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Zixuan PAN

Senior Undergraduate, Information Engineering, ZJU ISEE

Education

College of Information Science & Electronic Engineering, Zhejiang University, Zhejiang, China
Bachelor of Engineering in Information Engineering *2018.09 - 2022.06 (Expected)*
GPA: 3.94/4.00 (Overall), **3.97/4.00** (Major)
Major courses: Microcomputer Theory and Interfacing Technique: 96, Fundamentals of C Programming: 92, Data Analysis and Algorithm Design: 92, Probability Theory and Mathematical Statistics: 95, Artificial Intelligence: 95.

Publications

(* means equal contribution)
1. Shunjie Dong, **Zixuan Pan**, Yu Fu, Qianqian Yang, Yuanxue Gao, Tianbai Yu, Yiyu Shi, Cheng Zhuo, "DeU-Net 2.0: Enhanced Deformable U-Net for 3D Cardiac MRI Video Segmentation," Medical Image Analysis (under review).
2. Shunjie Dong*, **Zixuan Pan***, Qianqian Yang, Yiyu Shi, and Cheng Zhuo, "Easy Contrastive Learning for Medical Image Segmentation Without Access to Source Data," IEEE Transactions on Medical Imaging (in preparation).

Awards & Achievements

2021	International Interdisciplinary Contest in Modeling (ICM), Meritorious(First Prize)
2020-2021	Zhejiang University Scholarship, Second Prize
2019-2020	Zhejiang University Scholarship, Third Prize
2019	Physics Innovation Competition of Zhejiang Province, Second Prize
2019	National Mathematics Competition for College Students, Third Prize
2018-2019	Zhejiang University Scholarship, Third Prize

Research Projects

Contrastive Learning for Medical Image Segmentation
Supervisor: Prof. Cheng ZHUO, Dr.Shunjie DONG Zhejiang University 2021.09 - Present

Contributions: Data curation, Software, Validation, Visualization, Writing.

-We first introduce the architecture of the proposed *Easy Contrastive Learning* (ECL) for medical image segmentation, where the total loss function is given. Then, we present the *Feature-invariant Prototype-based Module* (FPM), where every pixel is assigned to a pixel-level cluster. We propose *Region Mutual Information Maximization* (RMIM) to model the dependencies among pixels through maximizing mutual information.

Enhanced Deformable U-Net for 3D Cardiac MRI Video Segmentation
Supervisor: Prof. Cheng ZHUO, Dr.Shunjie DONG Zhejiang University 2020.09 - 2021.09

Contributions: Built the framework from the scratch; Completed coding and experiments; Participated in paper writing.

-we introduce the proposed DeU-Net for 3D cardiac cine MRI segmentation, which contains three modules, i.e., *temporal deformable aggregation module* (TDAM), *Enhanced Deformable Attention Network* (EDAN), and *Probabilistic Noise Correction Module* (PNCM). A sequence of consecutive cardiac MR slices is first fed into TDAM which consists of a temporal deformable convolution layer and an offset prediction network based on U-Net to generate the fused features of the target slice. The PNCM then models the fused features as a distribution hence to quantify uncertainty in order to alleviate the negative effects of noisy slices. The fused features are simultaneously processed by EDAN that incorporates a stack of deformable convolution layers and a Multi-Scale Attention Module (MSAM) to generate discriminative features where the spatial sampling locations are generated. Finally, the probabilistic feature maps produced by the PNCM are concatenated to the last activation map of EDAN for final segmentation.

Three-dimensional Acceleration Signal Processing

Supervisor: Prof.Jingtong HU University of Pittsburgh *2020.08 - 2020.09*

Contributions: Designed a program to read ADXL362 data and return it to the host computer through STM32; Designed a program to count the number of steps; Data preprocessing.

- This project aims to provide a general method for further work of Implantable Cardiac Defibrillator/Pacemaker Programmer. In order to distinguish tachyarrhythmia and rapid heartbeat caused by strenuous exercise, we use ADXL362 to analyze the motion states of patients who use our chips. Specifically, the acceleration data is collected and then preprocessed by smoothing, denoising, resampling, normalization, windowing, and tilt correction. Then we use wavelet analysis to extract features from time-domain information and frequency-domain information, and finally, train a classifier to distinguish different motion states.

Research and Development of Algorithms for Rescue Robots

Supervisor: Prof.Guanding YU Zhejiang University *2020.06 - 2021.06*

Contributions: Project leader; Tested existing algorithms for rescue robots; Improved object detecting algorithm and tested it on 2018 DAC-SDC UAV image dataset.

- In this project, based on the Jetson-Nano platform, we have developed research on algorithms related to rescue and disaster relief robots. First, we assemble and build the Jetbot software and hardware platform, use Alexnet to achieve obstacle avoidance and tracking, and use Yolo-v3 to achieve target tracking. Secondly, to apply our algorithm in more disaster relief scenarios, we designed a model to strengthen our object detection function. Finally, we designed the SLAM model to generate maps from the images returned by the robot camera, which is conducive to search and rescue personnel to carry out an efficient rescue.

Computer Skills

Languages: C, Python, Verilog, Matlab, LaTeX, Assembly (C51, RISC-V)
Deep Learning Frameworks: PyTorch,TensorFlow