HANSHI SUN

Southeast University, Nanjing, Jiangsu, China, 210096
(+86) 15312872389 | preminstrel@gmail.com | github.com/preminstrel | preminstrel.com

Education

Southeast University (SEU) **Nanjing, China**
Bachelor of Engineering in Electronic Science and Technology Sep 2019 - Jun 2023
GPA: 3.98/4.0 (Major: 4.0/4.0) | **Average Score**: 94.04/100 | **Ranking**: 1/20

Publications

[1] Jinan Bao, **Hanshi Sun**, and Xingyu Li. "Retina OCT Anomaly Detection and Localization via Structure-aware Knowledge Distillation." (In Submission)

[2] Yi Zhou, Lei Huang, Tao Zhou, **Hanshi Sun**. "Combating Medical Noisy Labels by Disentangled Distribution Learning and Consistency Regularization." *Future Generation Computer Systems (FGCS)*, 2022.

[3] **Hanshi Sun**, Ao Wang, Ninghao Pu, Zhiqing Li, Junguang Huang, Hao Liu, and Zhi Qi. "Arrhythmia Classifier Using Convolutional Neural Network with Adaptive Loss-aware Multi-bit Networks Quantization." *International Conference on Artificial Intelligence and Computer Engineering (ICAICE)*, 2021.

Research Experience

Self-supervised Learning for Anomaly Detection **Edmonton, Canada**
Research Assitant, Mitacs GRI, University of Alberta, Supervisor: Prof. Xingyu Li Jun 2022 - Oct 2022
Innovation: Presented a hybrid architecture to integrate segmentation knowledge as privileged features for anomaly detection on Optical Coherence Tomography (OCT) images

- Proposed a structure extraction module, which takes advantage of the nature of the image distribution and copes the image with image processing methods to generate a structure-enhanced image
- Incorporated privileged features distillation and reverse distillation methods with the help of extra structure extraction networks
- Achieved competitive results compared to the state-of-art (SOTA) methods on three different retina OCT datasets for both image-level and pixel-level on three different retina OCT datasets

Multi-modal Multi-task Transformer for Retinal Disease Detection **Nanjing, China**
Research Assitant, PAttern Learning and Mining (PALM) Lab, Supervisor: Prof. Yi Zhou Jan 2022 - Jun 2022
Innovation: Designed a multi-modal multi-task transformer (Ret-T) for retinal disease detection and classification by combining self-attention and cross-attention mechanisms for multi-modal fusion

- Introduced the cross-modal synthesis to compensate for restricted information from a single modality by generating other modalities to complement the missing but vital information
- Realized a multi-modal multi-task transformer body with specific task heads, outperforming state-of-the-art classification methods by 2.4% and detection methods by 7.1%

Disentangled Distribution Learning and Consistency Regularization **Nanjing, China**
Research Assitant, PAttern Learning and Mining (PALM) Lab, Supervisor: Prof. Yi Zhou Oct 2021 - May 2022
Innovation: Proposed a hybrid hard-soft label learning mechanism and consistency regularization to enhance a single model's disease detection capability instead of struggling with model ensembling

- Integrated multiple reference models' predictions and disentangled them into a majority confident label vector and a description degree score vector for co-training the single-target model, mitigating the negative influence caused by label uncertainty and ambiguity
- Introduced the inter- and intra-instance consistency regularization by constraining the target model to provide consistent predictions on images with similar medical findings
- Conducted substantial experiments on the chest X-ray and fundus image datasets to validate the effectiveness of the proposed disentangled distribution learning (DDL) and consistency regularization

Energy-efficient DNN Algorithm for ECG Classification **Nanjing, China**
Research Assitant, National ASIC Engineering Research Center, Supervisor: Prof. Hao Liu Dec 2020 - Sep 2021
Innovation: Acted as the leader of a seven-person team and developed an efficient arrhythmia detection algorithm for deployment on resource-constrained devices to realize a real-time arrhythmia diagnosis

- Designed a 17-class arrhythmia classifier based on convolutional neural network blocks
- Proposed a hardware-friendly one-dimension adaptive loss-aware multi-bit networks quantization method to allocate different bitwidth for respective layers, balancing high performance (95.84% accuracy) and low resource consumption (23.36× compression rate)
- Published two papers, open-source code at `preminstrel/ECG-Classification`

Professional Experience

Apple Inc. **Shenzhen, China**
iPad System R&D Intern, EE team Nov 2022 - Present

- Built a pure python automation test frame that can run on multiple units, collect and analyze logs
- Issue reproduction, symptom capture, and hands-on debugging for coexistence testing
- Created web pages with diverse visualization of the analyzed data using Flask

Projects

Multi-task Learning Based Fundus Multi-disease Diagnosis **Nanjing, China**
Degree Project, Supervisor: Prof. Yi Zhou Oct 2022 - Present

- Implemented a multi-task/multi-source domain transfer learning model, making the training of different tasks promote each other
- Developed a pretrained model which can transfer knowledge efficiently without learning from scratch in the face of new downstream datasets

High Precision 3D Simulation of Electron Beam Lithography **Nanjing, China**
Project Leader, National-level Student Innovation and Entrepreneurship Project Dec 2020 - Aug 2021

- Developed a model of electron scattering in solids at low and high energies and simulated it using MATLAB
- Made energy distribution maps compared with those in the literature to confirm the reliability of the model and visualize three-dimensional etching patterns with Exposure
- Optimized model parameters based on the Monte Carlo algorithm to minimize the proximity effect, achieving higher resolution and better simulation results

Honors & Awards

- **2022 China National Scholarship** (the highest honor for undergraduates in China, **Top 0.1%**)
- 2020&2021&2022 Single-course Scholarship, 18 times for three consecutive academic years (**Top 2%**)
- 2020&2021&2022 Merit Student (Top 1%) for three consecutive years
- 2021 Alumni Scholarship (funded by notable alumni, **Top 1%**)
- **2021 China National Scholarship** (the highest honor for undergraduates in China, **Top 0.1%**)
- 2020 Exemplary Individual of Innovation and Entrepreneurship (**Top 1%**)
- Excellent Student Model (**only two** in the department)
- 2020 China Undergraduate Mathematics Competition (Provincial **1st Prize**, National **3rd Prize**)
- 2020 Southeast University Summer Social Practice Outstanding Team (**2nd Place**)
- 17th Challenge Cup National Extra-curricular Academic Science and Technology Works (Provincial **1st Prize**)

Skills & Interests

Programming Languages: Python, C/C++, MATLAB, HTML, CSS, Bash, Verilog, Java, R, SQL, JavaScript
Tools & Frameworks: Git, LaTeX, Pytorch, TensorFlow, Flask, Bootstrap
Platform: Linux (Ubuntu, CentOS), macOS, Windows
Languages: Mandarin (Native), English (Proficient), Japanese (Conversational, CJT-4)
Interests: Badminton, Swimming, Hiking