Hongwei Bran Li Ph.D.

Address: 13a Ware St., Cambridge, MA, USA

Email: holi2@mgh.harvard.edu Website: https://hongweilibran.github.io/

RESEARCH INTERESTS

My research focuses on developing AI-driven methods to analyze medical images. I build models that can assess uncertainties and improve the accuracy and trustworthiness of diagnostic tools used in radiology and oncology. My goal is to bridge advanced computational techniques with practical clinical applications, ensuring that the benefits of AI reach real-world healthcare settings effectively.

EDUCATION

Ph.D. in Computer Science from Technical University of Munich, Germany 12.2017-09.2023

Grade: Summa cum Laude

- **Thesis**: "*Efficient and cross-domain deep learning for advanced neuroimage analysis*"
- **Research** on developing deep learning methods for computational neuroimaging
- **Advisor**: Bjoern Menze. **Committee**: Daniel Rueckert, Tammy Riklin Raviv, and Koen Van Leemput

Visiting Ph.D. student at University of Zurich and ETH AI Center, Switzerland 11.2020-08.2023

- **Research** on establishing segmentation methods for microscopy images of zebrafish and developing self-supervised deep learning for large-scale medical datasets.

M.Sc. in Informatics, Sun Yat-sen University, China 09.2014-07.2017

Thesis: *"Machine learning for HEP-2 cell classification in microscopy images"*

Visiting M.Sc. student at School of Computing, University of Dundee, UK 12.2016-07.2017

- **Research** on developing automated brain white matter hyperintensities segmentation algorithm

B.Sc. in Electrical Engineering, Guangdong University of Technology, China. 09.2009-07.2013

PROFESSIONAL EXPERIENCE

Postdoctoral Researcher at Massachusetts General Hospital, Harvard Medical School. 08.2023-Present

Advisors: Juan Eugenio Iglesias, Matthew Rosen

- **Research** on developing novel deep learning methods for image analysis of ultra-low-field (0.064T) and ultra-high-field (7T, and 14T) MR images. Ongoing projects are:

  (1) Images super-resolution of ultra-low-field, 7T, and14T MR images with 3D diffusion models.

  (2) Automated segmentation of brain disorders in 3D heterogeneous multi-contrast MRI.

  (3) Uncertainty estimation for deep learning methods.

Research Assistant at University of Zurich and University Hospital 11.2020-07.2023

- Project: Self-supervised deep learning techniques for large-scale medical datasets.

Data Scientist in AI Startup *Orbem* (part-time, 10h/week) 12.2019-12.2020

- Project: Deep-learning-based classification methods for 3D MR imaging of the chicken eggs.
- We were among the top-10 AI starups worldwide for IBM AI XPRIZE in 2020.

GRANTS AND FELLOWSHIPS

Postdoctoral Mobility Grant from Swiss National Foundation (top 15%, **PI**, ~130k Euros) 2023
Grant: *Deep learning methods for portable low-field MR imaging in neurocritical care of stroke*

Individual Postdoctoral Grant (top 30%, University of Zurich, **PI**, ~45k Euros) 2021
Grant: *Robust self-supervised deep learning in quantitative medical imaging*

Nvidia GPU Research Grant (top 10%, **PI**, ~ 6k Euros) 2021
Grant: *Interpretable self-supervised deep learning for 3D medical imaging*

Master and Ph.D. Fellowships from China Scholarship Council (top 30%) 2016, 2017
Fellowship: *Medical image analysis with deep learning*

AWARDS AND HONORS

Outstanding Reviewer for Conf. on Computer Vision and Pattern Recognition (CVPR) 2024
- *Recognized among top 2% of reviewers for exceptional contribution*

Outstanding Reviewer for Conf. on Medical Imaging with Deep Learning (MIDL) 2024
- *Recognized among top 2% of reviewers for exceptional contribution*

Best Paper Runner-Up at MIDL (top 2%, co-authored) 2022

Winner of MICCAI White Matter Hyperintensities Segmentation Challenge (1/20, Team Lead) 2017

Outstanding Bachelor Thesis on Retinal Image Classification Using Machine Learning 2013

ACADEMIC ACTIVITIES

Area Chair/Senior PC: MICCAI 2024, 2025

Founding Committee and Lead Organizer of MICCAI Challenges (benchmark)

- Fetal Brain Tissue Annotation and Segmentation Challenge (FeTA) 2021,2022,2024
- Brain MR Image Synthesis Challenge (as a part of BraTS) 2023,2024
- Uncertainty Quantification in Medical Image Segmentation (QUBIQ) 2020,2021

Co-organizer of MICCAI Challenges (benchmark)

- Topology-Aware Anatomical Segmentation of the Circle of Willis for CTA and MRA. 2023, 2024
- Dental Enumeration and Diagnosis on Panoramic X-rays 2023
- Enlarged Perivascular Spaces (EPVS) Segmentation Challenge 2024

Co-organizer of Conference Track: Special Track on AI in Medical Imaging in CBMS 2023&2024.

Guest Editor for:

- Frontiers in Human Neuroscience**,** "*Advances in Computational Neuroimaging for Neurological Diseases*" (IF: 4.7)
- Journal of Bioengineering, "*Advances in Medical 3D Vision: Voxels and Beyond*" (IF: 3.8)

Reviewer for Journals, Conferences and Workshops

- MICCAI (2019-2023), MIDL (2019-2025), CVPR (2021-2025), ECCV (2022, 2024), NeurIPS 2024, AAAI (2023, 2025), AISTATS (2025), ICLR (2025)
- IEEE Transactions on Medical Imaging, Medical Image Analysis (14 times), IEEE-JBHI (12 times)
- Nature Communications, NeuroImage, MICCAI UNSURE/PIPPI/BrainLes workshops, etc

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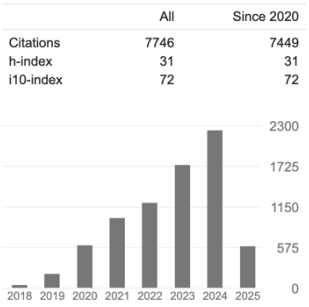
FLAGSHIP PUBLICATIONS



My research primarily focuses on machine learning in medical image analysis. As of March 26, 2025, my h-index is 31, with a total of 7,746 citations of my publications according to Google Scholar.

Below, I list **five** flagship publications (out of **83**) and highlight their contributions.

[1] **Li, H.**, Jiang, G., Zhang, J., Wang, R., Wang, Z., Zheng, W.S., and Menze, B. (2018). Fully Convolutional Network Ensembles for White Matter Hyperintensities Segmentation in MR Images. ***NeuroImage***, 183, pp.650-665. (Cited 262 times)

Contributions: *This work, which won the MICCAI 2017 international segmentation challenge, presents one of the early deep learning-based approaches to enhance the accuracy and robustness of white matter hyperintensity segmentation in MR images, significantly advancing automated neuroimaging analysis.*

[2] Bilic, P.*, Christ, P.*, **Li, H.***, Vorontsov, E., Ben-Cohen, A., Kaissis, G., Szeskin, A., Jacobs, C., Mamani, G.E.H., Chartrand, G., and Lohöfer, F. et al. (2023). The Liver Tumor Segmentation Benchmark (LITS). ***Medical Image Analysis***, 84, p.102680. (co-first&corresponding author)

Contributions: *This benchmark study, highly cited with **1400** references, establishes a standard dataset and evaluation framework for automated liver and liver tumor segmentation in 3D CT images, advancing method development in medical image analysis at the beginning of the deep learning era.*

[3] **Li, H.**, Paetzold, J.C., Sekuboyina, A., Kofler, F., Zhang, J., Kirschke, J.S., Wiestler, B., and Menze, B. (2019). DiamondGAN: Unified Multi-Modal Generative Adversarial Networks for MRI Sequences Synthesis. *In Medical Image Computing and Computer Assisted Intervention (**MICCAI**)*. Springer International Publishing. (MICCAI is one of the top AI conferences in medical image analysis. Cited 102 times)

Contributions: *This work presents a novel multi-contrast generative adversarial network (GAN) for synthesizing missing MRI sequences, advancing MRI synthesis techniques and providing a robust solution in multi-modal imaging.*

[4] Finck, T.*, **Li, H.***, Grundl, L., Eichinger, P., Bussas, M., Mühlau, M., Menze, B., and Wiestler, B. (2020). Deep-Learning Generated Synthetic Double Inversion Recovery Images Improve Multiple Sclerosis Lesion Detection. ***Investigative Radiology***, 55(5), pp.318-323. (Cited 50 times)

Contributions: *This clinical study validates the developed generative deep learning-based approach at MICCAI 2019 to generate synthetic double inversion recovery (DIR) images, which enhances lesion detection in multiple sclerosis patients.*

[5] **Li, H.**, Xue, F.F., Chaitanya, K., Luo, S., Ezhov, I., Wiestler, B., Zhang, J., and Menze, B. (2021). Imbalance-Aware Self-Supervised Learning for 3D Radiomic Representations. *In Medical Image Computing and Computer Assisted Intervention (**MICCAI**)*. Springer International Publishing. (Cited 33 times)

Contributions: *This work introduces the concept of 'self-supervised radiomics,' aimed at extracting meaningful information from images without labeled data. It also addresses distribution imbalance challenges commonly found in medical datasets.*

OHTER PUBLICATIONS IN MEDICAL IMAGE ANALYSIS

* indicates co-first authorship

[6] Gong, Z., Xu, T., Peng, N., Cheng, X., Niu, C., Wiestler, B., Hong, F. and **Li, H.**, 2024. A Multi-Center, Multi-Parametric MRI Dataset of Primary and Secondary Brain Tumors. ***Scientific Data*** (last author)

[7] **Li, H.**, Menegaux, A., Schmitz-Koep, B., Neubauer, A., Bäuerlein, F.J., Shit, S., Sorg, C., Menze, B., and Hedderich, D. (2021). Automated Claustrum Segmentation in Human Brain MRI Using Deep Learning. ***Human Brain Mapping***, 42(18), pp.5862-5872.

[8] **Li, H.**, Rosen, M.S., Nasr, S., and Iglesias, J.E. (2024). Resolution and Stimulus-Agnostic Super-Resolution of Ultra-High-Field Functional MRI: Application to Visual Studies. *Proceedings of 21st IEEE International Symposium on Biomedical Imaging (**ISBI** 2024).*

[9] Neubauer*, A., **Li, H.***, Wendt, J., Schmitz-Koep, B., Menegaux, A., Schinz, D., Menze, B., Zimmer, C., Sorg, C., and Hedderich, D.M. (2022). Efficient Claustrum Segmentation in T2-Weighted Neonatal Brain MRI Using Transfer Learning from Adult Scans. ***Clinical Neuroradiology***.

[10] Finck, T., **Li, H.***, Schlaeger, S., Grundl, L., Sollmann, N., Bender, B., Bürkle, E., Zimmer, C., Kirschke, J., Menze, B., and Mühlau, M. (2022). Uncertainty-Aware and Lesion-Specific Image Synthesis in Multiple Sclerosis Magnetic Resonance Imaging: A Multicentric Validation Study. ***Frontiers in Neuroscience***.

[11] Hu, Q.*, **Li, H.***, and Zhang, J. (2022, September). Domain-Adaptive 3D Medical Image Synthesis: An Efficient Unsupervised Approach. *In International Conference on Medical Image Computing and Computer-Assisted Intervention* (***MICCAI***). Cham: Springer Nature Switzerland.

[12] **Li, H.**, Prasad, R.G., Sekuboyina, A., Niu, C., Bai, S., Hemmert, W., and Menze, B. (2021, April). Micro-CT Synthesis and Inner Ear Super Resolution via Generative Adversarial Networks and Bayesian Inference. *In 2021 IEEE 18th International Symposium on Biomedical Imaging (**ISBI**)* (pp. 1500-1504). IEEE.

[13] **Li, H.**, Reichert, M., Lin, K., Tselousov, N., Braren, R., Fu, D., Schmid, R., Li, J., Menze, B., and Shi, K. (2019, July). Differential Diagnosis for Pancreatic Cysts in CT Scans Using Densely-Connected Convolutional Networks. In 2019 41st *Annual International Conference of the IEEE Engineering in Medicine and Biology Society* (***EMBC***) (pp. 2095-2098). IEEE.

[14] Prabhakar, C.*, **Li, H.***, Yang, J., Shit, S., Wiestler, B., and Menze, B. (2024, January). ViT-AE++: Improving Vision Transformer Autoencoder for Self-Supervised Medical Image Representations. *In International Conference on Medical Imaging with Deep Learning* (***MIDL***). PMLR.

[15] Payette, K., **Li, H.**, de Dumast, P., Licandro, R., Ji, H., Siddiquee, M.M.R., Xu, D., Myronenko, A., Liu, H., Pei, Y., and Wang, L. (2023). Fetal Brain Tissue Annotation and Segmentation Challenge Results. ***Medical Image Analysis**,* 88, p.102833. (**a founding member of FeTA**)

[16] Huang, W., **Li, H.**, Pan, J., Cruz, G., Rueckert, D., and Hammernik, K. (2023, June). Neural Implicit K-Space for Binning-Free Non-Cartesian Cardiac MR Imaging. *In International Conference on Information Processing in Medical Imaging* (***IPMI***). Cham: Springer Nature Switzerland.

[17] Schlaeger, S., **Li, H.**, Baum, T., Zimmer, C., Moosbauer, J., Byas, S., Mühlau, M., Wiestler, B., and Finck, T. (2023). Longitudinal Assessment of Multiple Sclerosis Lesion Load with Synthetic Magnetic Resonance Imaging - A Multicenter Validation Study. ***Investigative Radiology***, 58(5), pp.320-326.

[18] Amiranashvili, T., Lüdke, D., **Li, H.**, Zachow, S., and Menze, B.H. (2024). Learning Continuous Shape Priors from Sparse Data with Neural Implicit Functions. ***Medical Image Analysis**,* p.103099.

[19] Prabhakar, C., **Li, H.**, Paetzold, J.C., Loehr, T., Niu, C., Mühlau, M., Rueckert, D., Wiestler, B., and Menze, B. (2023, October). Self-Pruning Graph Neural Network for Predicting Inflammatory Disease Activity in Multiple Sclerosis from Brain MR Images. *In International Conference on Medical Image Computing and Computer-Assisted Intervention (**MICCAI**).* Cham: Springer Nature Switzerland.

[20] Schoppe, O., Pan, C., Coronel, J., Mai, H., Rong, Z., Todorov, M.I., Müskes, A., Navarro, F., **Li, H.**, Ertürk, A., and Menze, B.H. (2020). Deep Learning-Enabled Multi-Organ Segmentation in Whole-Body Mouse Scans. ***Nature Communications***, 11(1), p.5626.

TEACHING EXPERIENCE AND LECTURES

- **Linear Algebra Practice** at Sun Yat-sen University (audience: undergraduates , 2015)

  Presentation, discussion of solutions and advanced topics in linear algebra course. 80 hrs in total.

- **Deep Learning Practice** at Technical University of Munich (audience: postgraduates, 2018, 2019)

  Teaching Python and Tensorflow, simple machine learning methods (SVM and random forests), and deep learning for image classfication. 24 hrs in total.

- **Deep Learning Course** at AI4Health Summer School in Paris (audience: Ph.D., AI researchers, 2023)

  Teaching Python, Pytorch, and deep learning for 3D medical image segmentation and shape modeling. 12 hrs in total.

MENTORSHIP AS PRIMARY ADVISOR

1. Kilian Schimitt, TUM master student 11.2023-05.2024
   Thesis on machine unlearning for medical image classification (One co-authored paper is under review)
2. Qingqiao Hu, UCLA master student, now a PhD candidate at Stony Brook University 11.2022-07.2024
   Research projects on uncertainty estimation and probabilistic modeling
   (published one paper at MICCAI' 2022. Two papers are under review)
3. Agata Łabiak, TUM bachelor student 11.2021-05.2022
   Bachelor project on the interpretability of contrastive learning
4. Yujun Liu, TUM master student 04.2022-10.2022
   Thesis on latent diffusion model for pathology image generation
5. Maximilian Berger, TUM master student 11.2020-05.2021
   Thesis on federated learning for medical imaging
6. Sunita Gopal, TUM master student 03.2020-09.2020
   Thesis on disentangled learning for medical image synthesis
7. Yuqian Zhang, LMU master student 11.2019-06.2020
   Research project on fMRI feature extraction and brain activity classification.

HOBBY

- Reading and writing
- Indoor volleyball (above-amateur level)
  Awarded national silver medal (China, 2017), conference cup champion (Scotland, 2017), and 5 gold, 1 Silver, 1 bronze medal (Guangdong province, China). Competed in the Bavarian league (Landesliga) in Germany (2017–2018). Champion in 3 local mixed-gender tournaments in Bavaria (2018-2020).
- Hardware-related games