

Yi ZHU

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EDUCATION

CREATIS Laboratory, University of Lyon

Lyon, France

PhD Student in Signal and Image Processing funded by INSA Lyon

Oct 2024 – Present

Thesis subject: Creation of digital twins by fusion of radiographic and optical data for oral medicine

Institut National des Sciences Appliquées de Lyon (INSA Lyon)

Lyon, France

Diplôme d'Ingénieur (Equivalent to a Master's Degree in Eng.) in Electrical Engineering

Sep 2019 - Aug 2024

Core Courses: Deep Learning; Image Acquisition and Reconstruction; Computer Network; Digital Signal Processing; Automation; Embedded Systems Design

Honors: Scholarship awarded by the region Auvergne-Rhône-Alpes (BRMIE)

Pohang University of Science and Technology (POSTECH)

Pohang, South Korea

Exchange Student in Electrical Engineering

Sep 2022 - Jun 2023

Selected Courses: Data Structure; Medical Signal Processing; Machine learning; Artificial Intelligence; Statistical Inference; Computer Architecture; Modern Control Theory

RESEARCH EXPERIENCE

Fusion of IOS and CBCT

CREATIS Laboratory, INSA Lyon

Supervisor: [Sébastien Valette](#), [Razmig Kéchichian](#), [Raphaël Richert](#)

Oct 2024 - Sep 2027

This ongoing PhD research aims to develop cutting-edge segmentation methods using multimodal dental imaging data from Cone Beam Computed Tomography (CBCT) and Intraoral Scanners (IOS) to create highly accurate, patient-specific digital twins for clinical use. The project addresses key challenges in dental imaging, such as resolution disparities and the limited availability of annotated data, by leveraging unsupervised and semi-supervised learning techniques. Key objectives include:

- **Multimodal Image Fusion and Representation Learning:** Combining the full anatomical data from low-resolution CBCT scans with high-resolution but partial anatomical data from IOS scans, enabling better overall patient representations.
- **Development of Novel Segmentation Models:** Designing advanced segmentation algorithms tailored to dental applications, particularly in orthodontics, implantology, and endodontics, ensuring compatibility with clinical workflows.
- **Model Training and Validation:** Using both publicly available dental datasets and hospital-acquired images to train and test models for improved segmentation accuracy.
- **Clinical Application Focus:** Ultimately, the research seeks to create a set of tools for interactive, real-time segmentation in clinical environments, allowing for personalized treatment planning and precise patient-specific reconstructions.

Evaluation of DL Algorithms for Medical Image Segmentation

CREATIS Laboratory, INSA Lyon

Supervisor: [Chantal MULLER](#), [Thomas GRENIER](#)

Mar 2024 - Aug 2024

- Evaluated segmentation models (YOLOv8/v9, UNeXt, DETR/UNETR, UNET/nnUNET) using MONAI's Metrics Reloaded (Dice, Hausdorff, ASSD), with focus on lesion-size performance.
- Pretrained on public datasets, then fine-tuned on custom MS data for improved lesion segmentation.

Publications: [Comparative analysis of three advanced deep learning algorithms for Multiple Sclerosis lesion segmentation in FLAIR MRI](#)

ICSP2024, Suzhou

SKILLS

- Packages and Frameworks: PyTorch, Tensorflow, MONAI, Scikit-Learn, Pandas, Numpy, Nibabel
- Languages: English (IELTS 6.5), French (C1), Chinese (Native)