

Hongwei Bran Li Ph.D.

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

Email: holi2@mgh.harvard.edu

Website: <https://hongweilibran.github.io/> Phone: +1 (617) 899-2252

RESEARCH INTERESTS

My research focuses on advancing medical image analysis through the development of deep learning techniques for image segmentation, synthesis, and representation. I specialize in developing probabilistic models and uncertainty estimation methods to improve the accuracy and reliability of diagnostic tools in neuroimaging and oncology. My work bridges the gap between computational methods and clinical practice, with an emphasis on translating AI technologies into practical solutions for medical imaging diagnostics.

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 including image segmentation, representation and synthesis
- **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 Laboratory for Computational Neuroimaging, Martinos Center for Biomedical Imaging, 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) 3D diffusion models for images super-resolution of ultra-low-field, 7T, and 14T MR images.
 - (2) Segmentation of various 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
<ul style="list-style-type: none"> Project: Self-supervised deep learning for large-scale medical datasets. 	
Data Scientist in AI startup <i>Orbem</i> (part-time, 10h/week)	12.2019-12.2020
<ul style="list-style-type: none"> Project: Deep-learning-based classification methods for 3D MR imaging of the chicken eggs. 	
Research Assistant at TUM University Hospital (part-time, 10h/week)	12.2019-11.2020
<ul style="list-style-type: none"> Project: Generative methods for MR image synthesis and validation on multiple sclerosis patients. 	

GRANTS AND FELLOWSHIPS

Postdoctoral Mobility Grant from Swiss National Foundation (top 30%, PI , ~130k Euros)	2023
Grant: <i>Deep learning methods for portable low-field MR imaging in neurocritical care of stroke</i>	
Individual Postdoctoral Grant (top 30%, University of Zurich, PI , ~45k Euros)	2021
Grant: <i>Robust self-supervised deep learning in quantitative medical imaging</i>	
Nvidia GPU Research Grant (top 10%, PI , ~ 6k Euros)	2021
Grant: <i>Interpretable self-supervised deep learning for 3D medical imaging</i>	
Master and Ph.D. Fellowships from China Scholarship Council (top 35%)	2016, 2017
Fellowship: <i>Medical image analysis with deep learning</i>	

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

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

- Frontiers in Human Neuroscience, “*Advances in Computational Neuroimaging for Neurological Diseases*”

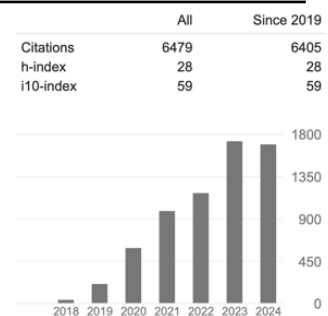
Organization Support: International Conference on Medical Imaging with Deep Learning (MIDL) 2022

Reviewer for Journals, Conferences and Workshops

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

SELECTED PUBLICATIONS

As of Oct. 20, 2024, my h-index is 28, with a total of 6,479 citations of my publications according to Google Scholar. My research primarily focuses on deep learning in biomedical image analysis and the development of advanced machine learning methods. Below, I list my selected publications (33 out of 76), highlighting first-author and last-author ones.



* indicates co-first authorship

[33] Gong, Z., Xu, T., Peng, N., Cheng, X., Niu, C., Wiestler, B., Hong, F. and **Li, H.B.**, 2024. A Multi-Center, Multi-Parametric MRI Dataset of Primary and Secondary Brain Tumors. *Scientific Data*, 11(1), p.789.

[32] **Li, H.B.**, 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)*. (**super-resolution of 7T fMRI**)

[31] Prabhakar, C., Shit, S., Musio, F., Yang, K., Amiranashvili, T., Paetzold, J.C., **Li, H.B.** and Menze, B., 2024, October. 3D Vessel Graph Generation Using Denoising Diffusion. In International Conference on Medical Image Computing and Computer-Assisted Intervention (*MICCAI*). Cham: Springer Nature Switzerland.

[30] McGinnis, J., Shit, S., **Li, H.B.**, Sideri-Lampretsa, V., Graf, R., Dannecker, M., Pan, J., Stolt-Ansó, N., Mühlau, M., Kirschke, J.S., and Rueckert, D. (2023, October). Single-Subject Multi-Contrast MRI Super-Resolution via Implicit Neural Representations. In *International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI)*. Cham: Springer Nature Switzerland.

[29] Huang, W., **Li, H.B.**, 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.

- [28] Schlaeger, S., **Li, H.B.**, 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.
- [27] 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. (**domain-adaptive image synthesis**)
- [26] Chen, J., Li, W., **Li, H.** and Zhang, J., 2020. Deep class-specific affinity-guided convolutional network for multimodal unpaired image segmentation. In *Medical Image Computing and Computer Assisted Intervention (MICCAI)*. Cham: Springer Nature Switzerland.
- [25] Amiranashvili, T., Lüdke, D., **Li, H.B.**, Zachow, S., and Menze, B.H. (2024). Learning Continuous Shape Priors from Sparse Data with Neural Implicit Functions. *Medical Image Analysis*, p.103099.
- [24] He, H., Paetzold, J.C., Börner, N., Riedel, E., Gerl, S., Schneider, S., Fisher, C., Ezhov, I., Shit, S., **Li, H.**, and Rückert, D. (2024). Machine Learning Analysis of Human Skin by Optoacoustic Mesoscopy for Automated Extraction of Psoriasis and Aging Biomarkers. *IEEE Transactions on Medical Imaging*.
- [23] Hedderich, D.M., Menegaux, A., Li, H., Schmitz-Koep, B., Stämpfli, P., Bäuml, J.G., Berndt, M.T., Bäuerlein, F.J., Grothe, M.J., Dyrba, M. and Avram, M., 2021. Aberrant claustrum microstructure in humans after premature birth. *Cerebral Cortex*, 31(12), pp.5549-5559.
- [22] Prabhakar, C., **Li, H.B.**, 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.
- [21] Payette, K., **Li, H.B.**, 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**)
- [20] 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.
- [19] Amiranashvili, T., Lüdke, D., **Li, H.B.**, Menze, B., and Zachow, S. (2022, December). Learning Shape Reconstruction from Sparse Measurements with Neural Implicit Functions. In *International Conference on Medical Imaging with Deep Learning (MIDL)*. PMLR. (**Best paper runner-up at MIDL**)
- [18] Bilic, P.*, Christ, P.*, **Li, H.B.***, 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. (**cited 1200 times, co-first/corresponding author**)
- [17] Pirkl, C.M., Cencini, M., Kurzawski, J.W., Waldmannstetter, D., **Li, H.**, Sekuboyina, A., Endt, S., Peretti, L., Donatelli, G., Pasquariello, R., and Costagli, M. (2022). Learning Residual Motion Correction for Fast and Robust 3D Multiparametric MRI. *Medical Image Analysis*, 77, p.102387.

[16] Thomas, M.F., Kofler, F., Grundl, L., Finck, T., **Li, H.**, Zimmer, C., Menze, B., and Wiestler, B. (2022). Improving Automated Glioma Segmentation in Routine Clinical Use through Artificial Intelligence-Based Replacement of Missing Sequences with Synthetic Magnetic Resonance Imaging Scans. *Investigative Radiology*, 57(3), pp.187-193.

[15] Neubauer*, A., **Li, H.B.***, 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*. (**claustrum segmentation**)

[14] 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*, 16, p.889808. (**image synthesis for MS patients**)

[13] **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. (**claustrum segmentation**)

[12] Sekuboyina, A., Hussein, M.E., Bayat, A., Löffler, M., Liebl, H., **Li, H.**, Tetteh, G., Kukačka, J., Payer, C., Štern, D., and Urschler, M. (2021). VerSe: A Vertebrae Labelling and Segmentation Benchmark for Multi-Detector CT Images. *Medical Image Analysis*, 73, p.102166.

[11] Timmins, K.M., van der Schaaf, I.C., Bennink, E., Ruigrok, Y.M., An, X., Baumgartner, M., Kuijff, H.J., **Li, H.** et al. (2021). Comparing Methods of Detecting and Segmenting Unruptured Intracranial Aneurysms on TOF-MRAS: The ADAM Challenge. *Neuroimage*, 238, p.118216.

[10] Niu, C., Wang, Y., Cohen, A.D., Liu, X., **Li, H.**, Lin, P., Chen, Z., Min, Z., Li, W., Ling, X., and Wen, X. (2021). Machine Learning May Predict Individual Hand Motor Activation from Resting-State fMRI in Patients with Brain Tumors in Perirolandic Cortex. *European Radiology*, 31, pp.5253-5262.

[9] **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. (**representation**)

[8] Dong, X.* , **Li, H.***, Jiang, Z., Grünleitner, T., Güler, I., Dong, J., Wang, K., Köhler, M.H., Jakobi, M., Menze, B.H., and Yetisen, A.K. (2021). 3D Deep Learning Enables Accurate Layer Mapping of 2D Materials. *ACS Nano*, 15(2), pp.3139-3151

[7] 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.

[6] **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.

[5] 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. (**image synthesis for MS patients, cited 46 times**)

[4] **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. (**image synthesis, cited 93 times**)

[3] **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. (**cited 39 times**)

[2] Zhao, Y., **Li, H.**, Wan, S., Sekuboyina, A., Hu, X., Tetteh, G., Piraud, M., and Menze, B. (2019). Knowledge-Aided Convolutional Neural Network for Small Organ Segmentation. *IEEE Journal of Biomedical and Health Informatics*, 23(4), pp.1363-1373.

[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. (**WMH segmentation, cited 247 times**)

SELECTED INVITED TALKS

1. "Quantifying White Matter Hyperintensity and Brain Volumes in Heterogeneous Clinical and Low-field Portable MRI", 21st IEEE International Symposium on Biomedical Imaging (**ISBI**), Greece, 04.2024.
2. "Towards Robust Neuroimaging Analysis: Image Synthesis and Self-Supervised Radiomics", **Harvard Medical School**. USA, 08.2021.
3. "Machine Learning in MR Image Processing", **3rd Retreat of BMMR Group**, Germany, 09.2019.
4. "Fully Convolutional Networks Ensembles for White Matter Hyperintensities Segmentation in MR Images", **SINAPSE**, Edinburgh, Scotland, UK, 06.2018.

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 classification. 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. Maximilian Berger, TUM master student 11.2020-05.2021
Thesis on federated learning for medical imaging
 5. Sunita Gopal, TUM master student 03.2020-09.2020
Thesis on disentangled learning for medical image synthesis
 6. Yuqian Zhang, LMU master student 11.2019-06.2020
Research project on fMRI feature extraction and brain activity classification.
-

LIST OF REFEREES

- Daniel Rueckert, collaborator / visit host,
Professor at Technical University of Munich, Germany
Email: daniel.rueckert@tum.de
- Bjoern Menze, PhD supervisor,
Professor at University of Zurich, Switzerland
Email: bjoern.menze@uzh.ch
- Juan Eugenio Iglesias, postdoctoral advisor,
Associate Professor at MGH/Harvard Medical School, USA
Email: jiglesiasgonzalez@mgh.harvard.edu