SHIHAO ZHANG

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Education

Computer Science | National University of Singapore
Aug. 2021- May. 2025 (expected). *Ph.D.*
Software Engineering | South China University of Technology
Sep. 2017-Jul. 2020. *Master of Science*
Mathematics and Applied Mathematics | South China University of Technology
Sep. 2012-Jul. 2016. *Bachelor of Science*

Research and Work Experience

My PhD research focuses on **regression representation learning**, using information theory and topology as tools with a theoretical emphasis. In contrast, my master's research was more application-oriented, concentrating on **medical image segmentation**.

National University of Singapore (PhD student, advisor: Angela Yao) **2021.08-Present**

Regression Representation Learning [1, 2, 3]**:** Exploring the differences between classification (with categorical targets) and regression representations (with continuous targets), providing a deeper understanding of both. The insights gained **benefit a wide range of regression tasks**, e.g., depth estimation, super-resolution, pose estimation, and age estimation.

Singapore National Eye Center (Research Associate, advisor: Daniel SW Ting) **2020.09-2021.08**

- Diabetic Retinopathy (DR) Incidence and Progression [7]: Developed predictive models to assess the likelihood of DR development and identified key features influencing DR incidence.

- Small Incision Lenticule Extraction: Automated and optimized machine parameters to replace manually set values, improving surgical precision and outcomes.

CVTE Research (Full-time Intern, advisor: Yanwu Xu & Huazhu Fu & Qingyao Wu) **2018.06-2019.08**

AS-OCT Data Processing and Retinal Image Segmentation [5, 6]: Developed a grading index to assess cataract severity based on the density of segmented tissue layers.

South China University of Technology (Master student, advisor: Mingkui Tan) **2017.09–2020.07**

Mainly focus on medical image segmentation [4, 5, 6], with additional research in Click-Through Rate prediction and super-resolution during the early stages of my master's studies.

Selected Publications

[1] S. Zhang, Y. Yan, and A. Yao. Improving Deep Regression with Tightness. Under Review of ICLR 2025 and received all positive ratings

[2] S. Zhang, K. Kawaguchi, and A. Yao. Deep Regression Representation with Topology. **ICML 2024** (https://github.com/needylove/PH-Reg)
[3] S. Zhang, L. Yang, M. Bi Mi, X. Zheng, and A. Yao. Improving Deep Regression with Ordinal Entropy. **ICLR. 2023 (**https://github.com/needylove/OrdinalEntropy**)**
[4] S. Zhang, H. Fu, Y. Xu, Y. Liu, and M. Tan. Retinal Image Segmentation with Structure-Texture Demixing Network. **MICCAI. 2020**
[5] S. Zhang, H. Fu, Y. Yan, Y. Zhang, Q. Wu, M. Yang, M. Tan, and Y. Xu. Attention Guided Network for Retinal Image Segmentation. **MICCAI. 2019 (**https://github.com/HzFu/AGNet**)**
[6] S. Zhang, Y. Yan, et al. Guided M-Net for High-resolution Biomedical Image Segmentation with Weak Boundaries and Noise. **OMIA. 2019 (best paper)**
[7] WY Ng, **S. Zhang**, et al. Updates in Deep Learning Research in Ophthalmology. **Clinical Science. 2021**

Awards & Honors

- National scholarship. Rank: 1/55, award to top 1% of students, 2019.
- 2019 Best Paper Award. 6th MICCAI Workshop on Ophthalmic Medical Image Analysis.
- PALM 2019. Rank second in the classification (https://palm.grand-challenge.org/Home/).
- AGE 2019. Rank first in the localization and rank second in the classification (https://age.grand-challenge.org/Home/).