Junhao Hu

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Educational Background

Electrical & Systems Engineering, Washington University in St. Louis 09/2023-present
PhD in **Electrical & Systems Engineering**

Computer Science & Engineering, Washington University in St. Louis 09/2021-05/2023
Master of Science in **Computer Science & Engineering,** GPA: **3.7** / 4.0

College of Computer Science, Chongqing University 09/2019-07/2021
Bachelor of Science in **Computer Science & Technology**, GPA (Jr & Sr): **3.7** / 4.0

Hongshen Honors School, Chongqing University 09/2017-09/2019

- Established to cultivate outstanding innovative talent, the experimental innovation school selects the best 150 students from its admitted undergraduate students.

Publication

J. Hu, S. Shoushtari, Z. Zou, J. Liu, Z. Sun, and U. S. Kamilov***, "Robustness of Deep Equilibrium Architectures to Changes in the Measurement Model"***. 2023 IEEE International Conference on Acoustics, Speech, & Signal Processing (ICASSP)

- Investigates the robustness of deep equilibrium models' priors to changes in the measurement models.
- Validate the performance shift on MRI reconstruction and super-resolution

Qing Li, L. Frank Huang, Jiang Zhong, Lili Li, Qi Li, J. Hu. ***"Data-driven Discovery of a Sepsis Patients Severity Prediction in the ICU via Pre-training BiLSTM Networks"***. 2019 IEEE International Conference on Bioinformatics and Biomedicine (BIBM)

- Studied the role of the neural network in predicting the development of septicemia
- The model includes self-attention and attention mechanism; combined with the user-defined entropy loss function based on L2 norm regularization, the accuracy of the model reached 94.72%
- Involved in Feature Engineering iteration, selecting features generated by manual and model

Awards

WUSTL Dean's Select Fellowship 2023

Work Experience

Research Assistant **WUSTL** 01/2023-06/2023

- Research Assistant in computational imaging group (CIG)
- Focused on deep model based learning methods in medical imaging

Data Analyst Intern **ByteDance** 06/2020-09/2020

- Conducted the data analysis and data mining of game projects by using SQL, spark, python, machine learning, and other knowledge to meet the daily data needs of the project, such as

data dashboard, data warehouse operation, event tracking maintenance, and data attribution

- Completed a user churn prediction model based on Xgboost + LSTM and a paid user detection module based on one class SVM, which were adopted by the company
- Got the job return offer

Web Development Intern **Chinasoft International** 07/2019-09/2019

- Based on the Django framework, customized transmission protocol and AES bidirectional encryption algorithm using Python language, and built CQU-hub forum (www.cqu.fun)
- Further open-source development was achieved after the internship and won the honor of GitHub Antarctic developer

Research Project

Unfolding Model in Robust Non-rigid Registration 05/2022-09/2022

Supervisor: Prof. Ulugbek Kamilov, Computer Science, Washington University in St. Louis

- Applied unfolding technic to combine iterative algorithm and deep learning method to do registration task with noise
- Demonstrated that Unfolding Model in Registration is better than a single iterative algorithm and a single neural network.
- Obtained satisfying results (Dice score evaluation) in datasets with different noise levels. Our model could mitigate the effects of noise without the regularizer term.
- Tested the model in OASIS, LITS, and lung dataset and obtained better results than the Voxel morph and other baseline models.

Unsupervised Multimodal 3D Medical Image PET-CT Registration 02/2022-05/2022

Supervisor: Prof. Ulugbek Kamilov, Computer Science, Washington University in St. Louis

- Applied proper data preprocessing methods such as clipping and standardization to reduce the difference between multimodal images.
- Designed a CNN-based model to do rigid registration on PET-CT images. Chose different loss functions in different ROI
- Applied Voxelmorph to do non-rigid registration on the output of the rigid registration model. Applied the proper regularizer weight to avoid drastic local changes.
- Obtained better results compared with expert results and state-of-the-art models, especially in detailed parts (the spine, femurs).

Predict patients' life span using GNN 10/2021-01/2022

Supervisor: Prof. Yixin Chen, Computer Science, Washington University in St. Louis

- Based on GNN, we applied DGCNN as a baseline model, designed NDGCNN to predict patients' life span with cancer
- Used over one hundred oncogenes and basic patient information to construct our GNN net
- Designed an algorithm to do pruning on oncogenes graph. We reduced the size of the graph from 1000 genes to 100 genes
- Obtained better results than DGCNN in all baseline datasets
- Designed a tool to visualize and explained the result of the prediction

Project Experience

Short video recommendation system for pension information platform 10/2020-06/2021

Supervisor: Prof. Xueming Li, College of Computer Science, Chongqing University

- Based on DeepFM, CF, and traffic pool, building a recommendation system for the platform, which can take care of both long-term interests and short-term interests
- Built a database that can automatically update and retrain the model
- The system was used by Prof. Xueming Li's pension information platform

Chongqing Bus Traffic Analysis Project 02/2020-04/2021

Supervisor: Prof. Xueming Li, College of Computer Science, Chongqing University

- Based on distributed computing and our model, calculated the boarding and alighting places of passengers by using the real-time Chongqing bus card data, which is convenient for the bus company to make reasonable scheduling
- The big data processing system was built based on Hadoop ecology, and efficient data retrieval was mainly ensured by spark
- Solely responsible for the operation of Hadoop and optimization of existing algorithms

Contemporary Undergraduate Mathematical Contest in Modeling (CUMCM) 10/2019

Supervisor: Prof. Tengzhong Rong, College of Computer Science, Chongqing University

- Applied Pandas to process the vehicle track information in Guangzhou, and one class SVM to filter out the taxi track information near the airport
- Used the improved analytic hierarchy process (AHP) for modeling, and the decision-making scheme of airport taxi drivers was given to maintain the model's good interpretability
- Awarded First prize at the provincial level

Personal Website Construction

08/2019

- Built the Linux operating environment based on a personal server, and the website using the WordPress framework
- Cooperated with Professor of Hongshen Honors School of Chongqing University to manage his teaching resources during the COVID-19 pandemic period as an online learning platform

Professional & Academic Skills

- Familiar with medical image processing, including Dicom file, IMG, PET, CT, commonly used preprocessing methods, and visualization.
- Proficiency in using Python data-related libraries, including Numpy, Pandas, Matplotlib, Sklearn, Imblearn, Pytorch, etc.; able to independently complete the whole data mining and model building process
- Mastery of SQL, hive, spark, and other data architecture languages and frameworks; able to independently design and implement efficient data warehouse; fundamental knowledge of Kafka tools, can consume and store online data quickly
- Familiar with machine learning algorithms and neural networks, can apply them according to the actual situation
- Skilled in collaborative code development using Git