

Samuel G. Finlayson

Curriculum Vitae

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Education

- 2014–present **Harvard Medical School and Massachusetts Institute of Technology, Cambridge, MA,**
MD, PhD (expected).
Harvard-MIT Division of Health Sciences and Technology (MD)
Harvard Department of Systems, Synthetic, and Quantitative Biology (PhD)
PhD Advisors: Isaac Kohane and Peter Szolovits
- 2012–2014 **Stanford University, Stanford, CA,**
Master of Science.
Biomedical Informatics
- 2007–2013 **Stanford University, Stanford, CA,**
Bachelor of Arts.
Human Biology (Specialization: Biomedical Computation)

Research Positions

- 2016–Present **Isaac Kohane Lab, Harvard Department of Biomedical Informatics, Boston, MA.**
Clinical Decision Making Group, MIT Computer Science & Artificial Intelligence Laboratory,
Cambridge, MA.
PhD Student. Applying deep learning methods to medical images, medical text, transcriptomics, and chemical structure data.
- 2013–2014 **Nigam Shah Lab of Clinical Informatics, Stanford University, Stanford, CA.**
Research Assistant. Analyzed millions of electronic medical records, including clinical text, for temporal associations between drugs, diseases, devices, and procedures. Applications included off-label drug use profiling, adverse drug event detection, and comparative effectiveness research. Supervisor: Dr. Paea LePendur
- 2013–2014 **Daniel Rubin Lab of Imaging Informatics, Stanford University, Stanford, CA.**
Research Assistant. Designed and implemented the Melanoma Rapid Learning Utility (MRLU), an analytical engine for near real-time analysis of clinical and genetic data from the Stanford and Vanderbilt Cancer Centers.

Refereed Publications

- SG Finlayson**, J. D. Bowers, J. Ito, J. L. Zittrain, A. L. Beam, I. S. Kohane. Adversarial attacks on medical machine learning. *Science* **2019**, 363, 1287–1289.
- S. L. Lipnick, D. M. Agniel, R. Aggarwal, N. R. Makhortova, **SG Finlayson**, A. Brocato, N. Palmer, B. T. Darras, I. Kohane, L. L. Rubin. Systemic nature of spinal muscular atrophy revealed by studying insurance claims. *PloS one* **2019**, 14, e0213680.
- SG Finlayson**, H. Lee, I. S. Kohane, L. Oakden-Rayner. Towards generative adversarial

networks as a new paradigm for radiology education. *Machine Learning for Health (NeurIPS Workshop)* **2018**.

B. K. Beaulieu-Jones, W. Yuan, **SG Finlayson**, Z. S. Wu. Privacy-Preserving Distributed Deep Learning for Clinical Data. *Machine Learning for Health (NeurIPS Workshop)* **2018**.

T. Gurry, **HST Microbiome Consortium**, S. M. Gibbons, S. M. Kearney, A. Ananthakrishnan, X. Jiang, C. Duvallet, Z. Kassam, E. J. Alm, et al.. Predictability and persistence of prebiotic dietary supplementation in a healthy human cohort. *Scientific Reports* **2018**, 8, 12699.

X. Tu, M. Xie, J. Gao, Z. Ma, D. Chen, Q. Wang, **SG Finlayson**, Y. Ou, J.-Z. Cheng. Automatic Categorization and Scoring of Solid, Part-Solid and Non-Solid Pulmonary Nodules in CT Images with Convolutional Neural Network. *Scientific Reports* **2017**, 7.

SG Finlayson, M. Levy, S. Reddy, Rubin. Toward rapid learning in cancer treatment selection: an analytical engine for practice-based clinical data. *Journal of Biomedical Informatics* **2016**.

S. Tamang, M. Patel, D. Blayney, J. Kuznetsov, **SG Finlayson**, N. H. Shah. Detecting Unplanned Care from Unstructured Text in Electronic Health Records. *Journal of Oncology Practice* **2015**.

SG Finlayson, P. LePendur, N. H. Shah. Building the graph of medicine from millions of clinical narratives. *Scientific Data* **2014**, 1.

R. Harpaz, A. Callahan, S. Tamang, Y. Low, D. Odgers, **SG Finlayson**, K. Jung, P. LePendur, N. H. Shah. Text Mining for Adverse Drug Events: the Promise, Challenges, and State of the Art. *Drug Safety* **2014**, 37, 777–790.

Preprints and Completed Manuscripts Under Review

SG Finlayson, IS Kohane, AL Beam Adversarial Attacks Against Medical Deep Learning Systems *arXiv preprint arXiv:1804.05296* 2018.

Conference Abstracts

Tamang S, **Finlayson S**, Chen X, Kuznetsov JL, Blayney D, Patel M, Shah NG. Assessing the true nature of unplanned cancer care. *Journal of Clinical Oncology (Meeting Abstracts)*, Boston, MA. 2014.

Finlayson S, Sochat V, Szabo L, Yancy L. A Rapid Learning System for Personalized Glioblastoma Treatment Planning. *AMIA Annual Symposium (Abstract, Focus Session Presentation)*, Washington, D.C.. 2013.

Book Chapters

Pollard T, Dernoncourt F, **Finlayson S**, Velasquez A. "Data Preparation". *Secondary Analysis of Electronic Health Records*. Springer International Publishing, 2016. 101–114.

Invited Presentations

2019 "AI algorithm design: key considerations for real-world performance", Tutorial and Panel Discussion. AI Workshop, ARVO 2019. April 27, 2019.

- 2018 "Learning from large-scale Real World Evidence: Challenges and Opportunities", UCB Pharmaceuticals, Chief Executive and Chief Scientific Officer Briefing. October 1, 2018.
- 2018 "Adversarial Attacks and the Potential for Deep Harm to the Healthcare System.", NLM Informatics Training Conference 2018 (Presentation and Panel).

Committee Membership

- 2013–Present Member, Research Advisory Committee, Hydrocephalus Association

Journal Referee Activities

- 2018–Present Referee for: *New England Journal of Medicine*, *Journal of Biomedical Informatics* *NeurIPS Machine Learning for Health Workshop*

Teaching

- 2015 **Teaching Assistant**, *Harvard-MIT Health Sciences, and Technology*, Boston, MA.
HST 190: Introduction to Biostatistics (Prof. Rebecca Betensky) and HST 015: Matlab for Medicine (Prof. Matthew Frosch).
- 2012–2013 **Teaching Assistant**, *Department of Computer Science*, Stanford University, Stanford, CA.
CS 181: Ethics in computer science (Prof. Stephen Cooper) and CS 103: Mathematical Foundations of Computing (Profs. Ma and Colgrove).
- 2013 **Teaching Assistant**, *Department of Biology*, Stanford University, Stanford, CA.
BIO 112/212 Human Physiology (Prof. Daniel Garza).
- 2012–2013 **Private Tutor**, *Mathematics, English, and Physics*.
Tutored middle and high school students on a weekly basis.

Honors

- 2014 Medical Scientist Training Program, NIH Predoctoral Fellowship
- 2011 Academic All-American Honors, NCAA Division I Men's Water Polo
- 2011 Mountain Pacific Sports Federation All-Academic Honors
- 2007-2008, Thomas Ford Family Endowed Scholarship, Stanford University Athletic Department
- 2010–2012
- 2007–2012 National Scholar, Coca-Cola Scholars Foundation
- 2007 Finalist, National Merit Scholar
- 2007 California State Scholar-Athlete of the Year, California Interscholastic Sports Federation
- 2007 National Winner, Wendy's High School Heisman Award
- 2004 2nd, American Physiological Society, Intel International Science and Engineering
- 2004 Eagle Scout with Gold Palm, Boy Scouts of America

Volunteer Work

- 2008–Present **Co-Founder and Chief Scientific Officer**, *Team Hydro*.
Co-Founded non-profit organization to raise funds and awareness for Hydrocephalus research through open water swims throughout nation, including from Alcatraz Island to SF. Have raised more than \$600,000+ to date. Research, author, and produce informational materials and website articles for lay public. Develop and maintain relationships with sponsors, donors, researchers, and swimmers. www.teamhydro.org
- 2012–2014 **Program Director and Counselor**, *Camp Kesem*, Stanford, CA.
As program director (2014), developed, planned, and oversaw all camp activities for week-long, sleep-away program for 140+ children of cancer patients. Worked with team of student and community volunteers to select and train a team of 50+ counselors and staff, raise funding through private and corporate donations, and execute camp program. As counselor (2012–2014), oversaw group of 14 campers throughout week.
- 2011–2013 **Medical Interpreter**, *Pacific Free Clinic*, Stanford, CA.
Selected via application and interview process to interpret for Spanish-speaking patients at free community clinic. Assisted and followed patients from triage. Completed 40-hour certification program.

Miscellaneous Experience

- 2007, **Member**, *Varsity Water Polo Team*, Stanford University, Stanford, CA.
- 2010–2011 Trained 20+ hours per week, approx. 46 weeks per year. Competed in matches at venues throughout nation. Team consistently ranked in top four nationally.
- 2007, **Member and Soloist**, *The Mendicants A Capella*, Stanford University.
- 2010–2011 Represented Stanford at concerts on campus and throughout nation. Featured as soloist on professionally produced album.

Programming Languages

- Advanced R, PYTHON, SQL
- Intermediate Unix Scripting (awk, etc.), MATLAB, JAVA, C, C++, JULIA
- Basic Web Development

Languages

- English Native
- Spanish Full working proficiency