusetts General Hospital. Boston, MA   2014 – PRESENT
Department of Neurology / Sleep Laboratory / Lab of Computer Science
Building simple tools for data-driven decision-making. Ongoing projects include: (i) predicting seizure risk for patients in intensive care; (ii) screening for sleep apnea using electronic medical records; (iii) predicting 30-day readmission risk.

Pacific Gas and Electric. San Francisco, CA   FALL 2009
Student Analyst, Supply Chain Division
Designed a stocking and ordering policy for electric grid replacement parts that saved over $30M in inventory costs at PG&E's Fremont warehouse. Created an inventory management tool to help planners implement the stocking and ordering policy across warehouses in CA.

Other consulting work includes projects with: NY Metropolitan Transit Authority (2013), Kiva Microfinance (2009), Beats Headphones (2008), SF Chronicle (2008), and Monster Cable (2007).

SELECTED
PRESS &
EDITORIALS

What does a fair algorithm actually look like? ✎
WIRED, October, 10, 2018.

Just Data. How algorithms go bad – and how they can be saved. ✎
Colloquy, August 13, 2018.

Do You Zone Out? Procrastinate? Might Be Adult ADHD ✎
National Public Radio, April 5, 2017.

Good News for Screening for Adult Attention-Deficit/Hyperactivity Disorder ✎
Invited Commentary in JAMA Psychiatry, April, 2017.

A Novel Clinical Score to Assess Seizure Risk ✎
Invited Commentary in JAMA Neurology, October, 2017.

Big-Data or Slim-Data: Predictive Analytics Will Rule with World ✎
Editorial in Journal of Clinical Sleep Medicine, 2016.

SOFTWARE
SKILLS

Advanced: Python, R, MATLAB, CPLEX
Intermediate: Java, Javascript, SQL
Beginner: HTML, CSS, C, Bash

PERSONAL

Languages: Fluent in English, French and Turkish
Interests: L.A. Lakers, Basketball, Photography, Cooking, Travel

REFERENCES   Available upon request.