Sarah Tan

Contact Information

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Objective

Seeking **full-time position** in applied machine learning research / data science. My research is on interpretability, causal inference methods, and social good applications, particularly healthcare and public policy.

Education

Cornell University
PhD Statistics; Minor in Computer Science **2013 - August 2019**

- Dissertation: Learning and evaluating post-hoc interpretability methods for black-box machine learning models
- Advisors: Giles Hooker, Martin Wells (Cornell Statistics)
- Committee member: Thorsten Joachims (Cornell Computer Science)
- External committee member: Rich Caruana (Microsoft Research)
- Affiliation: Cornell Algorithms, Big Data, and Inequality Program

University of California San Francisco (UCSF)
Visiting Graduate Student **Jan 2018 - present**

- Host: Charles McCulloch (UCSF Epidemiology and Biostatistics)
- Ongoing collaboration: Zuckerberg San Francisco General Hospital (Probing the need and context for interpretability in clinical decision support systems)

University of California Berkeley
BA (Honors) Statistics, Economics; Minor in Operations Research **2006 - 2010**

Professional Experience

Microsoft Research Redmond, WA
Research Intern Mentors: Rich Caruana, Kori Inkpen, Ece Kamar
Focus Areas: Interpretability, Algorithmic Fairness **Summers 2017 & 2018**

- Developed global interpretability method for fully-connected neural nets to characterize the relationship between tabular data features and neural net predictions.
- Extended model distillation techniques to inspect criminal justice and credit risk scoring models for potential bias.

Data Science for Social Good Chicago, IL
Summer Fellow Mentor: Rayid Ghani (Obama 2012 Chief Data Scientist) **Summer 2014**

- Developed predictive models to help a nonprofit identify clients at risk for attrition or noncompliance; wrote blog post to describe findings for non-technical audience.

Johnson Research Labs | Startup research lab New York, NY
Research Scientist. Focus Area: Computational Social Science **2012 – 2013**

- Topic modeling on tweets, news articles, and other media content to investigate the influence of social issue documentaries on public opinion and legislation

New York City Health + Hospitals | Public hospitals system
Research Assistant (Part-Time), Statistics & Data Quality Group **Oct 2011 – Aug 2013**

- Pulled data from electronic medical records and applied statistical models to develop predictive models of care quality, hospital readmissions, and adverse drug reactions.

For my complete work experience, please see my LinkedIn.

Publications

Tan, R Caruana, G Hooker, Y Lou. *Distill-and-Compare: Auditing Black-Box Models Using Transparent Model Distillation*, ACM/AAAI AI, Ethics, Society Conference (**Oral talk**), 2018.

- Media coverage: MIT Technology Review, Politico, Futurism, WorkFlow

Tan, S Makela, D Heller, K Konty, S Balter, T Zheng, JH Stark. *Using Bayesian Evidence Synthesis to Estimate Disease Prevalence Among Hard-To-Reach Populations*, Epidemics, 23, 96-109, 2018.

- Presented to NYC Health Commissioner

Tan, G Hooker, MT Wells. *Tree Space Prototypes: Another Look at Making Tree Ensembles Interpretable*. NIPS Interpretability Workshop, 2016.

Tan, G Hooker, MT Wells. *Probabilistic Matching: Incorporating Uncertainty to Correct for Selection Bias*. NIPS Causal Inference Workshop, 2016.

IB Vasi, E Walker, JS Johnson, **Tan**. *"No Fracking Way!" Media Activism, Discursive Opportunities and Local Opposition against Hydraulic Fracturing in the United States, 2010-2013*, American Sociological Review, 2015.

- **2 Best Paper Awards** from American Sociological Association
- Media coverage: The Guardian, The Atlantic, Pacific Standard

Tan, DI Miller, J Savage. *Proximity Score Matching: Locally Adaptive Matching for Causal Inference*, Atlantic Causal Inference Conference (Lightning talk), 2015.

- Full version in preparation, preliminary version received **1 of 3 Best Student Paper Awards** from American Statistical Association SSPA section

For all my publications, please see my Google Scholar.

Work Under Review

Tan, R Caruana, G Hooker, P Koch, A Gordo. *Learning and Evaluating Global Additive Explanations of Black-Box Models*

Tan, J Adebayo, K Inkpen, E Kamar. *Investigating Human + Machine Complementarity for Recidivism Predictions*

X Zhang, **Tan**, P Koch, Y Lou, U Chajewska, R Caruana. *Interpretability is Harder in the Multiclass Setting: Axiomatic Interpretability for Multiclass Additive Models*

Grants and Fellowships (Selected)

- Microsoft Research Dissertation Grant ($25,000) **2018**
  - One of eleven winners of grant to support promising dissertation research in computing
- American Statistical Association Wray Jackson Smith Award ($1,000) **2017**
  - Awarded to one student per year with demonstrated interest in statistics and public policy
- Engaged Cornell Grant for Community-Engaged Dissertation Research ($15,000) **2017**
  - To support project with NYC Office of School Health evaluating the impact of later school start times in NYC public schools on health and academic outcomes

Talks (Selected)

- AT&T Labs Graduate Student Symposium **Nov 2018**
- UC Santa Cruz Responsible Data Science Seminar. *Host: Lise Getoor* **May 2018**
- Novartis Pharmaceuticals. *Host: Statistics Methodology Group* **April 2018**
- UCSF Medical Interpretability Seminar. *Host: Gilmer Valdes* **March 2018**

Service (Selected)

- *Co-organizer*, ICLR Workshop "Debugging Machine Learning Models" **2019**
- *Board of directors*, Women in Machine Learning organization **2018**
- *Co-organizer*, Invited Session "New Advances in Causal Inference for Longitudinal and Survival Data" at International Conference on Health Policy Statistics (ICHPS) **2018**
- *Co-organizer*, Women in Machine Learning Workshop (600 attendees, 200 posters) **2016**

Programming Languages

R, Python

Software

R package surfin: (Statistical Inference for Random Forests)