SHANGRAN QIU

PhD candidate in AI medicine; seeking for a software/machine learning engineer position

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Working Experience

Research Assistant

Kolachalama Lab, Boston University

October 2017 – present Boston, MA

- Developed cutting-edge **computer vision** methods to solve **healthcare** problems.
- Gained 3 years of experience in machine learning with focuses on **explainable AI** and **diagnostic** tools.
- Covered technical skills including image classification, saliency visualization, multi-task learning, semi-supervised learning and distributed computing.
- Published 6 papers in this field including one in prestigious journal Brain. [google scholar profile]

R&D Intern

Philips Research

March 2019 – August 2019 Cambridge, MA

- Designed and developed a **user guidance** algorithm for optimal positioning of handheld ultrasound probe.
- Achieved a **deep learning prototype** of the guidance system by detecting locations of predefined medical key-points.
- Built a **data pipeline** to congregate, parse, sanitize and augment data from various sources.
- Evaluated and fine-tuned the **key-points detection** algorithm and demonstrated clinically relevant accuracy.

Education

Doctor of Philosophy, Physics

Boston University

September 2016 – present Boston, MA

Online Master, Computer Science

Georgia Institute of Technology

Aug 2020 – present

Bachelor of Science, Physics

Xi'an Jiaotong University

September 2012 – June 2016 Xi'an, China

Skills

Programming data structure, OOP, Unix
Language fluent(Python, C++, Bash), familiar(SQL)
Framework Pytorch, Tensorflow
Version Control Git, Github
Analytics 10 graduate-level Physics/Math courses

Research Highlights

Explainable AI on Alzheimer's Disease [paper] [Github]

- Developed an explainable AI framework to predict **3D risk map** of Alzheimer's disease (AD) in brain MRI.
- Validated the correctness of the predicted high risk regions by correlating with tissue examination outcome.
- Framework's classification accuracy (96.8%) outperformed the average of 11 neurologists given the same information.

Diagnostic Tool for Dementia [ongoing]

- Developed a **multi-task** model to concurrently diagnose subtypes of dementia.
- Achieved AUCs of diagnosing healthy (0.86), pre-dementia (0.70), dementia (0.86), Alzheimer's disease (0.88), Parkinson disease (0.94) and frontotemporal dementia (0.93).
- Implemented **distributed data parallel** training using NCCL backend with flexibility of assigning tasks into processes.
- Further improved diagnostic performance with **semi-supervised** strategy by 0.04 AUC in the most improved task.

Image Enhancement [paper] [Github]

- Developed a dual-purpose **Generative Adversarial Network** to enhance MRI image quality and disease classification accuracy.
- Demonstrated consistent image quality improvement on 4 metrics (SNR, SSIM, NIQE and BRISQUE) and classification performance boost over 3 datasets.

Technical Projects

Build Linux from Source Code

- Built a bootable linux distribution (LFS 9.1) from scratch using source code on a Linux virtual machine host.
- Built a host-independent toolchains (gcc, glibc, binutils, other utilities) in a clean partition and then changed root directory (chroot) to this partition to complete the build of LFS 9.1 using the toolchains.

Language Topic Classification (Pytorch)

- Developed a **tree-LSTM** model to classify arXiv paper abstract into research fields (Physics vs Biology).
- Customized a **word embedding** model (continuous bag-of-words) on the domain of research papers.
- Dynamically constructed the tree-LSTM model according to **grammatical tree** of sentence to perform the training and achieved an accuracy of 76%.

Object Detection (Pytorch) [Github]

- Built and trained **Yolov2** model on COCO2014 dataset to dive into the details of object detection task.
- Explored and optimized the model with various backends (Darknet, ResNet, MobileNet) and losses (cross entropy loss, focal loss) and achieved mean averaged precision of 25.