Yu Li

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EDUCATION

Wuhan University (WHU), Hongyi Honor College   **Wuhan, China**
B.Eng. in Microelectronics Science and Technology   09/2021-06/2025
GPA: 3.87/4.0

RESEARCH EXPERIENCE

Laser and Ultrafast Imaging Laboratory   **Wuhan, China**
Research Assistant, Mentor: Dr. Cheng Lei, WHU   09/2023-Present
   *Topic: **Medical Ultrasound Image Segmentation***

- Imported the parameter weight files of the Segment Anything Model (SAM) and adapted them for medical ultrasound image segmentation, adopting the default point prompt of SAM to avoid the impact of prompt learning
- Modified the Swin-Transformer model by incorporating CBAM to optimize the transformer module
- Designed a Wise-fusion module to implement feature fusion of SAM and improved Swin-Transformer, achieving segmentation results on the BUSI dataset with metrics like miou, dice, Jaccard exceeding 90%

Yang Research Lab at UC Davis   **Davis, CA**
Research Assistant, Mentor: Dr. Wenjian Yang, UC Davis   07/2023-Present
   *Topic: **Arterial Hemoglobin Oxygen Saturation (SpO2) Measurement Model based on Monte Carlo Simulation***

- Constructed a 3D model of the blood vessel using MATLAB and assigned different optical absorption parameters to each layer of the vessel
- Utilized Monte Carlo simulations to obtain the time-of-flight (TOF) curves of the vessel, calculated and plotted the beating signal curves with the TOF curve data, and leveraged the MBLL (Modified Beer-Lambert Law) formula to compute SpO2
- Designed a fitting neural network that correlated absorption parameters with TOF values, allowing for the prediction of vessel parameters from TOF curves
- Expanded the measurement model to dual targets by devising an adaptive algorithm to separate the mixed signals from the mother and the baby, enabling the calculation of SpO2 for each individual
- Validated the accuracy of the algorithm using the experimental measurement data collected from pregnant ewes

Riscv Lab   **Wuhan, China**
Research Assistant, Mentor: Dr. Wei Liu, WHU   10/2022-07/2023
   *Topic: **Electrocardiogram (ECG) Images Classification based on Deep Learning***

- Collected dual-lead ECG signals from the MIT-BIH database, used generative adversarial networks to perform data enhancement, and designed a lightweight model to address the real-time requirements of ECG-based preliminary diagnosis
- Built the XGBoost-based diagnostic model after comparing the performance of AdaBoost, CatBoost, XGBoost, and random forests
- Designed a voting system consisting of four Xgboost models, achieving an accuracy of 97.4% within a short time and with limited resources as well as nearly perfect identification of normal ECG signals
- Developed a deep learning model comprising a combination of CNN and RNN, in which the RNN's hidden states incorporated the self-attention mechanism, resulting in an accuracy of 99.2%

INDEPENDENT PROJECTS

FPGA-based Image Acquisition and Hardware Acceleration   03/2023-07/2023

- Labeled the images in the provided dataset of traffic lights, trained the YOLO5 model on the dataset, and adjusted the parameters, achieving an accuracy of more than 95%
- Developed a PCIe hardware driver that allowed the transmission of HDMI data from the FPGA to the host computer
- Employed FPGA's hardware computing unit to accelerate image recognition, stored the processed data in DDR4 memory, and continuously read the processed data from DDR4 memory, thus outputting the results of vehicle recognition in real-time

Insurance Fraud Study with Decision Tree Algorithm 07/2022-08/2022
- Applied feature engineering to reduce the dimensionality of the data set and performed feature selection
- Built ridge regression models and lasso regression models and conducted the comparative analysis
- Created decision-tree models such as the XGBoost and CatBoost models, and conducted the comparative analysis
- Applied grid search to find the optimal hyperparameters in the CatBoost model, improving its validation rate to up to 95%

Effect of Mask Material and Process Parameters on Performance 08/2022
- Constructed the relationship between process parameters and structural variables by using the decision tree models GBDT, XGBoost, LightGBM, and linear regression models Ridge and Lasso
- Applied the grid search strategy to select the decision tree and the optimal hyperparameters of linear regression models
- Calculated the arithmetic average of two models to reduce the impact of notice and optimize the prediction results
- Constructed relationship between structural variables and product performances with decision tree models and BP neural networks

Monte Carlo and Simulated Annealing Algorithm-Based Modeling of Parcel Sorting Optimization Problem 05/2022
- Built a greedy algorithm model to find an optimal solution for order acceptance and scheduling with batch delivery
- Built a Monte Carlo/simulated annealing algorithm model and obtained the optimal order of delivery by adjusting parameters of annealing temperature and maximum number of cycles

PUBLICATION

Li, Y., Hu, Y., Chen, J., Wang, B., & Liu, W. (2023). ECG Classification with Dual Models: XGBoost Voting and Deep Learning with Attention. International Conference on Advanced Computer Theory and Engineering (ICACTE), accepted.

Lv, S., Zeng, S., **Li, Y.**, Yang, K., & Chen, Y. (2023). Local Optimum Time-Reassigned Synchrosqueezing Transform for Bearing Fault Diagnosis of Rotating Equipment. IEEE Sensors Journal, accepted.

PATENTS

Li, Y. Split air conditioner power-saving controller and system thereof, and power-saving amount calculation method. Chinese Patent # CN116085952A, issued May 09, 2023.

Li, Y. Continuous monitoring method and system for the rational arrangement of heating equipment in a computer room. Chinese Patent #CN110220615A, issued April 18, 2019.

Li, Y. Continuous monitoring system and method for air conditioning performance. Chinese Patent # CN110068117A, issued April 18, 2019.

HONORS & SCHOLARHSIPS

"Innova" Scholarship for Academic Excellence, Top 3/650	10/2023
International Exchange Scholarship	09/2023
Academic Excellence Scholarship, Top 5%	04/2023
First-Class Scholarship, Top 5%	10/2023 & 10/2022
Excellent Prize, the 3rd Huashu Cup Mathematical Modelling Competition	08/2022
The 3rd Prize, the 14th Huazhong Cup Mathematical Modeling Competition for College Students	05/2022
"Growing Star" in Programming Practice Improvement Training, Hongyi Honor College, WHU	10/2021

SKILLS

Programming Language: Python, MATLAB, C++, C, Verilog