Fatemeh Ghezloo

Ph.D. Candidate at University of Washington

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Objective

As a **Ph.D. candidate** in **Computer Science** specializing in multimodal representation learning, computer vision, deep learning, and machine learning, I am seeking a position as a **Research Scientist/Engineer** for **Summer 2024**. I'm passionate about developing cutting-edge computer vision and multimodal technologies, with a proven track record in AI research and interdisciplinary projects.

Education

University of Washington Sep. 2019 - 2024 (Expected)
Ph.D. in Computer Science and Engineering
Multimodal Representation Learning, Computer Vision, Deep Learning, and Machine Learning

Amirkabir University of Technology Sep. 2014 - Oct. 2018
B.Sc. in Computer Engineering

Experiences

Graduate Research Assistant September 2019 - Present
University of Washington Seattle, WA, USA

- Conducting research in a fast-paced, collaborative and interdisciplinary environment.
- Working on a medical-specific latent diffusion model for text-conditioned image generation, ControlNet-based modality generation, and targeted inpainting tasks.
- Developed an instruction-tuned multimodal histopathology chatbot leveraging LLaVA model.
- Curated a large multimodal instruction-following dataset including conversational, complex reasoning, abductive reasoning, and detailed description QA pairs.
- Developed QuiltNet, a state-of-the-art model utilizing CLIP for zero-shot and few-shot classification and cross-modal image-text retrieval for histopathology domain.
- Curated Quilt-1m, the largest vision-language dataset for histopathology containing more than one million image-text pairs.
- Developed a novel ROI detection pipeline by leveraging a U-Net architecture for reconstructing pathologists' attention maps.
- Performed statistical analysis and applied classic machine learning methods to investigate the correlation between pathologists' viewing behaviors and diagnostic accuracy.

Computer Vision and AI Research Intern June - September 2022
Zippin San Francisco, CA, USA

- Attained a 89% accuracy in automating the cart verification process of a checkout-free store platform, significantly minimizing reliance on manual requests.
- Developed a multimodal network by fusing video and image features leveraging models like MoViNets and EfficientNet.
- Improved model architecture by integrating squeeze and excitation and hard attention techniques.
- Curated a large-scale dataset from Zippin stores' database containing 5-million datapoints.
- Collaborated with cross-functional teams to develop AI and computer vision solutions.

Skills

Programming skills: Python, C, C++, Java, SQL, HTML/CSS
Machine Learning Tools: PyTorch, TensorFlow, OpenCV, scikit-learn, NumPy, pandas, matplotlib
Developer Tools: Jupyter Notebooks, Git, Google Cloud Platform, VS Code, Azure

Projects

Data Augmentation Using CycleGAN

- Trained CycleGAN, an image-to-image translation model, to augment and balance the training set of the FER2013, a facial expression recognition dataset.
- Improved the accuracy of facial expression recognition for 'disgust' and 'anger' expressions by 10% by effectively leveraging the augmented data.
- **Technologies and models used:** Python, PyTorch, TensorFlow, OpenCV, CycleGAN, CNN.

AmbigQA: A Baseline Model for Ambiguous Question Answering

- Reimplemented and adjusted the AmbigQA model to be compatible with limited processing resources, achieving a F1 score (39.58) close to the original paper's (39.7).
- Conducted several ablation studies on hyper-parameters impact on the inference time.
- Evaluated the model's performance on an additional QA dataset.
- **Technologies and models used:** Python, PyTorch, Transformers, BERT, seq2seq, BART.

Interactive Data Visualization webpage

- Designed and built a webpage for an interactive visualization tool to investigate how pathologists view a skin biopsy image.
- Developed a MIL model to classify skin cancer and visualize attention maps using GradCAM.
- **Technologies and models used:** Python, PyThon, D3.js, HTML/CSS, Multiple Instance Learning (MIL), VGG16, Grad-CAM.

Real-Time Facial Expression Recognition

- Designed and developed a deep convolutional neural network for facial expression recognition.
- Enabled real-time face detection and facial expression recognition on computer's camera input.
- **Technologies and models used:** Python, OpenCV, TensorFlow, Convolutional Neural Network (CNN).

Publications

Ghezloo F, Chang OH, Knezevich S, Reisch LM, Shapiro LG, Elmore JG. "Robust ROI Detection in Whole Slide Images guided by Pathologists' Viewing Patterns." Submitted to Diagnostics (2023)

Ikezogwo WO*, Seyfioglu MS*, **Ghezloo F***, Geva DS, Mohammed FS, Anand PK, Krishna R, Shapiro L. "Quilt-1M: One Million Image-Text Pairs for Histopathology." **NeurIPS (2023) Oral.**

Nofallah S, Wu W, Liu K, **Ghezloo F**, Elmore JG, Shapiro LG. "Automated analysis of whole slide digital skin biopsy images." Journal of Pathology Informatics (2022)

Ghezloo F, Wang PC, Kerr KF, Brunyé TT, Drew T, Chang OH, Reisch LM, Shapiro LG, Elmore JG. "An analysis of pathologists' viewing processes as they diagnose whole slide digital images." Journal of Pathology Informatics (2022)

Kamkar S, **Ghezloo F**, Moghaddam HA, Borji A, Lashgari R. "Multiple-target tracking in human and machine vision." PLoS computational biology (2020)

Teaching

CSE344 Introduction to Data Management	2023
CSE455 Computer Vision	2020, 2021
CSE473 Introduction to Artificial Intelligence	2020
CSE391 System and Software Tools	2020
CSEP501/CSE401 Compiler Construction	2019, 2020

Awards

Microsoft Accelerate Foundation Models Research Program	2023
NeurIPS 2023 Scholar Award	2023
University of Washington Graduate Student Conference Presentation Award	2023