

Project: Improved segmentation tracking of anatomical structures in open-heart surgery

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In a research project with the Children's Heart Center, we have developed a dataset and method for tracking of three anatomical structures based on a fine-tuned Segment Anything Model (SAM 2) that can track segmented objects with monitoring using YOLO that will detect if the segmentation drifts. The current version is not reinitialized automatically from YOLO (because of limitations of that version of SAM 2). The project proposal is to implement and evaluate automatic reinitialization from YOLO to improve segmentation tracking over time.

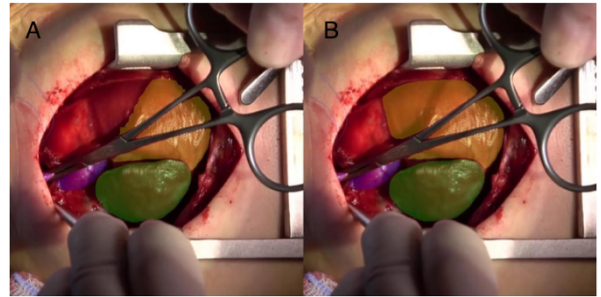


Figure 1: Incorrect segmentation of the right ventricle in A, where the shadow of the instrument is mistaken for the edge of the tissue. Correct segmentation in B.

Students will implement:

- Update the models to the latest SAM 2 models and YOLO26 and retrain with the existing dataset.
- Implement reinitialization from YOLO segmentations when the model detects that the segmentation for one of the structures has drifted, either by using the new SAM 2 API or by parallelization.
- Compare the new implementation with the previous version without YOLO reinitialization.

The work will be carried out at the Children's Heart Center and the results from the project will be part of a research paper.