

Zhongyi Han, Ph.D. Student

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EDUCATION

Ph.D. Student, Machine Learning Shandong University Supervisor: Prof. Yilong Yin	2019 - Present
Visiting Scholar, Machine Learning Nanjing University Advisor: Prof. Zhi-Hua Zhou	2019 - 2020
Graduate Student, Biomedical Engineering Shandong University of Traditional Chinese Medicine Supervisor: Prof. Benzhenh Wei	2016 - 2019
Visiting Graduate Student, Machine Learning the University of Western Ontario Supervisor: Dr. Shuo Li	2016 - 2018
Bachelor of Science, Biomedical Engineering Shandong University of Traditional Chinese Medicine	2012 - 2016

WORK EXPERIENCE

Intern, Machine Learning Artificial Intelligence Group, Baidu	<i>Feb. 2018 – Dec. 2018</i>
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RESEARCH INTERESTS

Machine Learning Robust Learning Medical Image Analysis

RESEARCH EXPERIENCE

Machine Learning and Data Mining Lab, School of Software, Shandong University

Mentor: Yilong Yin & Benzhenh Wei

Projects on Intelligent Analysis of COVID-19 *Mar. 2020 – Present*

- Proposed an Attention-based Deep 3D Multiple Instance Learning Algorithm to achieve accurate and interpretable screening of COVID-19 based on chest CT scans.
- Proposed a Discriminative Cost-Sensitive Learning algorithm to achieve balance and accurate screening of COVID-19 based on chest X-ray scans.
- Proposed to validate the effectiveness of tongue images on screening of COVID-19.

LAMDA Group, Nanjing University

Leader: Zhi-Hua Zhou

Projects on Robust Machine Learning *Oct. 2019 – Present*

- Proposed a Robust Domain Adaptation (RDA) algorithm to achieve robust and accurate domain adaptation under noisy environments.
- Given a theoretical analysis that reveals how harmful noises influence unsupervised domain adaptation.
- Proposed an offline curriculum learning for minimizing a newly-defined empirical source risk to eliminate the effect of label noise.
- Proposed a proxy distribution based margin discrepancy to reduce the impact of feature noise.

LAMDA Group, Nanjing University

Mentor: Wang-Zhou Dai

Projects on Abductive Learning *Mar. 2019 – Sep. 2019*

- Proposed Abductive Subconcept Learning to bridge machine learning and logical reasoning in low-level cognitive tasks.
- Proposed to use Subordinate Concepts (subconcepts) for bridging machine learning and logical reasoning.
- Further proposed to use DNNs to identify the subconcepts of raw data, and then uses logical reasoning to

perform secondary reasoning on subconcepts to infer the class label.

IDL & Artificial Intelligence Innovation Business department, Baidu Inc.

Leader: Shaoting Zhang & Lei Wang

Projects on Intelligent Diagnosis of Cancers and Fundus Diseases *Feb. 2018 – Dec. 2018*

- Designed a multi-scale classification system to diagnose cancers based on pathological images.
- Designed a deep learning-based system to grade fundus diseases of diabetic retinopathy.
- Proposed a tiny object detection algorithm to detect the tiny lesions of diabetic retinopathy.

The Digital Imaging Group of London, University of Western Ontario

Mentor: Shuo Li

Projects on Intelligent Spinal Image Analysis *Dec. 2016 – Feb. 2018*

- Proposed Spine-Gan to achieve accurate semantic segmentation of multiple spinal structures.
- Proposed a multiple task multiple scale learning framework to achieve accurate detection and grading of multiple spinal structures.
- Proposed to unify neural learning and logical reasoning for the automated radiological report generation of spinal diseases.

Center for Medical Artificial Intelligence, Shandong University of TCM

Mentor: Benzheng Wei & Yuanjie Zheng

Projects on Intelligent Analysis of Breast Cancer *Jul. 2016 – Dec. 2016*

- Proposed a breast cancer multi-classification method to provide an efficient tool for breast cancer multi-classification in clinical settings.
- Proposed a new class structure-based deep convolutional neural network (CSDCNN) to adopts the end-to-end training manner that can automatically learn semantic and discriminative hierarchical features from low-level to high-level

HONORS AND AWARDS

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| 1. First Class of Academic Scholarship, Shandong University | 2019 |
| 2. First Class Scholarship for Excellent Graduate Students, Yifang Pharmaceutical Co., Ltd (1/27) | 2018 |
| 3. Science and Technology Innovation Scholarship, Shandong University of Traditional Chinese Medicine | 2018 |
| 4. Second Class of Graduate Academic Innovation Forum, Shandong University of Traditional Chinese Medicine | 2018 |
| 5. Student Travel Award, MICCAI | 2018 |
| 6. Science and Technology Innovation Scholarship, Shandong University of Traditional Chinese Medicine | 2017 |

PUBLICATIONS

Conference Papers

1. **Zhongyi Han**, Xian-Jin Gui, Chaoran Cui, Yilong Yin, "Towards Accurate and Robust Domain Adaptation under Noisy Environments". The 29th International Joint Conference on Artificial Intelligence (IJCAI), 2020.
2. Yang Ning, **Zhongyi Han**, Li Zhong, Caiming Zhang, "Automated Pancreas Segmentation Using Recurrent Adversarial Learning". 2018 IEEE International Conference on Bioinformatics and Biomedicine (BIBM), pp.927-934, 2018.
3. **Zhongyi Han**, Benzheng Wei, Stephanie Leung, Jonathan Chung, Shuo Li, "Towards Automatic Report Generation in Spine Radiology Using Weakly Supervised Framework". 2018 International Conference on Medical Image Computing and Computer-Assisted Intervention (MICCAI), pp.185-193, 2018.
4. Benzheng Wei, **Zhongyi Han**, Xueying He, Yilong Yin, "Deep Learning Model Based Breast Cancer Histopathological Image Classification". 2017 IEEE 2nd International Conference on Cloud Computing and Big Data Analysis (ICCCBDA), pp. 348-353, 2017.

Journal Papers

5. **Zhongyi Han**, Benzheng Wei, Yanfei Hong, Tianyang Li, Jinyu Cong, Xue Zhu, Haifeng Wei, Wei Zhang, " Accurate Screening of COVID-19 using Attention Based Deep 3D Multiple Instance Learning". IEEE Transactions on Medical Imaging, 2020.
6. **Zhongyi Han**, Benzheng Wei, Ashley Mercado, Stephanie Leung, Shuo Li, "Spine-GAN:

- Semantic Segmentation of Multiple Spinal Structures". Medical Image Analysis, pp.23-35, 2018.
7. **Zhongyi Han**, Hongbo Wu, Benzhenh Wei, Yilong Yin, Shuo Li, "Recursive Narrative Alignment for Movie Narrating". Science China Information Sciences, 63(7), 174101, 2020.
 8. **Zhongyi Han**, Benzhenh Wei, Stephanie Leung, Ilanit Ben Nachum, David Laidley, Shuo Li, "Automated Pathogenesis-Based Diagnosis of Lumbar Neural Foraminal Stenosis via Deep Multiscale Multitask Learning". Neuroinformatics, pp.325-337, 2018.
 9. **Zhongyi Han**, Benzhenh Wei, Yuanjie Zheng, Yilong Yin, Kejian Li, Shuo Li, "Breast Cancer Multi-classification from Histopathological Images with Structured Deep Learning Model". Scientific Reports, 2017.
 10. Yanfei Hong, Benzhenh Wei, **Zhongyi Han**, Xiang Li, Yuanjie Zheng, Shuo Li, "MMCL-Net: Spinal Disease Diagnosis in Global Mode using Progressive Multi-task Joint Learning". Neurocomputing, pp.307-316, 2020.
 11. Yang Ning, **Zhongyi Han**, Li Zhong, Caiming Zhang, "DRAN: Deep Recurrent Adversarial Network for Automated Pancreas Segmentation". IET Image Processing, 14(6), pp.1091-1100, 2019.

Under Review Papers

12. **Zhongyi Han**, Wang-Zhou Dai, Le-Wen Cai, Yu-Xuan Huang, Benzhenh Wei, Li Lian, Yilong Yin, "Abductive Subconcept Learning". Submitted to NeurIPS 2020.
13. **Zhongyi Han**, Benzhenh Wei, Yanfei Hong, Tianyang Li, Jinyu Cong, Xue Zhu, Haifeng Wei, Wei Zhang, "Can Tongue Image Help the Automated Screening of COVID-19?". Submitted to ACM Multimedia 2020 (MM).
14. **Zhongyi Han**, Benzhenh Wei, Yilong Yin, Shuo Li, "Unifying Neural Learning and Symbolic Reasoning for Spinal Medical Report Generation". Submitted to Medical Image Analysis, 2020.
15. Tianyang Li, **Zhongyi Han**, Benzhenh Wei, Yanfei Hong, Jinyu Cong, Xue Zhu, Haifeng Wei, Wei Zhang, "Robust Screening of COVID-19 from Chest X-ray via Discriminative Cost-Sensitive Learning". Submitted to Artificial Intelligence in Medicine, 2020. (Co-first author)

SERVICES

Program committee or reviewer for conferences:

- China Conference on Data Mining (CCDM 2020)
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2020)
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2019)
- International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI 2018)

Reviewer for journals:

- IEEE Transactions on Neural Networks and Learning Systems (TNNLS)
- IEEE Transactions on Medical Imaging (TMI)
- Medical Image Analysis
- Journal of Intelligence Systems
- Scientific Reports
- Applied Soft Computing
- IEEE Access