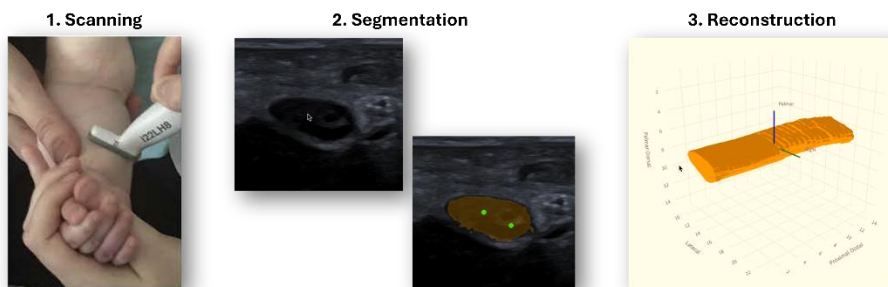


Application of Video Object Segmentation for Pediatric Nerve Ultrasound

Diseases like Type-1 diabetes (T1D) and spinal muscular atrophy (SMA) affect peripheral nerve function and structure. While high-resolution ultrasound can assess nerve morphology, the current annotation process is time-intensive, requires specialized expertise, limits clinical evaluation to just 1-3 points, and misses variations along the nerve trajectory. Our project develops a methodology to comprehensively study the median nerve, which controls motor and sensory functions in the upper limb. This approach aims to enhance understanding of pediatric nervous system development and neuronal degeneration mechanisms in T1D and SMA patients by:

1. Developing of a standardized procedure for ultrasound scanning of the median nerve
2. Preprocessing of the scans and 2D Segmentation of the neuronal cross-sections of the median nerve
3. 3D reconstruction of the median nerve from the segmented cross-sections
4. Developing clinically relevant metrics and diagnostic procedures



This project focuses on steps 2-3 of our methodology: systematically evaluating video object segmentation pipelines for pediatric median nerve ultrasound, and developing a robust pipeline for annotation, segmentation, and 3D reconstruction of ultrasound scans. In this interdisciplinary project, you will work with researchers at the University of St. Gallen's Interactions Research Group and clinicians at the Children's Hospital of Eastern Switzerland. This project is great for you, if you are

- Drawn to exploring or developing solutions that can potentially improve people's lives
- Strongly interested in computer vision or already familiar with video object segmentation
- Interested in publishing your findings in academic venues and
- Want to gain experience in impactful research dissemination

If you want to further familiarize yourself with the topics, you can find more details in

- Jenny et al. 2020. Change in cross-sectional area of the median nerve with age in neonates, infants and children analyzed by high-resolution ultrasound imaging. <https://doi.org/10.1016/j.ejpn.2020.07.017>
- Templier et al. 2016. Eye-trace: Segmentation of volumetric microscopy images with eyegaze. <https://doi.org/10.1145/2858036.2858578>
- SAM 2: Segment Anything in Images and Videos: <https://doi.org/10.48550/arXiv.2408.00714>
- Segment Anything for Medical Image Segmentation: <https://github.com/YichiZhang98/SAM4MIS>
- Chen et al. 2023. The ability of Segmenting Anything Model (SAM) to segment ultrasound images. https://www.jstage.jst.go.jp/article/bst/17/3/17_2023.01128/pdf

Reach out if you are interested!

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