XIN WANG

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EDUCATION

Fudan University   Shanghai, P.R. China
B.Eng. in Electronic Engineering   Sept. 2016 – Jun. 2020
- Overall GPA: 3.77/4.0 (rank 4/84), Major GPA: 3.9/4.0
- GRE: 332 + 3.5, TOEFL: 109
- Highlights:
  - Top 10 Students in the School of Information Science and Technology (top 1.3% of ~760 students)
  - First Prize Scholarship in Fudan University (twice; top 3% of ~13,000 students)

RESEARCH INTERESTS

My research interests include biomedical image analysis and machine learning, with a focus on multimodal feature fusion and unsupervised learning for diagnosis and disease prediction applications in MRI and tomography. I also have great passion and research experience in probabilistic modeling, mathematical statistics, optimization, and traditional image processing algorithms.

EXPERIENCE

Fudan University (School of Data Science)   Shanghai, P.R. China
Research Assistant   Sept. 2020 – Present
Unsupervised Multimodal Co-registration and Segmentation of Medical Images
- Introduced an evidence lower bound to maximize the likelihood in a variational manner;
- Implemented spatial transformers to warp feature maps of networks by displacement fields, which are endowed with invertibility via vector integration;
- Leveraged convolution kernels shared by different modalites and modality-specific batch normalization to obtain domain-invariant latent variables;
- Designed an encoder-decoder architecture with skip connections to unsupervisedly register modalites into a common space, and segment them using the learned latent feature;
- Currently conducting research on contrastive learning and rotational equivariance to ensure the extraction of structure information through encoders.

Real-Time Image Warping and Sketch Generation via Edge Detection
- Implemented an accelerated version of the Free-Form Deformation algorithm to warp images in real time, in which a deformation takes only 0.1 seconds without GPU acceleration;
- Implemented six edge detection algorithms, i.e., Sobel, Canny, Laplacian, LoG, DoG, and XDoG, for sketch generation;
- Visualized space transformation with four types of animations in a user-friendly GUI;
- Implemented algorithms entirely using basic libraries like Numpy and Pytorch, code available on *github.com/lsDrizzle/FreeFormDeformation-SketchDetection*.

University of North Carolina at Chapel Hill   Chapel Hill, USA
Summer Researcher under Prof. Dinggang Shen and Pew-Thian Yap   Jul. 2019 – Sept. 2019
Vertebra Localization and Segmentation
- Participated in an MICCAI challenge, aiming to localize and segment vertebrae from 3D CT scans that involve various challenges such as scoliotic spines, metal insertions and highly restrictive FOVs;
- Implemented a Single Shot MultiBox Detector (an object detection network) to detect the entire spine;
- Implemented a Butterfly-like network, using sagittal and coronal projections of CT scans as inputs, to localize vertebrae, with an identification rate of 83% on the validation set;
- Implemented a 3D U-net to segment each vertebra according to the localization results, with a dice coefficient of 78% on the validation set;
- Ranked 7th over the testing dataset, code available on *github.com/lsDrizzle/Btrfly-Net-Pytorch*.

Fudan University (Biomedical Imaging Lab)   Shanghai, P.R. China
Research Assistant under Prof. Jinhua Yu
Vessel Extraction Based on Style Transfer   Oct. 2019 – Mar. 2020
- Conducted research on the diagnosis of arteriosclerosis based on T1 MRI images, as a novel substitution for current golden standard, digital subtraction angiography (DSA);
- Developed an innovative idea to generate TOF MRA images from corresponding high-resolution T1 MRI version;
- Segmented vessel lumen on MRA using kernel methods, then mapped the results back to T1 images so as to get prior information of vessel positions on T1;
- Implemented U-net-like networks to segment outer walls of vessels on T1 by utilizing prior information from MRA.

Massachusetts Institute of Technology   Boston, USA
Member of Team Fudan-CHINA   Oct. 2018
International Genetically Engineered Machine Competition (iGEM)
- Prepared for iGEM through intensive interdisciplinary training in computer science, medicine and biology for 6 months;
- Developed paper writing and teamwork skills when conducting scientific research in English;
- Developed machine learning, mathematical optimization, differential equation, stochastic process models to improve the performance of a synthetic signal transducer system on cell membranes, and wrote a report detailing the modeling;
- Designed webpages to illustrate our work (see, for example, our webpage for the modeling: *2018.igem.org/Team:Fudan-CHINA/Model*);
- Delivered a formal presentation in Boston, and obtained a bronze medal.

Fudan University   Shanghai, P.R. China
China Undergraduate Mathematical Contest in Modeling   Sept. 2017
- Prepared for event through training in probability theory, mathematical statistics, and machine learning;
- Developed professional skills including modeling and scientific tools such as Python, MATLAB and Mathematica;
- Used cluster analysis and a decision tree to examine the best pricing strategy of a membership app, and used Bayesian estimation to forecast returns;
- Was part of the only sophomore team that obtained the first prize in the Shanghai Division.

SELECTED AWARDS AND HONORS

- Top 10 Students in the School of Information Science and Technology (top 1.3% of ~760 students)   2019
- Outstanding Student at Fudan University (top 5% of ~13,000 students)   2019
- Outstanding Research Prize in the School of Information Science and Technology (2 of ~760 students)   2019
- First Prize Scholarship in Fudan University (top 3% of ~13,000 students)   2018
- Bronze Medal in International Genetically Engineered Machine Competition (343 teams)   2018
- Honorable Mention in Interdisciplinary Contest in Modeling (top ~20% of ~10,000 teams)   2018
- First Prize Scholarship at Fudan University (top 3% of ~13,000 students)   2017
- Selected to the Elite Engineer Program at Fudan University based on outstanding research performance (top 5% of ~350 students)   2017
- First Prize in China Undergraduate Mathematical Contest in Modeling (top 5% of ~1,000 teams)   2017

COMPUTER SKILLS AND METHODS

- Languages: Python, MATLAB, C, JavaScript, Verilog, Mathematica
- Machine learning: Variational Bayes, Graphical Models, Kernel Methods, Convolutional Neural Network
- Courses: Data Structure, Computer Architecture, Convex Optimization, Discrete-Time Signal Processing, Random Processes, Information Theory