Xiangxiang Cui

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Education

Beijing Normal University, Beijing, China — Sep. 2022 – Present

Ph.D. in Cognitive Neuroscience. Advisor: Jing Sui
Research: Machine Learning, Deep Learning, Brain Cognition.

Xi'an Jiaotong University, Xi'an, China — Sep. 2019 – June 2022

M.E. in Software Engineering, Advisor: Zhongyu Li
Thesis Topic: Study on the methods of adversarial attack and robustness evaluation of medical images based on differential evolution.

Employment

Frontline Intelligent Technology, Xi'an, China — Dec. 2020 – Present

Intern. Analysis of dynamic ultrasound video.

Keya Medical Technology, Shenzhen, China — June 2020 – Dec. 2020

Intern. Coronary Segmentation & Head and Neck Segmentation.

Lobon Technology, Shenzhen, China — Jan. 2018 – June 2018

Intern. Embedded Software Development.

Research Interest

- **Model Robustness**: Adversarial Attack, Model Robustness Evaluation
- **Medical Informatics**: Computer-Aided Diagnosis, Medical Image Analysis

PUBLICATIONS

- Xiangxiang Cui, Shi Chang, Chen Li, Bin Kong, Lihua Tian, Hongqiang Wang, Peng Huang, Meng Yang, Yenan Wu, Zhongyu Li. "DEAttack: A differential evolution based attack method for the robustness evaluation of medical image segmentation." *Neurocomputing (2021).*

Research Projects

Ultrasound Video Image Classification — Mar. 2021 – Present

Role: Leader of computational methods, finished in Frontline Intelligent Technology.

- Feature extraction of multiple consecutive video frames based on CNN and LSTM.
- The verification accuracy of video-based(Our) classification is higher than single-frame classification.

Adversarial Attack and Model Robustness Evaluation — Jan. 2020 – Jan. 2021

Role: Project Leader, cooperated with Prof. Zhongyu li and other professors, finished in Xi'an Jiaotong University.

- We proposed the evaluation method of the segmentation model robustness based on the differential evolution.
- Implemented Adversarial Attack approach including FGSM, PGD, ASMA, in four medical datasets for compare experiments.
- Does not require additional target network information. Attack the medical image segmentation model while perturbing only a tiny fraction of the image pixels. For the robustness evaluation of different segmentation models under adversarial attacking by comparing the numbers of perturbation points.

Head and Neck Segmentation Oct. 2020 – Dec. 2020

Role: Leader of computational methods, finished in Keya Medical Technology.

- Label Data Preparation: using regional growth and optical flow to generate pre-segmentation. The Label specialists manually revised pre-segmentation.
- Deep Learning: using label data and 3D CNN to generate smooth segmentation results.

Coronary Segmentation June 2020 – Oct. 2020

Role: Leader of aorta segmentation, participate in coronary segmentation full process, finished in Keya Medical Technology.

- Using CNN to segment the aorta, analyse the aorta segmentation results and then adjust algorithmic to adapt to different hospital datasets.
- Participating in the refinement of coronary segmentation, including vessel broken, vein removal.
- Develop vessel segmentation results evaluation tools to improve iterative efficiency.

The embedded car Oct. 2017 – Mar. 2018

Role: Developers.

- The whole system is completed by using microsystem STM32, Cortex-A8 and C language.
- Using KNN to identify direction(turn to left or right) based on the Opencv library.
- Using PID algorithm and sensor to control the travel stability of the embedded car.

Web online compiler June 2017 – Sep. 2017

Role: Developers.

- The whole system is completed by using Html, Javascript, Php, Linux shell, Mysql.
- Support languages: C, C++, C#, Java, Html, Javascript, Php.
- As a sub-module of the online video and live programming learning website, we embed the online compiler into the learning website to assist computer science students in completing programming languages.

Skills & Expertise

- Proficient with deep learning and computer vision algorithms, proficient with Pytorch framework, proficient with state-of-the-art deep neural networks.
- Proficient with multiple Image processing open source library, including ITK, SimpleITK, Scikit-Image, VTK, VMTK, Opencv. Proficient with format and processing of 2D and 3D medical images. Such as DICOM, NIFTI.
- Proficient with multiple programming languages, including Python, C, C++, PHP, Java, HTML, Javascript, Linux shell. Proficient with Network Socket Programming, Multi-process communiction, Docker container.
- Proficient with microcomputer system, including MSC-51, STM32, Cortex-A8.
- Leading engineer experience in Websites, Web Server, Embedded Internet of Things, Android APP and so on.
- Extensive experience in cooperation with researchers with multidisciplinary and different engineer backgrounds.

Honors & Awards

Intelligent Algorithm Contest of China, Rank: 13/600	Nov. 2019
Double Excellent Graduate, Anhui Province	July 2018
Special scholarships, Rank: Top 1%, Undergraduate	July 2018
Special scholarships, Rank: Top 1%, Undergraduate	July 2017
President of the Computer Association, Undergraduate	Sep. 2016
National scholarships, Rank: 1/800, Undergraduate	July 2016
Special scholarships, Rank: Top 1%, Undergraduate	July 2016
Special scholarships, Rank: Top 1%, Undergraduate	July 2015