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Summary: I am a postdoctoral scholar at **Stanford University School of Medicine**, developing methods using **artificial intelligence (AI)** to identify risk phenotypes for diverse **clinical applications**. Previously, I obtained my **Ph.D. in the Electrical and Computer Engineering Department** at **Princeton University**. I completed my **S.B. and MEng. degrees** at **MIT in Electrical Engineering and Computer Science** with a concentration in AI. **My research interest is on developing solutions for healthcare using AI, e.g., causal inference, machine learning/deep learning algorithms, and statistics.** For example, my Ph.D. research has focused on **making clinical randomized controlled trials more data-efficient** (i.e., fewer subjects and measurements) and my MEng. research focused on assessing and improving the quality of fetal brain MRI. I have also done **internships on AI for health at Apple**, where I developed methods for **analyzing behavioral health data and improving automated sleep staging from wearable data.**

EDUCATION

Princeton University   Princeton, NJ
PhD, Department of Electrical and Computer Engineering   Sept. 2019-Sept. 2024
Minor: Neuroscience, GPA: 3.9/4.0
Thesis: Designing Efficient Clinical Randomized Controlled Trials using AI

Massachusetts Institute of Technology (MIT)   Cambridge, MA
Master of Engineering in Electrical Engineering and Computer Science   Sept. 2017-May 2019
Concentration: AI, GPA: 5.0/5.0
Thesis: Convolutional Neural Networks for Image Reconstruction and Image Quality Assessment of 2D Fetal Brain MRI

Bachelor of Science in Electrical Engineering and Computer Science   Sept. 2013-May 2017
Minor: Economics, GPA: 4.9/5.0

Notre Dame High School   San Jose, CA
GPA: 4.68/4.0 (Valedictorian), SAT: 2340   June 2013

SKILLS

Software: Python (e.g., PyTorch, TensorFlow, Scikit-learn, NumPy, Pandas), Git, cloud and distributed computing, LaTeX

Coursework: AI, **Machine Learning (ML), Deep Learning (DL), Statistics, Linear Algebra, Probability**, Reinforcement Learning, Discrete Math, Optimization, Signals and Systems, Computer Vision, Robotics, Algorithms, Software Engineering, Computational Cognitive Science

ML: model architectures (e.g., Transformer, Generative Adversarial Network, Convolutional Neural Network [CNN]), training algorithms (e.g., self-supervised learning), tasks (e.g., data generation, classification, regression), data types (e.g., images, high-dimensional, **multi-modal time-series data**), data pre-processing (e.g., of raw clinical and wearable data), model evaluation (e.g., cross-validation)

Applications: Randomized Controlled Trial (RCT), wearables and biosignals (e.g., EEG), medical imaging (e.g., MRI)

EXPERIENCE

Stanford University, School of Medicine, Department of Neurosurgery   Palo Alto, CA
Advisors: Prof. Summer Han and Prof. Corinna Zygourakis   October 2024-present
- Developing AI-based solutions to discover and predict health risk phenotypes from wearable and clinical data

Princeton University, Department of Electrical and Computer Engineering   Princeton, NJ
Machine Learning for Healthcare   May 2020-present
Advisor: Prof. Niraj K. Jha
- Developed AI (e.g., causal inference, DL) and statistics-based frameworks for enabling data-efficient clinical RCTs (e.g., SECRETS, TAD-SIE, METRIK)
- Developed a DL-based framework (e.g., using CNN, generative models, and self-supervised learning) to train classifiers for medical imaging diagnosis in a label-efficient manner; e.g., on diabetic retinopathy detection, the method reduced the amount of human-expert-labeled data by up to 50% or 7K labels

Princeton University, Department of Electrical and Computer Engineering   Princeton, NJ
ELE/ECE364 Machine Learning for Predictive Data Analytics   Aug.-Dec. 2020/2023

- Held office hours resolving homework/lecture questions
- Held discussion sections teaching advanced concepts beyond lectures (2020)
- Developed coding assignments on topics, e.g., Deep Learning, Decision Trees, Bayes Nets, that have been used in subsequent years (2020)
- Served as head teaching assistant and coordinated logistics (e.g., assignment grading) among 5 teaching assistants (2020)

Apple   Cupertino, CA
Biosignal Intelligence Group: AIML Research Intern   June-Aug. 2023
Supervisor: Dr. Christopher Sandino
- Developed a Transformer-based framework that learns to sleep stage from biosignal data in a label-efficient manner (e.g., the method reduced the amount of labeled training data needed by up to 800 subjects) (paper, mlr_link)
- Contributed to the development/evaluation of new Transformer-based pre-training algorithms (paper, paper)

Apple   Sunnyvale, CA
Health Technologies Research Intern   May-Sept. 2022
Supervisor: Dr. Matt Bianchi
- Developed a framework to detect user behavior patterns ("phenotypes") from a large public study cohort using statistics and machine learning for time-series classification

MIT, Department of Electrical Engineering and Computer Science   Cambridge, MA
Magnetic Resonance Imaging Group, Research Lab of Electronics   Sept. 2017-Aug. 2019
Advisor: Prof. Elfar Adalsteinsson
- Prepared a novel fetal brain MRI quality dataset (i.e., 11K+ images from 40+ subjects) under supervision of clinical experts and trained a CNN for artifact detection to high performance (e.g., 0.85+ AUC) (presentation, paper)
- Helped initiate work to build a tool deploying the classifier for low-latency evaluation of slice quality during scanning (presentation)
- Demonstrated that a CNN-based architecture can remove aliasing artifacts from fetal brain MR images with superior reconstructions over a SOTA baseline (poster)

NASA Ames Research Center   Mountain View, CA
Data Sciences Group   May. 2015-Sept. 2017 (summer; winter)
Research Intern
- Explored methods for integrating multiple kernel learning into an active learning framework used to train an SVM for anomaly detection on flight data
- Work featured in NASA's ML workshop (report)

Apple Maps   Sunnyvale, CA
Data Science Intern   May-Sept. 2016
- Experimented with ML algorithms for anomaly detection

MIT, Department of Electrical Engineering and Computer Science   Cambridge, MA
Genesis Research Group, Computer Science Artificial Intelligence Lab   Feb. 2015-May 2016
Advisor: Prof. Patrick H. Winston
- Developed a question generation module enabling the Genesis system (a natural language processing system) to generate and prioritize questions over stories

PATENTS

S. Lala and N. K. Jha, "System and Method for Subject-Efficient Clinical Randomized Controlled Trials". April, 12, 2024. (application filed)

PUBLICATIONS & TALKS

S. Lala and N. K. Jha, "TAD-SIE: Sample size estimation for clinical randomized controlled trials using a Trend-Adaptive Design with a Synthetic-Intervention-Based Estimator," *Trials*, Jan. 2025. [Online]. Available:
https://pmc.ncbi.nlm.nih.gov/articles/PMC11780961/

S. Lala and N. K. Jha, "METRIK: Measurement-efficient randomized controlled trials using transformers with input masking," 2024, arXiv:2406.16351. *(under review)*

S. Lala, H. Goh, and C. Sandino, "Label-efficient sleep staging using transformers pre-trained with position prediction," in *Proc. 1st IEEE Int. Conf. on Artif. Intell. for Medicine, Health, and Care*, 2024. [Online]. Available: https://ieeexplore.ieee.org/abstract/document/10504333

S. Lala and N. K. Jha, "SECRETS: Subject-efficient clinical randomized controlled trials using synthetic intervention," *Contemporary Clinical Trials Communications*, Feb., 2024. [Online]. Available: https://www.sciencedirect.com/science/article/pii/S2451865424000127

L. Huang, **S. Lala**, and N. K. Jha, "CONFINE: Conformal prediction for interpretable neural networks," 2024, *arXiv:2406:00539*.

C. Sandino, **S. Lala**, M. Ayoughi, B. Mahasseni, E. Zippi, A. Moin, E. Azemi, and H. Goh, "WiSE: Pairwise window shift estimation for pretraining EEG models," 2024.

M. Ayoughi, S. Abnar, C. Huang, C. Sandino, **S. Lala,** E. Dhekane, D. Busbridge, S. Zhai, V. Thilak, J. Susskind, and H. Goh, "PART: Self-supervised pretraining with pairwise relative translations," 2024.

S. Lala and N. K. Jha, "Applications of machine learning to healthcare," *Association of Physicians of India Conference*, Apr. 2022.

J. Xu, **S. Lala,** B. Gagoski, E. A. Turk, P. E. Grant, P. Golland, and E. Adalsteinsson, "Semi-supervised learning of fetal brain MRI quality assessment with ROI consistency," in *Proc. 23rd Int. Conf. on Medical Image Computing and Computer-Assisted Intervention,* 2020. [Online]. Available: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC9652031/

B. Gagoski, J. Xu, P. Wighton, D. Tisdall, R. Frost, **S. Lala**, W. Lo, P. Golland, A. van Der Kouwe, E. Adalsteinsson, and P. E. Grant, "Automatic detection and reacquisition of motion degraded images in fetal HASTE imaging at 3T," in *Proc. 28th Joint Annual Meeting ISMRM-ESMRMB*, 2020. [Online]. Available: https://cds.ismrm.org/protected/20MProceedings/PDFfiles/0098.html (presentation)

S. Lala and E. Gong, "Use of AI and neural networks in medical imaging enhancement," IEEE Santa Clara Valley Consumer Electronics Society, July, 2019. (presentation)

S. Lala, N. Singh, B. Gagoski, E. A. Turk, P. E. Grant, P. Golland, and E. Adalsteinsson, "A deep learning approach for image quality assessment of fetal brain MRI," in *Proc. 27th Joint Annual Meeting ISMRM-ESMRMB*, 2019. [Online]. Available: https://cds.ismrm.org/protected/19MProceedings/PDFfiles/0839.html (presentation**)**

S. Lala, M. Shady, A. Belyaeva, and M. Liu, "Evaluation of mode collapse in generative adversarial networks," *in Proc. 22nd IEEE High Performance Extreme Computing Conf.,* 2018. [Online]. Available: https://ieee-hpec.org/2018/2018program/index_htm_files/124.pdf. (poster)

S. Lala, B. Gagoski, J. Stout, B. Bilgic, B. Zhao, E. P. Grant, P. Golland, and E. Adalsteinsson, "A machine learning approach for mitigating artifacts in fetal imaging due to an undersampled HASTE sequence," in *Proc. 26th Joint Annual Meeting ISMRM-ESMRMB*, 2018. [Online]. Available: https://cds.ismrm.org/protected/18MProceedings/PDFfiles/3383.html (poster)

RECOGNITIONS

- 2nd place for research poster presentation in the NextG symposium (2024)
- Outstanding Assistant in Instruction Award for ELE364 in Electrical Engineering and Computer Engineering (2021)
- Nominated by Princeton University (Department of Electrical and Computer Engineering) for the Microsoft Fellowship (2021)
- Anthony Ephremides Fellowship in Electrical Engineering (2019-2020)
- Selected to attend the MIT Brains, Minds, & Machines Summer Course (2019)
- National Science Foundation Graduate Research Fellowship Program Honorable Mention (2019)
- Member of MIT's Tau Beta Pi, Eta Kappa Nu, Sigma Xi (invited)

PROFESSIONAL/MENTORSHIP ACTIVITIES

- Reviewer for *IEEE Transactions in Artificial Intelligence* (2022)
- Google Research CS Research Mentorship Program recipient (2021)
- Member of IEEE (2020-present)
- Mentored undergraduate/Master's students on their thesis projects exploring AI topics (e.g., generative models, uncertainty quantification) (2020-present)