Mingze Yuan

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Education

- **Peking University, School of Mathematical Sciences** — Beijing, China
  B.S. in Statistics; GPA: 3.67/4.00 (Top 20%) — *Sep 2017 - Jul 2021*
- **Peking University, Center for Data Science** — Beijing, China
  M.S. in Data Science — *Sep 2021 - Present (Expected Jul 2024)*

Research Interests

Machine learning and its applications in medical image analysis.

Research Projects

- **Mask transformer based method for real-world medical image segmentation & out-of-distribution localization**:
  - Proposed a mask transformer based framework, MaxQuery, and query-distribution loss that segments in-lier tumors and localize out-of-distribution (OOD) ones.
  - Outperformed nnUNet by 5.27% in DSC, and previous leading OOD localization approach by 14.69% in AUPR.
  - Paper accepted by CVPR 2023 (highlight).
- **Deep metric learing based algorithm for open-world semantic segmentation**:
  - Proposed a region-aware metric learning method for open-world semantic segmentation.
  - Surpassed previous best anomaly segmentation method by 5.0% in AUPR and incremental few-shot learning approach by 12.0% in mIoU.
  - Paper accepted by IJCAI 2022.
- **Deep learning based algorithm for gastric cancer screening using non-contrast CT imaging**:
  - Designed a joint segmentation and classification algorithm that leverages the single-phase non-contrast CT scan for gastric cancer (GC) screening.
  - Achieved a sensitivity of 85.0% and specificity of 92.6% on a large-scale dataset.
  - Paper submitted to MICCAI 2023.
- **Diffusion models based algorithm for virtual contrast-enhanced CT synthesis:**:
  - (Ongoing) Explored the feasibility of simulating contrast-enhanced CT from non-contrast CT via diffusion models.
- **Deep learning based algorithm for RNA velocity and dynamical modeling**:
  - Proposed a Neural ODE based framework for RNA velocity estimation by generalizing the original first-order dynamical model for single-cell transcriptomics.
  - Effectively captured cellular transitions in different biological systems and flexible to be applied to multi-omics data.

Publications

- **Conference**: **Mingze Yuan**, Yingda Xia, Hexin Dong, Zifan Chen, Jiawen Yao, Mingyan Qiu, Ke Yan, Xiaoli Yin, Yu Shi, Xin Chen, Zaiyi Liu, Bin Dong, Jingren Zhou, Le Lu, Ling Zhang, Li Zhang. *Devil is in the Queries: Advancing Mask Transformers for Real-world Medical Image Segmentation and Out-of-Distribution Localization*. The IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR), 2023 (**Highlight**).
- **Conference**: Hexin Dong, Zifan Chen, **Mingze Yuan**, Yutong Xie, Jie Zhao, Fei Yu, Bin Dong, Li Zhang. *Region-Aware Metric Learning for Open World Semantic Segmentation via Meta-Channel Aggregation.* The 31st International Joint Conference on Artificial Intelligence (IJCAI), 2022.
- **Conference**: **Mingze Yuan**, Yingda Xia, et al., *Cluster-Induced Mask Transformers for Effective Opportunistic Gastric Cancer Screening on Non-contrast CT Scans.* Submitted to Medical Image Computing and Computer-Assisted Intervention (MICCAI), 2023.
- **Preprint**: Yutong Xie, **Mingze Yuan**, Bin Dong, Quanzheng Li. *Diffusion Model for Generative Image Denoising.* arXiv preprint arXiv:2302.02398.

Honors and Awards

- Academic Excellence Award, Peking University, 2022
- Challenge Winner Award (Champion), crossMoDA, MICCAI 2022
- Runner-up, Zero-shot object detection of Zhijiang Cup Global Artificial Intelligence Competition, 2021
- Merit Student Award, Peking University, 2018
- Gold Medal, the 32th China Mathematics Olympid, 2016

Internship Experience

- **Research Intern at Medical AI Laboratory, Alibaba DAMO Acadamy** — Beijing, China
  Gastric cancer screening; Real-world medical OOD detection — *Jun 2022 - Present*

Skills Summary

- **Programming Languages**: Python, C/C++, Matlab, R
- **Languages**: English (CET-6)
- **Frameworks**: PyTorch
- **Soft Skills**: Leadership, Event Management, Writing, Public Speaking, Time Management