

# Zeju Li

Post-Doctoral Researcher at University of Oxford

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## Research Interests

### Medical Image Computing, Neuroimaging and Machine Learning

Primary area    📌 Semantic Segmentation, Brain MRI, Class Imbalance.  
Secondary area    📌 Meta-Learning, Federated Learning, 3D Vision, Image Restoration.

## Research Experience

- Jan. 23 – ...    📌 **Post-Doctoral Researcher.** Nuffield Department of Clinical Neurosciences, University of Oxford, Oxford, United Kingdom.  
Supervisor: Prof. Saad Jbabdi  
He worked on advancing neuroimaging with machine learning algorithms.
- Oct. 18 – Dec. 22    📌 **Research Student.** Department of Computing, Imperial College London, London, United Kingdom.  
Supervisor: Prof. Ben Glocker and Prof. Daniel Rueckert  
He worked on improving the generalization capability of neural networks for medical imaging, especially under class imbalance.
- Jul. 19 – Mar. 20    📌 **Research Intern.** Noah's Ark Lab, Huawei, London, United Kingdom.  
Supervisor: Prof. Greg Slabaugh and Dr. Liang Chen  
He worked on exploring AutoML for computational photography.
- Jul. 18 – Sep. 18    📌 **Research Intern.** Institute of Computing Technology, Chinese Academy of Sciences, Beijing, China.  
Supervisor: Prof. Shaohua Kevin Zhou and Prof. Hu Han  
He worked on embedding CT prior knowledge in chest X-ray diagnosis.
- Jun. 14 – Jun. 18    📌 **Research Student.** Department of Electronic Engineering, Fudan University, Shanghai, China.  
Supervisor: Prof. Yuanyuan Wang and Prof. Jinhua Yu  
He worked on brain MR image analysis including tumor segmentation, image reconstruction and disease classification.  
He also worked on compressing ultrasound signal.

## Education

- 2018 – 2022    📌 **PhD in Computing, Imperial College London, United Kingdom.**  
Thesis title: *Learning strategies for improving neural networks for image segmentation under class imbalance.*
- 2015 – 2018    📌 **MSc in Biomedical Engineering, Fudan University, China.**  
Thesis title: *Deep learning based MR images analysis of glioma and its clinical applications.*
- 2011 – 2015    📌 **BSc in Electronic Engineering, Fudan University, China.**  
Thesis title: *Fourier domain ultrasound beamforming.*

## Research Publications

### Refereed Journal Articles

- 1 Li, Z., Kamnitsas, K., Dou, Q., Qin, C., & Glocker, B. (2023). Joint optimization of class-specific training- and test-time data augmentation in segmentation. *IEEE Transactions on Medical Imaging*.
- 2 Li, Z., Kamnitsas, K., Ouyang, C., Chen, C., & Glocker, B. (2023). Context label learning: improving background class representations in semantic segmentation. *IEEE Transactions on Medical Imaging*.
- 3 Li, Z., Kamnitsas, K., & Glocker, B. (2020). Analyzing overfitting under class imbalance in neural networks for image segmentation. *IEEE Transactions on medical imaging*.
- 4 Li, Z., Yu, J., Wang, Y., Zhou, H., Yang, H., & Qiao, Z. (2019). Deepvolume: brain structure and spatial connection-aware network for brain mri super-resolution. *IEEE Transactions on Cybernetics*.
- 5 Li, Z., Wang, Y., Yu, J., Guo, Y., & Cao, W. (2017). Deep learning based radiomics (dlr) and its usage in noninvasive idh1 prediction for low grade glioma. *Scientific Reports*.
- 6 Li, Z., Wang, Y., Yu, J., Shi, Z., Guo, Y., Chen, L., & Mao, Y. (2017). Low-grade glioma segmentation based on cnn with fully connected crf. *Journal of Healthcare Engineering*.
- 7 Li, Z., Wang, Y., Yu, J., Guo, Y., & Zhang, Q. (2017). Age groups related glioblastoma study based on radiomics approach. *Computer Assisted Surgery*.
- 8 Chen, C., Ouyang, C., Li, Z., Wang, S., Qiu, H., Chen, L., ... Rueckert, D. (2022). Enhancing mr image segmentation with realistic adversarial data augmentation. *Medical Image Analysis*.
- 9 Ouyang, C., Chen, C., Li, S., Li, Z., Qin, C., Bai, W., & Rueckert, D. (2022). Causality-inspired single-source domain generalization for medical image segmentation. *IEEE Transactions on Medical Imaging*.
- 10 Qiao, M., Liu, C., Li, Z., Zhou, J., Xiao, Q., Zhou, S., ... Wang, Y. (2022). Breast tumor classification based on mri-us images by disentangling modality features. *IEEE Journal of Biomedical and Health Informatics*.
- 11 Luo, H., Zhuang, Q., Wang, Y., Abudumijiti, A., Shi, K., Rominger, A., ... Wu, G. et al. (2021). A novel image signature-based radiomics method to achieve precise diagnosis and prognostic stratification of gliomas. *Laboratory investigation*, 101(4), 450–462.
- 12 Dou, Q., So, T. Y., Jiang, M., Liu, Q., Vardhanabhuti, V., Kaissis, G., ... Yu, K. et al. (2021). Federated deep learning for detecting covid-19 lung abnormalities in ct: a privacy-preserving multinational validation study. *NPJ digital medicine*, 4(1), 1–11.
- 13 Li, H., Han, H., Li, Z., Wang, L., Wu, Z., Lu, J., & Zhou, S. K. (2020). High-resolution chest x-ray bone suppression using unpaired ct structural priors. *IEEE Transactions on Medical Imaging*.
- 14 Wu, G., Lin, J., Chen, X., Li, Z., Wang, Y., Zhao, J., & Yu, J. (2019). Early identification of ischemic stroke in noncontrast computed tomography. *Biomedical Signal Processing and Control*.
- 15 Zhou, Z., Wang, Y., Yu, J., Guo, W., & Li, Z. (2019). Super-resolution reconstruction of plane-wave ultrasound image based on a multi-angle parallel u-net with maxout unit and novel loss function. *Journal of Medical Imaging and Health Informatics*.
- 16 Gu, J., Li, Z., Wang, Y., Yang, H., Qiao, Z., & Yu, J. (2019). Deep generative adversarial networks for thinsection infant mr image reconstruction. *IEEE Access*.
- 17 Chen, Y., Li, Z., Wu, G., Yu, J., Wang, Y., Lv, X., ... Chen, Z. (2018). Primary central nervous system lymphoma and glioblastoma differentiation based on conventional magnetic resonance imaging by high-throughput sift features. *International Journal of Neuroscience*.
- 18 Yu, J., Shi, Z., Lian, Y., Li, Z., Liu, T., Gao, Y., ... Mao, Y. (2017). Noninvasive idh1 mutation estimation based on a quantitative radiomics approach for grade ii glioma. *European Radiology*.

- 19 Wu, G., Li, Z., Wang, Y., Yu, J., Chen, Y., & Chen, Z. (2018). Primary central nervous system lymphoma and glioblastoma image differentiation based on sparse representation system. *Journal of Biomedical Engineering*.

## Refereed Conference Proceedings

- 1 Li, Z., Kamnitsas, K., Islam, M., Chen, C., & Glocker, B. (2022). Estimating model performance under domain shifts with class-specific confidence scores. In *International conference on medical image computing and computer-assisted intervention (miccai 2022)*.
- 2 Li, Z., Kamnitsas, K., & Glocker, B. (2019). Overfitting of neural nets under class imbalance: analysis and improvements for segmentation. In *International conference on medical image computing and computer-assisted intervention (miccai 2019)*.
- 3 Li, Z., Li, H., Han, H., Shi, G., Wang, J., & Zhou, S. K. (2019). Encoding ct anatomy knowledge for unpaired chest x-ray image decomposition. In *International conference on medical image computing and computer-assisted intervention (miccai 2019)*.
- 4 Li, Z., Wang, Y., & Yu, J. (2017a). Brain tumor segmentation using an adversarial network. In *International miccai brainlesion workshop (miccai-brainlesion 2017)*.
- 5 Li, Z., Wang, Y., & Yu, J. (2017b). Reconstruction of thin-slice medical images using generative adversarial network. In *International workshop on machine learning in medical imaging (miccai-mlmi 2017)*.
- 6 Chen, C., Li, Z., Ouyang, C., Sinclair, M., Bai, W., & Rueckert, D. (2022). Maxstyle: adversarial style composition for robust medical image segmentation. In *International conference on medical image computing and computer-assisted intervention (miccai 2022)*.
- 7 Gu, X., Guo, Y., Li, Z., Jianning, Q., Dou, Q., Liu, Y., ... Yang, G.-Z. (2022). Tackling long-tailed category distribution under domain shifts. In *European conference on computer vision (eccv 2022)*.
- 8 Li, L., Ma, Q., Li, Z., Ouyang, C., Zhang, W., Price, A., ... Alansary, A. (2022). Fetal cortex segmentation with topology and thickness loss constraints. In *Topological data analysis and its applications for medical data (miccai-tda 2022)*.
- 9 Ouyang, C., Wang, S., Chen, C., Li, Z., Bai, W., Kainz, B., & Rueckert, D. (2022). Improved post-hoc probability calibration for artifact-corrupted mri segmentation. In *Uncertainty for safe utilization of machine learning in medical imaging (miccai-unsure 2022)*.
- 10 Yan, W., Wang, Y., Li, Z., van der Geest, R. J., & Tao, Q. (2018). Left ventricle segmentation via optical-flow-net from short-axis cine mri: preserving the temporal coherence of cardiac motion. In *International conference on medical image computing and computer-assisted intervention (miccai 2018)*.
- 11 Li, X., Wang, Y., Yan, W., Van der Geest, R. J., Li, Z., & Tao, Q. (2018). A multi-scope convolutional neural network for automatic left ventricle segmentation from magnetic resonance images: deep-learning at multiple scopes. In *International congress on image and signal processing, biomedical engineering and informatics (cisp-bmei 2018)*.

## Submitted Papers

- 1 Islam, M., Li, Z., & Glocker, B. (2022). Progressive stress testing of model robustness in medical image classification. Under Review.

## Skills

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Languages    📌 English, Mandarin Chinese.  
Coding        📌 Python, Java, Matlab, R, C.  
Machine Learning    📌 Pytorch, Tensorflow, MatConvNet.

## Miscellaneous Experiences

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### Awards and Achievements

- 2022    📌 1st place of Fetal Tissue Annotation Challenge.
- 📌 3rd place of EPIC-Kitchens Challenge Action Anticipation Track.
- 2021    📌 2nd place of Learn2Reg-Challenge Task2.
- 2019    📌 MICCAI 2019 Graduate Student Travel Award.
- 2018    📌 Winner of Huawei UK AI challenge.
- 📌 CSC Imperial Scholarship.
- 📌 Outstanding Graduate of Shanghai.
- 📌 National Scholarship.
- 2017    📌 CSC-IBM Scholarship.
- 2016    📌 Intel Fellowship.

### Patents

- 📌 Apparatus and method for image processing, CN114846506A, 2021.
- 📌 Thin layer magnetic resonance image reconstruction method based on deep learning, CN108629816A, 2018.
- 📌 Method and system for lossless prediction of low-grade intracranial gliomas isocitrate dehydrogenase based on deep learning, CN108109140A, 2018.
- 📌 Identification method of primary central nervous system lymphoma and glioblastoma based on sparse representation system, CN107016395A, 2017.
- 📌 Brain glioma molecular marker nondestructive prediction method and prediction system based on radiomics, CN106683081A, 2017.

### Journal Reviewer

- 📌 IEEE Transactions on Medical Imaging;
- 📌 Medical Image Analysis;
- 📌 Journal of Biomedical and Health Informatics;
- 📌 Neurocomputing;
- 📌 IEEE Access;
- 📌 Neural Networks;
- 📌 Computer Methods and Programs in Biomedicine;
- 📌 Biomedical Signal Processing and Control;
- 📌 Academic Radiology;
- 📌 Biocybernetics and Biomedical Engineering;
- 📌 Frontiers in Oncology.

## Miscellaneous Experiences (continued)

### Conference Reviewer

- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI);
- The IEEE / CVF Computer Vision and Pattern Recognition Conference (CVPR);
- The IEEE / CVF International Conference on Computer Vision (ICCV);
- The AAAI Conference on Artificial Intelligence (AAAI);
- European Conference on Computer Vision (ECCV);
- Domain Adaptation and Representation Transfer (DART).

### Volunteer

- International Conference on Medical Imaging with Deep Learning (MIDL) 2019.

### Teaching

- Imperial
- 70014 Machine Learning for Imaging [Spring 2021];
  - 70028 Reinforcement Learning [Autumn 2020];
  - CS 496 Mathematics for Machine Learning [Autumn 2019];
  - CS 316 Computer Vision [Autumn 2018, Spring 2020];
  - CS 317 Graphics [Spring 2019].
- Fudan
- Circuit Laboratory [Spring 2016];
  - Signal Processing [Spring 2017].

## References

**Ben Glocker** (PhD Supervisor)

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