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研究兴趣

我的研究聚焦于用人工智能解决科学问题(AI4S)，尤其是计算生物学领域的基础性难题。通过将物理先验知识与深度学习框架相结合 [I.6]，我致力于缓解高分辨率结构数据匮乏的瓶颈问题，借助多模态生物数据融合技术建立稳健的序列-结构-功能映射关系。这些创新方法旨在解析RNA 的动态结构与多样化功能，以期实现：

- 系统性标注非编码基因组区域中的功能性RNA 基序
- 通过RNA-配体相互作用建模实现人工智能驱动的药物发现

在这之前，我研究过医学影像计算，开发了具有跨域适应能力的通用模型 [I.1, I.2] 及小样本学习算法[I.5]，专注于医学影像关键点的精准定位。

教育经历

- 中国科学技术大学 2023.09 - 现在
博士研究生，生物医学工程
◦ 导师: [周少华教授](#) (Fellow of IEEE, AIMBE, NAI) 苏州
- 中国科学院，计算技术研究所 2020.09 - 2023.06
硕士，计算机应用技术
◦ 导师: [周少华教授](#) (Fellow of IEEE, AIMBE, NAI) 北京
- 中国科学院大学 2020.09 - 2023.06
硕士，计算机应用技术
◦ 导师: [周少华教授](#) (Fellow of IEEE, AIMBE, NAI) 北京
- 中国科学技术大学 2016.09 - 2020.06
本科，计算机科学与技术
◦ 华夏计算机科学与技术英才班 合肥

荣誉获奖

- 苏州工业园区奖学金，中国科学技术大学 2025
- 一等学业奖学金，中国科学技术大学 2024-2025
- 一等学业奖学金，计算所&国科大 2020-2023
- 三好学生，计算所&国科大 2023
- 优秀学生奖，中国科学技术大学 2018-2019
- 化研所英才奖, 中国科学技术大学 2017

实习经历

- 腾讯天衍实验室 2021.07 - 2021.11
研究实习生 深圳
◦ 使用深度图监督学习进行图像显著性检测

学术服务

- 会议审稿: MICCAI
- 期刊审稿: TCSVT

志愿活动

- 志愿者: 医学增强现实夏季学期, 苏州 2024
- 志愿者: 医学影像计算独墅湖会议, 苏州 2023
- 助教: 电子信息开放实践, 中国科学技术大学 2023

PUBLICATIONS

Selected publications, # denotes co-first author and * denotes co-corresponding author. For full list, please refer to [Google Scholar](#).

Representative Papers

- [I.6] **Heqin Zhu**, Fenghe Tang, Quan Quan, Ke Chen, Peng Xiong*, and S. Kevin Zhou*. "Deep generalizable prediction of RNA secondary structure via base pair motif energy." *Nature Communications* 2025. ([Nat. Commun.](#) 2025). [[Paper](#); [Code](#)]
- [I.5] **Heqin Zhu**, Quan Quan, Qingsong Yao, Zaiyi Liu, and S. Kevin Zhou. "Uod: Universal one-shot detection of anatomical landmarks." In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pp. 24-34. Cham: Springer Nature Switzerland, 2023. ([MICCAI 2023](#)). [[Paper](#); [Code](#)]
- [I.4] **Heqin Zhu**, Qingsong Yao, and S. Kevin Zhou. "Datr: Domain-adaptive transformer for multi-domain landmark detection." *arxiv preprint arxiv:2203.06433* (2022). [[Paper](#); [Code](#)]
- [I.3] **Heqin Zhu**, Xu Sun, Yuexiang Li, Kai Ma, S. Kevin Zhou*, and Yefeng Zheng*. "DFTR: Depth-supervised fusion transformer for salient object detection." *arxiv preprint arxiv:2203.06429* (2022). [[Paper](#); [Code](#)]
- [I.2] **Heqin Zhu**, Qingsong Yao, Li Xiao, and S. Kevin Zhou. "Learning to Localize Cross-Anatomy Landmarks in X-Ray Images with a Universal Model." *BME Frontiers* 2022 (2022): 9765095. ([BMEF 2022](#)). [[Paper](#); [Code](#)]
- [I.1] **Heqin Zhu**, Qingsong Yao, Li xiao, and S. Kevin Zhou. "You only learn once: Universal anatomical landmark detection." In *Medical Image Computing and Computer Assisted Intervention*, pp. 85-95. Springer International Publishing, 2021. ([MICCAI 2021](#)). [[Paper](#); [Code](#)]

Journal Papers

- [J.4] Quan Quan#, Qingsong Yao#, **Heqin Zhu**, and S. Kevin Zhou. "IGU-Aug: Information-guided unsupervised augmentation and pixel-wise contrastive learning for medical image analysis." *IEEE Transactions on Medical Imaging* (2024). ([TMI 2024](#)).
- [J.3] Quan Quan#, Qingsong Yao#, **Heqin Zhu**, Qiyuan Wang, and S. Kevin Zhou. "Which images to label for few-shot medical image analysis?." *Medical Image Analysis* 96 (2024): 103200. ([MIA 2024](#)).
- [J.2] Huang Zhen#, Han Li#, Shitong Shao, **Heqin Zhu**, Huijie Hu, Zhiwei Cheng, Jianji Wang, and S. Kevin Zhou. "PELE scores: pelvic X-ray landmark detection with pelvis extraction and enhancement." *International Journal of Computer Assisted Radiology and Surgery* 19, no. 5 (2024): 939-950. ([IJCARs 2024](#)).
- [J.1] Pengbo Liu, Hu Han, Yuanqi Du, **Heqin Zhu**, Yinhao Li, Feng Gu et al. "Deep learning to segment pelvic bones: large-scale CT datasets and baseline models." *International Journal of Computer Assisted Radiology and Surgery* 16 (2021): 749-756. ([IJCARs 2021](#)).

Conference Papers

- [C.4] Xinyi Wang, Zikang Xu, **Heqin Zhu**, Qingsong Yao, Yiyong Sun, and S. Kevin Zhou. "SIX-Net: Spatial-Context Information miX-up for Electrode Landmark Detection." In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pp. 338-348. Cham: Springer Nature Switzerland, 2024. ([MICCAI 2024](#)).
- [C.3] Fenghe Tang, Ronghao Xu, Qingsong Yao, Xueming Fu, Quan Quan, **Heqin Zhu**, Zaiyi Liu, and S. Kevin Zhou. "Hyspark: Hybrid sparse masking for large scale medical image pre-training." In *International Conference on Medical Image Computing and Computer-Assisted Intervention*, pp. 330-340. Cham: Springer Nature Switzerland, 2024. ([MICCAI 2024](#)).
- [C.2] Quan Quan, Fenghe Tang, Zikang Xu, **Heqin Zhu**, and S. Kevin Zhou. "Slide-SAM: Medical SAM Meets Sliding Window." In *Medical Imaging with Deep Learning*, pp. 1179-1195. PMLR, 2024. ([MIDL 2024](#)).
- [C.1] Yuanyuan Lyu, Haofu Liao, **Heqin Zhu**, and S. Kevin Zhou. "A 3 DSegNet: anatomy-aware artifact disentanglement and segmentation network for unpaired segmentation, artifact reduction, and modality translation." In *International Conference on Information Processing in Medical Imaging*, pp. 360-372. Cham: Springer International Publishing, 2021. ([IPMI 2021](#)).