Gregory I. Holste

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EDUCATION

The University of Texas at Austin, Austin, TX
M.S.E, Ph.D. in Electrical Engineering **Aug. 2021-present**
- Ph.D. student in DICE track of ECE department
- <u>Advisor</u>: Zhangyang (Atlas) Wang

Kenyon College, Gambier, OH
B.A. in Mathematics & Statistics **Aug. 2016-May 2020**
- GPA: 3.91 / 4.00 (*summa cum laude*)
- Concentration in Scientific Computing; Minor in Biology

RESEARCH
EXPERIENCE

The University of Texas at Austin, Austin, TX
Visual Informatics @ UT Austin (VITA) **Jul. 2021-present**
- Self-supervised and multimodal learning for data-efficient cardiac diagnosis from echocardiogram videos [1, p1]
- Long-tailed learning of thorax diseases on chest X-rays [4]
- Co-organizing the ICCV CVAMD 2023 workshop and leading the CXR-LT competition for long-tailed chest X-ray classification
- Designed a radiomics-guided Transformer architecture for weakly supervised disease localization in chest X-rays [3]
- <u>Advisor</u>: Zhangyang (Atlas) Wang

Weill Cornell Medicine, New York City, NY
Peng Lab, Population Health Sciences **May. 2023-present**
- Deep survival analysis from longitudinal medical imaging for eye disease prognosis
- Led an open competition for multi-label, long-tailed learning on chest X-rays
- <u>Advisor</u>: Yifan Peng

Artera Inc, Mountain View, CA
Artificial Intelligence Team **May. 2022-Oct.2022**
- Implemented methods for multimodal fusion of histopathology images and clinical data for prostate cancer prediction [2]
- Improved upon productionalized biomarker by 0.02 mean cross-validation AUROC
- <u>Advisors</u>: Akinori Mitani, Andre Esteva

Michigan State University, East Lansing, MI
Medical Imaging & Data Integration Lab **Aug. 2019-Jul. 2021**
- Developed and compared multimodal fusion models that learn jointly from breast MRI images and associated non-image clinical data [6]
- Applied novel ensemble methods to pediatric rib fracture detection in X-rays [5]
- Submitted solutions to RSNA Pulmonary Embolism Detection Challenge and MICCAI 2020 RibFrac Challenge (top 8-performing solution)
- <u>Advisor</u>: Adam Alessio

Michigan State University, East Lansing, MI

ACRES Research Experience for Undergraduates (REU)   **Summer 2019**

- Implemented methods to segment eight regions of the chest in pediatric radiographs
- Compared methods to improve anatomic segmentation with 10^5-fold imbalance between classes, including custom pixel weight maps and loss functions [7]
- <u>Advisor</u>: Adam Alessio

PUBLICATIONS

[1] **G. Holste**, E.K. Oikonomou, B.J. Mortazavi, A. Coppi, K.F. Faridi, E.J. Miller, J.K. Forrest, R.L. McNamara, L. Ohno-Machado, N. Yuan, A. Gupta, D. Ouyang, H.M. Krumholz, Z. Wang, R. Khera. "Severe aortic stenosis detection by deep learning applied to echocardiography." *European Heart Journal*. Forthcoming.

[2] **G. Holste**, Z. Jiang, A. Jaiswal, M. Hanna, S. Minkowitz, A.C. Legasto, J.G. Escalon, S. Steinberger, M. Bittman, T.C. Shen, Y. Ding, R.M. Summers, G. Shih, Y. Peng, Z. Wang. "How Does Pruning Impact Long-Tailed Multi-Label Medical Image Classifiers?" *Medical Image Computing and Computer-Assisted Intervention (MICCAI) 2023*. Forthcoming.

[3] **G. Holste**, D. van der Wal, H. Pinckaers, R. Yamashita, A. Mitani, A. Esteva. "Improved Multimodal Fusion for Small Datasets with Auxiliary Supervision." *Proceedings of the IEEE International Symposium on Biomedical Imaging (ISBI)*. Forthcoming.

[4] Y. Han, **G. Holste**, Y. Ding, A. Tewfik, Y. Peng, Z. Wang. "Radiomics-Guided Global-Local Transformer for Weakly Supervised Pathology Localization in Chest X-Rays." *IEEE Transactions on Medical Imaging*. 26 October 2022.

[5] **G. Holste**, S. Wang, Z. Jiang, T.C. Shen, G. Shih, R.M. Summers, Y. Peng, Z. Wang. "Long-Tailed Classification of Thorax Diseases on Chest X-Ray: A New Benchmark Study" in *Proc. MICCAI Workshop on Data Augmentation, Labelling, and Imperfections*. 16 September 2022.

[6] J. Burkow, **G. Holste**, J. Otjen, F. Perez, J. Junewick, A. Alessio. "Avalanche decision schemes to improve pediatric rib fracture detection" in *Proc. SPIE Medical Imaging 2022: Computer-Aided Diagnosis*. 4 April 2022.

[7] **G. Holste**, S. Partridge, H. Rahbar, D. Biswas, C. Lee, A. Alessio. "End-to-End Learning of Fused Image and Non-Image Features for Improved Breast Cancer Classification from MRI" in *Proc. International Conference on Computer Vision (ICCV) Workshops*. 31 October 2021.

[8] **G. Holste**, R. Sullivan, M. Bindschadler, N. Nagy, A. Alessio. "Multi-class semantic segmentation of pediatric chest radiographs" in *Proc. SPIE Medical Imaging 2020: Image Processing*. 10 March 2020.

[9] R. Sullivan, **G. Holste**, J. Burkow, A. Alessio. "Deep learning methods for segmentation of lines in pediatric chest radiographs" in *Proc. SPIE Medical Imaging 2020: Computer-Aided Diagnosis*. 16 March 2020.

PREPRINTS

[p1] **G. Holste**, E.K. Oikonomou, B. Mortazavi, Z. Wang, R. Khera. "Self-Supervised Learning of Echocardiogram Videos Enables Data-Efficient Clinical Diagnosis." *arXiv preprint*. 23 July 2022.

Honors/ Awards	**NSF Graduate Research Fellowship (GRFP)**	Mar. 2023-2026
	National Science Foundation fellowship for outstanding STEM graduate students	
	Dean's Prestigious Fellowship Supplement	Sep. 2023
	UT Austin award for graduate students receiving prestigious external scholarships	
	Charles W. & Margaret A. Tolbert Endowed Scholarship	Aug. 2021
	UT Austin Cockrell School of Engineering scholarship for top incoming engineering students	
	Phi Beta Kappa	May 2020
	Elected to Kenyon College's chapter of the national honor society	
	Sigma Xi	Feb. 2020
	Inducted into the Kenyon-Denison chapter of the national science research honor society	
	Pi Mu Epsilon	Apr. 2018
	Elected to the Ohio Pi chapter of the national mathematics society	
	Wendell D. Lindstrom Memorial Prize	Apr. 2018
	One of 12 students given prize for outstanding mathematics students at Kenyon College	
	Kenyon College Merit List (8x)	every semester

Oral Presentations	**Long-Tailed Classification of Thorax Diseases on Chest X-Ray: A New Benchmark Study**	
	MICCAI Workshop on Data Augmentation, Labelling, & Imperfections, Singapore	Sep. 2022
	Multi-class semantic segmentation of pediatric radiographs	
	SPIE Medical Imaging: Image Processing, Houston, TX	Feb. 2020

Scientific Abstracts	**Biometric Contrastive Modeling for Data-Efficient Deep Learning from Electrocardiographic Images**	
	Veer Sangha, Akshay Khunte, **Gregory Holste**, Bobak Mortazavi, Zhangyang Wang, Evangelos K Oikonomou, Rohan Khera	
	American College of Cardiology (ACC) Scientific Session	Mar. 2023
	Long-Tailed Classification of Thorax Diseases on Chest X-Ray	
	G. Holste, S. Wang, Z. Jiang, T.C. Shen, G. Shih, R.M. Summers, Y. Peng, Z. Wang	
	Radiological Soceity of North America (RSNA) 2022, Chicago, IL	Nov. 2022
	Automated Detection of Aortic Stenosis From Single-View 2-Dimensional Echocardiography Using a Semi-Supervised, Contrastive Learning Approach	
	E.K. Oikonomou, **G. Holste**, B. Mortazavi, Z. Wang, R. Khera	
	American Heart Association (AHA) 2022, Chicago, IL	Nov. 2022
	Self-Supervised Learning of Echocardiogram Videos Enables Data-Efficient Clinical Diagnosis	

G. Holste, E.K. Oikonomou, B. Mortazavi, Z. Wang, R. Khera
ICML Workshop on Interpretable Machine Learning in Healthcare, Baltimore, MD   **Jul. 2022**

Rib fracture detection in pediatric radiographs via deep convolutional neural networks
J. Burkow, **G. Holste**, F. Perez, J. Junewick, A. Zbojniewicz, J. Frost, E. Romberg, S. Menashe, J. Otjen, A. Alessio
International Pediatric Radiology Congress, Milan, Italy   **Oct. 2021**

Automatic segmentation of chest radiographs with deep learning
G. Holste, R. Sullivan, N. Nagy, M. Bindschadler, A. Alessio
Mid-SURE Symposium, East Lansing, MI   **Jul. 2019**

Deep learning methods for automatic evaluation of lines in chest radiographs
R. Sullivan, **G. Holste**, A. Alessio
Mid-SURE Symposium, East Lansing, MI   **Jul. 2019**

INVITED TALKS

Fusing imaging and clinical information for improved automatic breast cancer detection
MSU Virtual Imaging Research Symposium, East Lansing, MI   **Feb. 2021**

Automatic segmentation of pediatric chest radiographs
Kenyon College Math Monday, Gambier, OH   **Nov. 2019**

SERVICE

Conference Reviewer: ICCV CVAMD 2023, NeurIPS 2023, ICML 2023

Journal Reviewer: European Heart Journal, IEEE Journal of Biomedical and Health Informatics, PLoS One, ACM Transactions on Computing for Healthcare