Deep Learning-Based Cine MRI Segmentation for Cardiac Function Assessment

Advisor: Daniel Stuckey, Prof., UCL, Jan. 2025- Present

• Manual **segmentation** of ED and ES area for **assessing ventricular volumes** from short-axis cardiac MR images.

• Implemented multiclass left ventricle segmentation using **short-axis cardiac MRI registry** with **UNet3+**.

Laparoscopic Surgical Instruments Binary Segmentation

Advisor: Wenpeng Gao, Assoc. Prof., HIT, Sep. 2023- Jan. 2024

• Designed nove architecture based on **U-Net** with Transformer, tested on **Endovis2017** dataset for **surgical instruments binary segmentation**, implemented ablation experiments to verify the efficiency of components.

• Segmented the sequenced images extracted from the video, approximately achieved surgical instrument tracking and outperformed existing schemes. - **Code Available**

https://github.com/ZhiYu-2002/Graduation-Project

Phase Detection of Surgical Instruments

Advisor: Wenpeng Gao, Assoc. Prof., HIT, Jun.- Jul. 2022

• Extracted images from **Cholec80** videos and modified labels, generated random data to test feasibility, fine-tuned and trained **AlexNet** with acquired images.

PeRCeiVe Lab, University of Catania (Remote)

Advisor: Concetto Spampinato, Prof., Jan. 2025- Present

• Fine-tuned existing networks and compared performances on **Kvasir** and **NCI-ISBI 2013 Dataset** for **saliency prediction**.

• Generated saliency maps with the best performing network as prompts for segmentation with **SAM 2**.

• Work will be submitted to **MICCAI**.

Publications

Surface Deformation Tracking in Monocular Laparoscopic Video (2023)

• Z. Liu, W. Gao, J. Zhu, **Z. Yu** and Y. Fu

https://www.sciencedirect.com/science/article/pii/S1361841523000361