Zongwei Zhou

Ph.D. Candidate, Department of Biomedical Informatics

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OVERVIEW

Zongwei Zhou is currently a Ph.D. candidate in the Department of Biomedical Informatics at Arizona State University (ASU) supervised by Dr. Jianming Liang, and he will join CCVL as a post-doc at Johns Hopkins University supervised by Dr. Alan Yuille. He has also spent time at Mayo Clinic, University of California, Berkeley, and Université de Montréal. Zongwei holds a perfect GPA (4.0/4.0) and receives the University Graduate Fellowship from ASU. Drawing upon the realms of biomedical informatics, computer vision, and deep learning, his research focuses on developing novel methodologies to minimize the annotation efforts for computer-aided diagnosis and medical imaging. In addition to 11 U.S. patents pending, Zongwei has published 4 peer-reviewed clinical abstracts and over 10 peer-reviewed journal/conference articles, two of which have received the MICCAI Young Scientist Award and Elsevier-MedIA Best Paper Award. Two of his journal publications have been ranked among the most popular articles in IEEE TMI and the highest-cited article in EJNMMI Research, respectively. Furthermore, Zongwei has been awarded as the co-PI of the Bridges AI program from XSEDE. Zongwei also plays an active role in the leading societies of the computer vision and medical imaging field. He serves as a reviewer of IEEE TPAMI, MedIA, IEEE TMI, etc. and he was on the program committee for MICCAI in 2020, 2021; AAAI in 2020, 2021; ICCV in 2021.

EDUCATION

■ **Arizona State University**   Aug 2017 – Present

- Ph.D. Candidate of Biomedical Informatics. (GPA: 4.0 / 4.0)
- Thesis: Annotation-Efficient Deep Learning in Medical Image Analysis
- Advisor: Dr. Jianming Liang
- Thesis Committee: Dr. Edward H. Shortliffe, Dr. Robert Greenes, and Dr. Baoxin Li

■ **Dalian University of Technology**   Sep 2012 – June 2016

- B.S. in Computer Science and Technology. (GPA: 86.6 / 100, Ranking: 7 / 70)
- Thesis: Medical Image Classification based on Deep Learning
- Advisor: Dr. Hongkai Wang

AWARDS AND HONORS

Research Grants

■ XSEDE Research (135,360 GPU Hours, 12,000 GB Storage); PI: Dr. Jianming Liang   June 2020

Awards and Recognitions

■ Elsevier-MedIA Best Paper Award ($1,000)   Oct 2020

■ Sun Award   Sep 2020

■ MICCAI Student Participation Award ($125)   Aug 2020

■ First & third places in Annual Student Poster Competition, BMI/BMD Symposium ($350)   Apr 2020

■ University Graduate Fellowship, Arizona State University ($6,728)   Mar 2020

■ MICCAI Young Scientist Award ($1,000)   Oct 2019

■ MICCAI Best Presentation Award Finalist   Oct 2019

■ MICCAI Graduate Student Travel Award ($500)   Aug 2019

■ First place in the Annual Student Poster Competition, Mayo Clinic, BMI/BMD Symposium ($150)   Apr 2019

■ Outstanding Graduate, Dalian University of Technology   June 2016

EXPERIENCE

- ■ **Johns Hopkins University**   Expected May 2021 -
  Position: Postdoc Researcher, Advisor: Dr. Alan Yuille
  - Group: Computational Cognition, Vision, and Learning (CCVL)
  - Project: Detect signs of pancreatic cancer in CT scans earlier and with more accuracy than humans
- ■ **Centre Hospitalier de l'Université de Montréal**   Jan 2018 - July 2018
  Position: Research Intern, Advisor: Dr. An Tang
  - Group: Laboratoire clinique de traitement de l'image (LCTI)
  - Project: Develop predictive model of colorectal cancer liver metastases response to chemotherapy
  - Joint Collaboration: Centre de recherche du CHUM and Mila - Quebec Artificial Intelligence Institute
- ■ **Mayo Clinic, Rochester MN**   June 2017 - July 2017
  Position: Research Intern, Advisor: Dr. Bradley Erickson
  - Group: Radiology Informatics Lab
  - Project: Thyroid Ultrasound imaging, tumor radiogenomics

BOOK CHAPTERS

[1] Z. Zhou, M. Gotway, J. Liang. "**Interpreting Medical Images**." In *Cognitive Informatics in Biomedicine and Healthcare. Intelligent Systems in Medicine and Health: The Role of AI.* T. Cohen, V. Patel and E. Shortliffe (eds.). Springer. (under contract)

PEER-REFEREED JOURNAL PUBLICATIONS

[1] Z. Zhou, J. Shin, S. Gurudu, M. Gotway, and J. Liang. "**Active, Continual Fine Tuning of Convolutional Neural Networks for Reducing Annotation Efforts.**" *Medical Image Analysis*, 2021.

[2] F. Haghighi, M. R. Hosseinzadeh Taher, Z. Zhou, M. Gotway, J. Liang. " **Transferable Visual Words: Exploiting the Semantics of Anatomical Patterns for Self-supervised Learning**." *IEEE Transactions on Medical Imaging,* 2021.

[3] Z. Zhou, V. Sodha, J. Pang, M. Gotway, and J. Liang. "**Models Genesis.**" *Medical Image Analysis,* 2020. (MedIA Best Paper Award)

[4] Z. Zhou, M. M. Rahman Siddiquee, N. Tajbakhsh, and J. Liang. "**UNet++: Redesigning Skip Connections to Exploit Multi-Resolution Features in Image Segmentation.**" *IEEE Transactions on Medical Imaging,* 2020. (IEEE TMI Most Popular Articles)

[5] Z. Zhou, J. Shin, R. Feng, R. Hurst, C. Kendall, and J. Liang. "**Integrating Active Learning and Transfer Learning for Carotid Intima-Media Thickness Video Interpretation.**" *Journal of Digital Imaging,* 2019.

[6] H. Wang, Z. Chen, Z. Zhou, Y. Li, P. Lu, W. Wang, W. Liu, L. Yu. "**Evaluation of Machine Learning Classifiers for Diagnosing Mediastinal Lymph Node Metastasis of Lung Cancer from PET/CT Images.**" *Journal of ZheJiang University (Engineering Science)*, 2018

[7] H. Wang, Z. Zhou, Y. Li, Z. Chen, P. Lu, W. Wang, W. Liu, and L. Yu. "**Comparison of Machine Learning Methods for Classifying Mediastinal Lymph Node Metastasis of Non-Small Cell Lung Cancer from 18 F-FDG PET/CT Images.**" *EJNMMI Research,* 2017. (EJNMMI Research Highest-Cited Article, 2017-18)

PEER-REFEREED CONFERENCE PROCEEDINGS

[1] R. Feng, Z. Zhou, M. Gotway, J. Liang. "**Self-supervised Learning: From Parts to Whole**." *Domain Adaptation and Representation Transfer (DART'20),* 2020.

[2] F. Haghighi, M. R. Hosseinzadeh Taher, Z. Zhou, M. Gotway, J. Liang. "**Learning Semantics-enriched Representation via Self-discovery, Self-classification, and Self-restoration**." *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'20),* 2020. (Oral)

[3] M. M. Rahman Siddiquee, Z. Zhou, R. Feng, N. Tajbakhsh, M. Gotway, Y. Bengio, and J. Liang. "**Learning Fixed Points in Generative Adversarial Networks: From Image-to-Image Translation to Disease Detection and Localization**." *International Conference on Computer Vision (ICCV'19),* 2019.

[4] <u>Z. Zhou</u>, V. Sodha, M. M. Rahman Siddiquee, R. Feng, N. Tajbakhsh, M. Gotway, and J. Liang. "**Models Genesis: Generic Autodidactic Models for 3D Medical Image Analysis**." *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'19),* 2019. (Young Scientist Award; Best Presentation Award Finalist; Oral)

[5] <u>Z. Zhou</u>, M. M. Rahman Siddiquee, N. Tajbakhsh, and J. Liang. "**UNet++: A Nested U-Net Architecture for Medical Image Segmentation.**" *Deep Learning in Medical Image Analysis (DLMIA'18),* 2018. (Oral)

[6] <u>Z. Zhou</u>, J. Shin, L. Zhang, S. Gurudu, M. Gotway, and J. Liang. "**Fine-tuning Convolutional Neural Networks for Biomedical Image Analysis: Actively and Incrementally.**" *Conference on Computer Vision and Pattern Recognition (CVPR'17),* 2017.

CONFERENCE ABSTRACTS

[1] <u>Z. Zhou</u>, Z. Akkus, M. S. Warner, M. N. Stan, J. Liang, and B. J. Erickson. "**A Preliminary Study of Using Machine Learning to Reduce Biopsies of Thyroid Nodules Based on Ultrasound Images.**" *The 2nd SIIM Conference on Machine Intelligence in Medical Imaging,* 2017.

[2] P. D. Korfiatis, <u>Z. Zhou</u>, J. Liang, and B. J. Erickson. "**Fully Automated IDH Mutation Prediction in MRI Utilizing Deep Learning.**" *The 2nd SIIM Conference on Machine Intelligence in Medical Imaging,* 2017.

[3] <u>Z. Zhou</u>, J. Shin, R. T. Hurst, C. B. Kendall, and J. Liang. "**Integrating Active Learning and Transfer Learning for Carotid Intima-Media Thickness Video Interpretation.**" *The 2nd SIIM Conference on Machine Intelligence in Medical Imaging,* 2017.

[4] L. Zhang, <u>Z. Zhou</u>, H. Siddiki, N. S. Madiraju, F. C. Ramirez, S. R. Gurudu, and J. Liang. "**Approaching Medical Fellow-Level Performance on Colonoscopy Frame Classification with Deep Neural Networks.**" *WP Time, the 82rd Annual Meeting,* 2017.

US PATENTS

[1] <u>Z. Zhou</u>, M. M. Rahman Siddiquee, N. Tajbakhsh, and J. Liang. "**Methods, systems, and media for segmenting images.**" *US Patent App. 16/885,579, 12/03/2020.*

[2] M. M. Rahman Siddiquee, <u>Z. Zhou</u>, R. Feng, N. Tajbakhsh, and J. Liang. "**Methods, systems, and media for discriminating and generating translated images.**" *US Patent App. 16/875,680,* 11/19/2020.

[3] <u>Z. Zhou</u>, M. M. Rahman Siddiquee, N. Tajbakhsh, and J. Liang. "**Systems, methods, and apparatuses for implementing a multi-resolution neural network for use with imaging intensive applications including medical imaging.**" *US Patent App. 16/556,130,* 3/5/2020.

[4] <u>Z. Zhou</u>, J. Shin, and J. Liang. "**Methods, systems, and media for selecting candidates for annotation for use in training classifiers.**" *US Patent App. 16/397,990,* 10/31/2019.

[5] <u>Z. Zhou</u>, J. Shin, and J. Liang. "**Systems, methods, and/or media, for selecting candidates for annotation for use in training a classifier.**" *US Patent App. 15/965,691,* 11/1/2018.

[6] F. Haghighi, M. R. Hosseinzadeh Taher, <u>Z. Zhou</u>, and J. Liang. "**Transferable Visual Words**." *Tech Id: M21-047L* (pending)

[7] R. Feng, <u>Z. Zhou</u>, M. Gotway, J. Liang. "**Self-supervised Learning: From Parts to Whole**." *Tech Id: M20-240L* (pending)

[8] <u>Z. Zhou</u>, V. Sodha, J. Pang, and J. Liang. "**Models Genesis.**" *Tech Id: M20-225L* (pending)

[9] F. Haghighi, M. R. Hosseinzadeh Taher, <u>Z Zhou</u>, and J. Liang. "**Learning Semantics-enriched Representation via Self-discovery, Self-classification, and Self-restoration**." *Tech Id: M20-127L* (pending)

[10] <u>Z. Zhou</u>, V. Sodha, M. M. Rahman Siddiquee, R. Feng, N. Tajbakhsh, and J. Liang. "**Models Genesis: Generic Autodidactic Models for 3D Medical Image Analysis.**" *Tech Id: M19-252LC* (pending)

[11] <u>Z. Zhou</u>, J. Shin, and J. Liang. "**Integrating active learning and transfer learning for cutting annotation cost.**" *Tech Id: M17-151L* (pending)

INVITED TALKS

■ **The Will of Computer Vision**   Jan 28 2021
   Venue: VALSE Student Webinar, Host: Dr. Yong Xia

■ **Cost-Effective Deep Learning in Medical Image Analysis**   Dec 6 2020
   Venue: Arizona Physiological Society's (AZPS) Annual Meeting, Host: Dr. Dawn Coletta

■ **Annotation-efficient Deep Learning for Computer-aided Diagnosis in Medical Imaging**   Nov 6 2020
Venue: CIDSE Invited Talk, Host: Dr. Yalin Wang

■ **Computer-aided Diagnosis and Therapy in Medical Imaging**   Sep 4 2020
Venue: BMI Seminar, Host: Dr. Anita Murcko

■ **Cost-Effective Computer-Aided Diagnosis of Lung Cancer in Chest Computed Tomography**   Aug 13 2020
Venue: Phoenix Symposium on Data Analytics in Healthcare, Host: Dr. Claire Pascavis

■ **Models Genesis: Generic Autodidactic Models for 3D Medical Image Analysis**   Nov 11 2019
Venue: Mila - Quebec Artificial Intelligence Institute, Host: Dr. Joseph Paul Cohen

■ **3D Transfer Learning in Medical Image Analysis**   Oct 24 2019
Venue: AI Research Club

■ **Models Genesis: Generic Autodidactic Models for 3D Medical Image Analysis**   Sep 24 2019
Venue: MICS Webinar, Host: Dr. Yong Xia, Dr. Huiguang He

■ **UNet++: A Nested U-Net Architecture for Medical Image Segmentation**   Sep 18 2018
Venue: AI Research Club

■ **How to Cut Annotation Cost in Biomedical Imaging**   May 22 2018
Venue: Centre Hospitalier de l'Université de Montréal, Host: Dr. Catherine Huet

Teaching

■ **BMI 598: NLP Methods for Biomedical Text Mining**   Aug 2020 - Dec 2020
Position: Teaching Assistant, Instructor: Dr. Murthy Devarakonda

■ **BMI 598: Imaging in Diagnostics**   Jan 2020 - May 2020
Position: Teaching Assistant, Instructor: Dr. Jianming Liang

■ **BMI 507: Intro Digital Image Processing**   Jan 2019 - May 2019
Position: Teaching Assistant, Instructor: Dr. Jianming Liang

Professional Services

■ **Journal Reviewer**
- IEEE Transactions on Pattern Analysis and Machine Intelligence
- Medical Image Analysis
- IEEE Transactions on Medical Imaging
- Pattern Recognition
- IEEE Transactions on Biomedical Engineering
- Journal of Biomedical and Health Informatics
- IEEE Access
- Journal of Biomedical Informatics

■ **Conference Area Chair**
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'20), Lima, Peru

■ **Conference Program Committee**
- International Conference on Computer Vision (ICCV'21), Montreal, Canada
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI'21), Strasbourg, France
- AAAI Conference on Artificial Intelligence (AAAI'21), Vancouver, Canada
- AAAI Conference on Artificial Intelligence (AAAI'20), New York, USA
- ICCV'19 Workshop Visual Recognition for Medical Images (VRMI), Seoul, Korea

References

■ Jianming Liang, Associate Professor, Arizona State University; `Jianming.Liang@asu.edu`
■ Edward H. Shortliffe, Adjunct Professor, Arizona State University; `Ted.Shortliffe@asu.edu`

- Robert Greenes, Professor Emeritus, Arizona State University; `greenes@asu.edu`
- Murthy Devarakonda, Research Professor, Arizona State University; `Murthy.Devarakonda@asu.edu`
- Alan L. Yuille, Bloomberg Distinguished Professor, Johns Hopkins University; `ayuille1@jhu.edu`
- Hongkai Wang, Associate Professor, Dalian University of Technology; `wang.hongkai@dlut.edu.cn`