SAYERI LALA US Citizen • 408-544-0293 • slala@princeton.edu • slala21021@gmail.com • github.com/slala21021

Research interests: Artificial Intelligence, Machine Learning, Deep Learning, and their applications to the analysis of medical data

EDUCATION

Princeton University Princeton, NJ
PhD candidate, Department of Electrical and Computer Engineering Sept. 2019-present
GPA: 3.9/4.0

Massachusetts Institute of Technology (MIT) Cambridge, MA
Master of Engineering in Electrical Engineering and Computer Science Sept. 2017-May 2019
Concentration: Artificial Intelligence, 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

Relevant MIT, Princeton coursework
Dynamics in Cognition, Computational Cognitive Science, Probabilistic Models of Cognition, Reinforcement Learning, Robotics, Optimization, Artificial Intelligence, Machine Learning, Deep Learning, Computer Vision, MRI, Signals and Systems, Algorithms, Discrete Math, Probability, Statistics, Linear Algebra

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

PRESENTATIONS & PUBLICATIONS

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. Intl. Conf. on Medical Image Comput. and Computer-Assisted Intervention,* Oct. 2020.

B. Gagoski, J. Xu, P. Wighton, D. Tisdall, R. Frost, **S. Lala**, W. Lo, P. Golland, A. van de Kouwe, and E. Adalsteinsson, "Automatic detection and reacquisition of motion degraded images in fetal HASTE imaging at 3T," in *Proc. Joint Annu. Meeting ISMRM-ESMRMB*, Aug. 2020.

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. Joint Annu. Meeting ISMRM-ESMRMB*, May 2019. (presentation)

S. Lala, M. Shady, A. Belyaeva, and M. Liu, "Evaluation of mode collapse in generative adversarial networks," *in Proc. IEEE High Perform. Extreme Comput. Conf.,* Sept. 2018. (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. Joint Annu. Meeting ISMRM-ESMRMB*, June 2018. (poster)

RECOGNITIONS/SOCIETIES

- The Anthony Ephremides Fellowship in Electrical Engineering from Princeton University (2019-2020)
- National Science Foundation Graduate Research Fellowship Program Honorable Mention (2019)
- Honor societies: Member of MIT's Tau Beta Pi, Eta Kappa Nu, Sigma Xi (invited)
- Professional organizations: Society of Women Engineers, IEEE

SKILLS

Programming: Python (e.g., TensorFlow, PyTorch, NumPy, SciPy, Scikit-learn, Matplotlib), MATLAB, Java, C++, Bash, Linux, AWS, Google Cloud

RESEARCH EXPERIENCE

Princeton University, Department of Electrical and Computer Engineering Princeton, NJ
Machine Learning and Smart Healthcare Feb. 2020-present
Advisor: Prof. Niraj K. Jha

- Investigating deep learning-based methods (e.g., GANs, self-supervised learning) for synthesizing medical images and training classifiers on the synthesized images to improve classification performance
- Our method for generating synthetic medical images and training CNNs on real and synthetic datasets reduced the amount of real labeled training data needed to match target performance by 50-67% or 6-13K image-label pairs on sample medical imaging classification datasets (e.g., diabetic retinopathy detection)

MIT, Center for Brains, Minds, and Machines Woods Hole, MA
Brains, Minds, and Machines Course Aug. 2019

- Conducted a research project training a 1D Convolutional Neural Network to classify human speech properties (speaker identity) from ECoG measurements
- Preliminary results demonstrated above chance performance. Ablation studies showed that measurements obtained from electrodes in the language processing regions yielded higher predictive performance

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

Fetal Brain MR Image Quality

- Developed and deployed a scalable pipeline for labeling a fetal brain MRI quality dataset, visualizing the dataset's quality distribution, then training a Convolutional Neural Network (CNN) to detect whether an image contained an artifact or not
- Under the guidance of a fetal brain MRI radiologist and clinical fellows at Boston Children's Hospital, labeled a novel fetal brain MRI quality dataset of 12K+ images pooled from 60+ mothers. Provided novel statistics on the quality distribution (e.g., 20%+ images contained artifacts)
- Trained a CNN on the labeled dataset which attained 0.86 area under the receiver operating characteristic curve. Demonstrated that the CNN learned to focus on the small brain region of interest in the image (<20% of the image pixels), using a state-of-the-art saliency map algorithm (Grad-CAM)
- Helped initiate work to build a tool deploying the classifier for low-latency evaluation of slice quality during scanning. Our results showed that the classifier could be used to efficiently flag poor quality images, with subsequent reacquisition of such slices improving the image quality

Fetal Brain MR Image Reconstruction

- Trained a CNN-based architecture to remove aliasing artifacts from fetal brain MR images that were retrospectively undersampled
- Demonstrated that the CNN-based reconstructions were higher quality than compressed sensing reconstructions, attaining 3% normalized root mean square error (NRMSE) and 12% NRMSE at 2x and 8x undersampling respectively, compared to 12% NRMSE and 32% NRMSE under compressed sensing (competing baseline approach)

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 an Automated Question Generation module enabling the Genesis system, a natural language processing system modeling human story comprehension, to generate and prioritize questions over stories represented as text

TEACHING EXPERIENCE

Princeton University, Department of Electrical and Computer Engineering Princeton, NJ
ELE364 Machine Learning for Predictive Data Analytics, Head Teaching Assistant Aug.-Dec. 2020

- Held office hours reviewing lecture material and resolving homework/lecture questions
- Led discussion sections teaching advanced concepts beyond lectures (e.g., deep learning)
- Prepared coding assignments
- Coordinated assignment grading among 5 teaching assistants

PROFESSIONAL EXPERIENCE

NASA Ames Research Center Mountain View, CA
Data Sciences Group May. 2015-Sept. 2017 (summer; winter)
Research intern

- Developed an algorithm based on multiple kernel learning for Support Vector Machines (SVMs) to automatically construct features for anomaly detection
- 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 Machine Learning workshop (https://ntrs.nasa.gov/api/citations/20190030497/downloads/20190030497.pdf)

Apple Maps Sunnyvale, CA
Data science Intern May-Sept. 2016

- Experimented with machine learning algorithms (e.g., gradient boosted decision trees) for anomaly detection