# Zhuchen SHAO

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## EDUCATION

**Tsinghua University** - *Tsinghua Shenzhen International Graduate School* *Sep. 2021 - Present*

- M.E. in Electronic and Information Engineering (Artificial Intelligence)
- Advisor: Prof. Haoqian Wang
- GPA: 3.64 / 4.0
- Main courses: Machine Learning, Statistical Learning Methods, Artificial Neural Network
- Reseach interests: Weakly-Supervised Learning, Representation Learning, Synthetic Data Generation

**Dalian Maritime University** - *College of Marine Electrical Engineering* *Aug. 2017 - Jun. 2021*

- B.E. in Automation
- GPA: 4.22 / 5.0 Rank: 1 / 123
- Main courses: Signals and Systems, Automatic Control Theory, Basics of Computer Software
- Research interests: Image Denoising, Lane Detection

## PUBLICATIONS

**HVTSurv: Hierarchical Vision Transformer for Patient-level Survival Prediction from Whole Slide Image** *AAAI, 2023*

***Zhuchen Shao**, Yang Chen, Hao Bian, Jian Zhang, Guojun Liu, Yongbing Zhang*

- Proposed a **local-to-global hierarchically processing framework** for patient-level survival prediction in whole slide image.
- We devised (1) feature generation method based on k-nearest neighbor search and Manhattan distance, which can reflect the local characteristics, (2) the local-level, WSI-level and patient-level interaction layers to hierarchically encode the contextual and hierarchical information in whole slide image.
- Our HVTSurv significantly outperforms SOTA methods on 6 cancer types from The Cancer Genome Atlas (TCGA).

**Multiple Instance Learning with Mixed Supervision in Gleason Grading** *MICCAI, 2022*

*Hao Bian*, **Zhuchen Shao***, Yang Chen*, Yifeng Wang, Haoqian Wang, Jian Zhang, Yongbing Zhang*

- Proposed a **mixed supervision Transformer** based on the multiple instance learning (MIL) framework.
- We devised (1) mixed supervision MIL framework that slide-level multi-label classification task and the instance-level multi-classification task can jointly trained in the training process, (2) a effective random masking strategy to deal with the inaccurate instance-level labels.
- Our method achieves the best slide-level classification performance, and the visual analysis shows the instance-level accuracy of the model in Gleason pattern prediction.

**TransMIL: Transformer based Correlated Multiple Instance Learning for Whole Slide Image Classification** *NeurIPS, 2021*

***Zhuchen Shao**, Hao Bian*, Yang Chen*, Yifeng Wang, Jian Zhang, Xiangyang Ji, Yongbing Zhang*

- Proposed a **correlated multiple instance learning framework**, including the convergence proof and a three-step algorithm.
- We introduced the correlated assumption in the i.i.d based MIL problem and firstly proposed a Transformer based MIL in whole slide image, which explored both morphological and spatial information.
- The proposed TransMIL can effectively deal with unbalanced/balanced and binary/multiple classification with great visualization and interpretability.

## SELECTED HONORS

**Second Prize Scholarship**, Tsinghua University *2022*

**National Scholarship (top 1%)**, Dalian Maritime University *2019, 2020, 2021*

## SKILLS

**Programming:** Python, PyTorch, LaTeX

**Languages:** English (conversant), Mandarin (native)

## SERVICES

**Reviewer:** CVPR2023