ZHIWEI GONG

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EDUCATION

Johns Hopkins University, Baltimore, MD — Aug. 2021 - May. 2023 (Expected)
M.S.E., Applied Mathematics and Statistics

University of Reading, Reading, UK — Sep. 2020 - July 2021
B.S., Mathematics and Applied Mathematics
Overall GPA: 85.58/100 (UK Standard), First Class Honours

Nanjing University of Information Science & Technology, Nanjing, China — Sep. 2017 - July 2021
B.S., Mathematics and Applied Mathematics
Overall GPA: 3.9/5.0 (89.16/100)

RESEARCH EXPERIENCE

Malone Center for Engineering in Healthcare, Johns Hopkins University — September. 2022 - Current
Research Assistant under the direction of Dr. Swaroop Vedula

Project: Cataract Surgery Study - Spatial-Temporal Attention For Video-Based Assessment Of Intraoperative Surgical Skill

- Generalized the algorithms of supervised spatial temporal attention using instrument trajectories to different datasets for surgical skill assessment
- Evaluated several semi-supervised domain adaptation techniques for improving models' performance in external validations

Computer Integrated Interventional Systems Lab, Johns Hopkins University — May. 2022 - Current
Research Assistant under the direction of Dr. Russell Taylor and Dr. Manish Sahu

Project: Deep Learning Platform for Automated Segmentation of the Eustachian Tube

- Applied Semi-Supervised VoxelMorph framework on the CT scans to do the registration and Eustachian Tube segmentation
- Evaluated and compared the segmentation performance of different deep networks based on Dice Similarity Coefficient and Average Hausdorff Distance, including Semi-Supervised VoxelMorph, Weakly-Supervised Deepatlas and the baseline nnUNet

Project: Statistical Shape Modeling of the Eustachian Tube

- Designed the Statistical Shape Models (SSMs) for eustachian tube
- Extracted and analyzed shape variation using linear Principal Component Analysis (PCA) and non-linear manifolds
- Performed a dense correspondence-free shape model (FlowSSM) to learn shape variability

PRESENTATIONS & PROJECTS

Structure from Motion — November 2022 - December 2022
Machine Perception Project, Johns Hopkins University, Supervisor: Dr. Rama Chellappa

- Implemented the factorization approach for structure from motion for orthographic camera
- Evaluated the performance of Tomasi-Kanade algorithm and failure modes

Image Reconstruction via Bayesian Inference — April 2022 - May 2022
Mathematical Image Analysis Project, Johns Hopkins University, Supervisor: Dr. Mario Micheli

- Applied a generalized approach of sparse Bayesian learning using the Bayesian coordinate descent algorithm to image reconstruction on image domain and frequency domain with different additive noise

· Applied Gaussian Low-Pass and High-Pass filter to the task of image reconstruction on frequency domain
· Achieved a good performance using a small variance noise and Gaussian High-Pass filter

dMRI Distortion Correction: A Deep Learning-based Registration Approach March 2022 - May 2022
Deep Learning Project, Johns Hopkins University, Supervisor: Dr. Vishal Patel

· Perform MRI image preprocessing such as affine spatial normalization and brain extraction using FreeSurfer to obtain the segmentation for various structure
· Run traditional registration method, SyN as baseline for comparison with DL based algorithm
· Applied VoxelMorph on HCP and Buckner40 brain datasets to perform subject-to-atlas registration tasks

ABSTRACTS

· Ameen Amanian, Manish Sahu, Yuliang Xiao, **Zhiwei Gong**, Deepa Galaiya, Russell Taylor, Francis Creighton. *Automated Segmentation of the Eustachian Tube for Applications in the Management of Eustachian Tube Dysfunction – A Deep Learning Framework.* Society for Imaging Informatics in Medicine: Conference on Machine Intelligence in Medical Imaging 2022

SKILLS

· **Programming Languages** Python (proficient), R (proficient), MATLAB (proficient)
· **Platforms & Frameworks** PyTorch (proficient), TensorFlow (familiar)
· **Deep Leaning Techniques** CNN (proficient), GAN (familiar)
· **Statistical & Database software** SPSS (proficient), MySQL (familiar)

CERTIFICATIONS

· Summary Statistics in Public Health, Johns Hopkins University, Course Certificate (Coursera)
· Machine Learning, Stanford University, Course Certificate (Coursera)
· Managing Big Data with MySQL, Duke University, Course Certificate (Coursera)

RELEVANT COURSEWORK

Deep Learning; Machine Perception; Statistical Data Science and Machine Learning; Mathematical Image Analysis; Computational Molecular Medicine; Bayesian Statistics; Stochastic Processes; Differential Equations; Multivariate Data Analysis

HONORS & AWARDS

· First-class Academic Scholarship, three times (Top 5%, one of the highest honors in our university)
· Merit Student. three times (Top 5%, one of the highest honors in our university)