Samuel G. Finlayson

Curriculum Vitae

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Education

2022 (Expected) **Harvard Medical School and Massachusetts Institute of Technology**, *Cambridge, MA*, M.D.
Harvard-MIT Division of Health Sciences and Technology

2020 **Harvard Medical School and Massachusetts Institute of Technology**, *Cambridge, MA*, Ph.D.
Harvard Department of Systems, Synthetic, and Quantitative Biology
PhD Advisors: Isaac Kohane (HMS DBMI) and Peter Szolovits (MIT CSAIL)

2014 **Stanford University**, *Stanford, CA*,
M.S.
Biomedical Informatics

2013 **Stanford University**, *Stanford, CA*,
B.A.
Human Biology (Specialization: Biomedical Computation)

Research Positions

2016–2020 **Isaac Kohane Lab**, *Harvard Department of Biomedical Informatics*, Boston, MA.

Clinical Decision Making Group, *MIT Computer Science & Artificial Intelligence Laboratory*, Cambridge, MA.
PhD Student. Designing, implementing, and analyzing machine learning algorithms for use in biomedicine. Applications areas include medical imaging, medical text, EHR and claims data, genomics, and drug development.

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 LePendu

2013–2014 **Daniel Rubin Lab of Imaging Informatics**, *Stanford University*, Stanford, CA.
Research Assistant. Designed and implemented the Melanoma Rapid Learning Utility (MRLU), a tool for interactive analysis of clinical and genetic data from the Stanford and Vanderbilt Cancer Centers.

Journal Articles

B. Beaulieu-Jones, **SG Finlayson**, C. Chivers, I. Chen, M. McDermott, J. Kandola, A. V. Dalca, A. Beam, M. Fiterau, T. Naumann. Trends and Focus of Machine Learning Applications for Health Research. *JAMA network open* **2019**, *2*, e1914051–e1914051.

B. K. Beaulieu-Jones, **SG Finlayson**, W. Yuan, R. B. Altman, I. S. Kohane, V. Prasad, K.-H.

Yu. Examining the use of real-world evidence in the regulatory process. *Clinical Pharmacology & Therapeutics* **2020**, *107*, 843–852.

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.

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. LePendu, 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. LePendu, N. H. Shah. Text Mining for Adverse Drug Events: the Promise, Challenges, and State of the Art. *Drug Safety* **2014**, *37*, 777–790.

Peer-Reviewed Workshop Papers

SG Finlayson, HK Lee, IS Kohane, L Oakden-Rayner Towards generative adversarial networks as a new paradigm for radiology education *Machine Learning for Health (NeurIPS Workshop)* 2018.

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

Preprints and Completed Manuscripts Under Review

E Alsentzer*, **SG Finlayson***, MM Li, M Zitnik Subgraph Neural Networks *In Submission* 2020.

SG Finlayson, MD McDermott, A Pickering, S Lipnick, W Yuan, IS Kohane ross-Modal Representation Alignment of Transcriptional Profiles and Small Molecule Therapeutics *In Submission* 2020.

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

Peer-Reviewed Conference Abstracts

Tamang S, **Finlayson SG**, 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 SG, 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 SG**, Velasquez A. "Data Preparation". *Secondary Analysis of Electronic Health Records*. Springer International Publishing, 2016. 101–114.

Invited Presentations (Selected)

2019 "Robust machine learning for highly vulnerable patients", HMS Media Fellows Program, Harvard Medical School. September 10, 2019.

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", Presentation and Panel, NLM Informatics Training Conference 2018.

Conference and Workshop Leadership

2020 Co-Proceedings Chair, ACM Conference on Health, Inference, and Learning (CHIL) 2020

2020 Founding Organizer and Program Committee Member, Symposium on Artificial Intelligence for Learning Health Systems (SAIL) 2020

2019 Co-Program Chair, Machine Learning for Health Workshop (ML4H) at the Conference on Neural Information Processing Systems (NeurIPS) 2019

2018 Co-Program Chair, Machine Learning for Health Workshop (ML4H) at the Conference on Neural Information Processing Systems (NeurIPS) 2018

Journal Referee Activities

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

Committee Membership

2013–Present Member, Research Advisory Committee, Hydrocephalus Association

Teaching

2015 **Teaching Assistant**, *Harvard-MIT Health Sciences, and Technology*, Boston, MA.
HST 190: Intoduction 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, 2010–2012 Thomas Ford Family Endowed Scholarship, Stanford University Athletic Department

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 Fair

2004 Eagle Scout with Gold Palm, Boy Scouts of America

Industry Experience

2018–Present **Clinical Data Scientist and Deep Learning Engineer**.
Consulting scientist for pharmaceutical and information technology companies. Engagements ranging from short term (single sessions) to longer term (year+). Help formulate new strategies for using machine learning for clinical and biological data, implement statistical analyses, prototype deep learning systems, and present results to senior leadership and research teams.

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 $700,000+ 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 volunteers to select and train 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, 2010–2011 **Member**, *Varsity Water Polo Team*, Stanford University, Stanford, CA.
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, 2010–2011 **Member and Soloist**, *The Mendicants A Capella*, Stanford University.
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, Web Development (HTML, CSS, Javascript)

Languages

English Native

Spanish Full working proficiency