

Paroma Varma

Curriculum Vitae

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Research Interests

Weak Supervision, Machine Learning

Education

- Doctor of Philosophy**, *Electrical Engineering*, Stanford University, Stanford, CA.
2017 **Master of Science**, *Electrical Engineering*, Stanford University, Stanford, CA.
2015 **Bachelor of Science**, *Electrical Engineering and Computer Science*, University of California at Berkeley, Berkeley, CA.

Fellowships and Awards

National Science Foundation Graduate Research Fellowship
Stanford Graduate Research Fellowship
Arthur M. Hopkin Award for High Academic Achievement
Outstanding Course Development and Teaching Award

Research Projects

Reef: Automating Weak Supervision to Label Training Data

- A weak supervision framework that automatically generates heuristics to label data based on a small, labeled dataset
- Outperforms manually defined heuristics for several image-based tasks

Coral: Enriching Statistical Models with Static Analysis

- A weak supervision framework to efficiently label and video training data given small set of user-defined heuristics
- Perform static analysis on user-defined functions to enrich generative model with dependency information about heuristics

Socratic Learning: Finding Latent Subsets in Training Data

- Automatically correct for latent subsets in training data that affect weak supervision source behavior
- Utilize the disagreement between generative and discriminative models to identify latent subsets

Babble Labble: Learning from Natural Language Explanations

- Use natural language explanations for why crowd workers provide the label they do as a higher form of supervision
- Parse explanations into executable functions to generate high-quality labels for training data

Previous Work: Computational Imaging

- Explored phase retrieval via partial coherence illumination and digital holography
- Adapted proximal algorithms for 3D blind deconvolution applied to microscopy

Teaching and Mentoring Experience

TA for EE16A and EE20N, Designing Devices and Systems

- Helped develop course material and lab-based projects for pilot offering of the class
- Taught weekly sections and labs, designed homework and discussion problems

EECS Peer Advisor

- Held weekly drop-in hours for academic and policy advising

Industry Experience

Tablet and Netbooks Group Intern, Intel Corporation

- Developed algorithm to adjust camera's colorspace to better represent true color values
- Created internal testing tool to analyze image colors from tablet cameras

Business Intelligence Intern, GAP Inc.

- Used Selenium and Cucumber for automated testing of web-based reporting software (Microstrategy)
- Wrote scripts to solve issue regarding Microstrategy reports timing out

Abstracts, Presentations, and Publications

- 2018 B. Hancock, P. Varma, S. Wang, P. Liang, C. Ré. Training Classifiers with Natural Language Explanations. *ACL 2018*
- 2018 J. Zhang, M. Lam, S. Wang, P. Varma, L. Nardi, K. Olukotun, C. Ré. Exploring the Utility of Developer Exhaust. *DEEM 2018*
- 2017 P. Varma, B. He, P. Bajaj, N. Khandwala, C. Ré. Inferring Generative Model Structure with Static Analysis. *NIPS 2017*
- 2017 B. Hancock, P. Varma, S. Wang, P. Liang, C. Ré. Babble Labble: Learning from Natural Language Explanations. *DEMO NIPS 2017*
- 2017 V. Chen, P. Varma, M. Fiterau, J. Priest, C. Ré. Automated Training Set Generation for Aortic Valve Classification. *ML4H-NIPS 2017*
- 2017 V. Chen, P. Varma, M. Fiterau, J. Priest, C. Ré. Generating Training Labels for Cardiac Phase-Contrast MRI Images. *MED-NIPS 2017*
- 2017 P. Varma, D. Iyer, C. De Sa, C. Ré. Flipper: A Systematic Approach to Debugging Training Sets. *HILDA 2017*
- 2016 P. Varma, R. Yu, D. Iyer, C. De Sa, C. Ré. Socratic Learning: Correcting Misspecified Generative Models using Discriminative Models. *arXiv, FILM-NIPS 2016*
- 2016 P. Varma, G. Wetzstein. Efficient 3D Deconvolution Microscopy with Proximal Algorithms. *Imaging and Applied Optics Congress*

- 2015 J. Zhong, L. Tian, P. Varma, L. Waller. Nonlinear Optimization Algorithm for Partially Coherent Phase Retrieval and Source Recovery. *IEEE Transactions on Computational Imaging*
- 2015 J. Zhong, P. Varma, L. Tian, L. Waller. Source Shape Estimation in Partially Coherent Phase Imaging with Defocused Intensity. *Imaging and Applied Optics Congress*, Arlington, Virginia
- 2015 Z. Phillips, G. Gunjala, P. Varma, J. Zhong, L. Waller. Design of a Domed LED Illuminator for High-Angle Computational Illumination. *Imaging and Applied Optics Congress*, Arlington, Virginia
- 2015 L. Waller, L. Tian, J. Zhong, P. Varma. Phase Microscopy and 3D Imaging with Partially Coherent Light. *OSA Technical Digest (online)*
- 2014 M. Haller, P. Varma, T. Noto, R.T. Knight, A.Y. Shestyuk, B. Voytek. Automated “Spectral Fingerprinting” of Electrophysiological Oscillations. *Society for Neuroscience*, Washington DC
- 2014 P. Varma, D. Shuldman, L. Waller. Improving Depth Resolution in Digital Holography through Blind Deconvolution. *National Science Foundation REU*, UC Berkeley
- 2014 M. Haller, P. Varma, L.M. Rosenberg, N.E. Crone, E.F. Chang, J. Parvizi, R.T. Knight, A.Y. Shestyuk. Temporally Sustained Activity in Lateral Prefrontal Cortex Supports Decision Making. *International Conference on Cognitive Neuroscience*, Brisbane, Australia
- 2014 M. Haller, L.M. Rosenberg, P. Varma, N.E. Crone, E.F. Chang, J. Parvizi, R.T. Knight, A.Y. Shestyuk. High Gamma Duration in Human Prefrontal Cortex Predicts Decision Time. *International Neuropsychological Society*, Jerusalem, Israel