Meng ZHOU

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OBJECTIVE: A current Computer Science Master's student at the University of Toronto with various research and industry experiences in Machine Learning (ML), Computer Vision, and its application in Medical Imaging. Seeking full-time positions in ML-related fields.

EDUCATION

EXPECTED JAN. 2024 — SEPT. 2022	***Master of Science* - Computer Science** GPA: 4.00/4.00 University of Toronto, Toronto, Ontario **Supervisor:** Prof. Farzad Khalvati, Intelligent Medical Imaging Computing System Lab **Awards:** Ontario Graduate Scholarship Recipient, Mergelas Family Graduate Award (Temerty Faculty of Medicine), Department of Computer Science Fellowship **Courses:** Computational Imaging, Information Visualization, Natural Language Computing, Neural Networks and Deep Learning
MAY 2022 — SEPT. 2017	***Bachelor of Computing Honor* - Computing and Mathematics** Core GPA: 3.96/4.30 Queen's University, Kingston, Ontario **Supervisors:** Prof. Yanglei Song and Prof. Parvin Mousavi **Awards:** Dean's Honor List, John Ursell Tutor Award

SKILLS

- **Programming Languages:** Python, R, Java, C++, HTML, PHP, Haskell, Prolog
- **Frameworks:** PyTorch, Nilearn/SITK, OpenCV, Scikit-Learn, NumPy, TensorFlow/Keras, Pandas, PySpark, Hadoop, Matplotlib
- **Tools:** SQL, MATLAB, Linux, Tableau, SAS, LaTeX

WORK EXPERIENCE

PRESENT SEPT. 2022	***Graduate Machine Learning Researcher* - The Hospital for Sick Children, Toronto** • Collaborated closely with PI and neuroradiologists to develop and implement deep generative models for improving the diagnosis of Pediatric Low-Grade Gliomas at the Intelligent Medical Imaging Computing System Lab. • Proposed an innovative approach by utilizing a vector quantization GAN with a Masked Transformer model to produce high-fidelity MRI scans of brain tumors under a data-constrained regime. • Evaluated the synthetic MRI scans on both image quality-based metrics and on a downstream tumor classification task, showcasing remarkable performance surpassing 6% in AUC compared to various baseline models. • Manuscript under review as a journal paper. The preprint is available at https://arxiv.org/abs/2310.01251.
JULY 2021 APR. 2021	***Machine Learning Engineer Intern* - The Illuminera Group, Shanghai, China** • Collaborated with the Program Manager and Senior Algorithm Engineers to develop an end-to-end Computer Vision framework for customer behavior analysis using **Python** and **Tensorflow Keras**. • Retrieved 1M+ image data from database using **PySpark SQL** and automated data pipelines to extract image data using Python and **Hadoop**. • Implemented the Perceptual-Hash algorithm to remove redundant images that are 90% or more similar to the other images in the database. • Built the ResNet-50 model with 99% categorical accuracy, increasing the accuracy by 20% and optimizing the prediction time by 10%. Fine-tuned the Yolov5 model that achieved 98% in precision, recall, and mAP. • Deployed the models online using Docker to support other teams in the analysis of customer's behavior.

RESEARCH EXPERIENCE

AUG. 2022 SEPT. 2021	***Undergraduate Machine Learning Researcher* - Queen's University, Kingston** • Worked on Prostate Cancer Classification project under the supervision of Prof. Parvin Mousavi at the Medical Informatics Lab. • Developed a GAN-based framework to translate unpaired prostate multi-parametric MRIs from 3.0T to 1.5T to address the data-hungry problem in medical imaging. • Proposed a novel evidential focal loss based on the evidential uncertainty estimation and the focal loss. Demonstrated a significant improvement over 10% in AUC compared to the baselines. • ***"Domain Transfer through Image-to-Image Translation in Prostate Cancer Detection"* Zhou et al.**, Pitch and Poster Presentation at ImNO2022. The extended version is under revision as a journal paper. The preprint is available at https://arxiv.org/abs/2307.00479.

APR. 2022 MAY 2021	***Undergraduate Research Assistant* - Queen's University, Kingston** • Worked on contextual multi-armed bandit problems under the supervision of Prof. Yanglei Song. • Claimed the over-exploration problem for "LinUCB" algorithm, and developed a novel approach to overcome this problem for K-armed contextual stochastic linear bandits. • *"Truncated LinUCB for Stochastic Linear Bandits"* **Yanglei Song and Meng Zhou** `https://arxiv.org/abs/2202.11735`, under the first round revision as a journal paper.

PROJECTS

DEC. 2022 NOV. 2022	***Medical Image Fusion* - Course Project** • Proposed a novel Dilated Residual Attention Network for the anatomical-functional medical image fusion task in **Python** and **PyTorch** on 184 MRI-CT pairs. • Developed a new fusion strategy based on the Softmax weights, which outperformed the state-of-the-art methods by 12.97% on PSNR and 1.49% on Feature-based SSIM. • Our project paper *"An Attention-based Multi-Scale Feature Learning Network for Multimodal Medical Image Fusion"* is available at `https://arxiv.org/abs/2212.04661`.
DEC. 2021 NOV. 2021	***Genetic Algorithm for Convolutional Neural Networks Optimization* - Course Project** • Proposed a Genetic Algorithm (GA) approach to optimize network parameters of a pre-defined CNN model for COVID-19 detection based on Chest X-Ray images. • Introduced the level-wise crossover and multi-point mutation method during the optimization process. The proposed GA-based approach outperforms a pre-trained and fine-tuned VGG16 model by 6.1 % in Accuracy, demonstrating the effectiveness of the proposed approach. • The project paper *"Heuristic Hyperparameter Optimization for Convolutional Neural Networks using Genetic Algorithm"* is available at `https://arxiv.org/abs/2112.07087`.
APR. 2021 FEB. 2021	***Shoulder Implants X-Ray Manufacturer Classification* - Course Project** • Developed VGG16, ResNet50 and Vision Transformer models in **Python** and **Tensorflow Keras** to establish a classification model to classify 600 medical images. • Performed affine transformation to each image for data augmentation with random cropping, scaling, flipping, rotating, and adding noise. • Utilized Transfer Learning and Cross-Validation techniques to improve the model precision score by 20%. The project report is available at `https://arxiv.org/abs/2104.07667`.

LEADERSHIP EXPERIENCE

PRESENT SEPT. 2022	***Teaching Assistant* - Department of Computer Science** • Office Hour, Marking, and Lecture TA for CSC108 "Introduction to computer programming" (Python) at the University of Toronto. • Held weekly office hour to help students with their class exercises, home assignments and tests review.
APR. 2022 JAN. 2022	***Teaching Assistant* - Department of Mathematics and Statistics** • Managed a group of 30 undergraduate students for STAT 457/857 Statistical Learning II (an advanced statistical learning course) at Queen's University. • Designed and prepared the midterm and final project using Python and R, deployed to the Kaggle platform for students to participate.
DEC. 2021 SEPT. 2021	***Teaching Assistant* - School of Computing** • Managed a group of 20+ students for CISC/CMPE 457 Image Processing and Computer Vision at Queen's University. • Designed the tutorial of hands-on activities, marked assignments using Python and Linux and provided test reviews.

SERVICES

• Reviewer for DGM4MICCAI Workshop at MICCAI 2023 Conference