

Zhengliang Liu

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Visa status: U.S. Permanent Resident

EDUCATION

University of Georgia <i>PhD in Computer Science. GPA: 4.0/4.0. Natural Language Processing in healthcare.</i> Published/submitted over 80 papers	Athens, GA 09/2023
Washington University in St. Louis <i>Master of Science in Computer Science, GPA: 3.9/4.0. Conducted Data Visualization Research (3 papers).</i>	St. Louis, MO 05/2021
University of Wisconsin - Madison <i>Bachelor of Arts in Computer Science, GPA: 3.904/4.0</i> <i>Graduated with Distinction; Dean's List, 2016-2018</i>	Madison, WI 08/2016 – 08/2018

PROFESSIONAL EXPERIENCE

Hippocratic AI , Palo Alto, CA <i>Research Scientist</i> <ul style="list-style-type: none">Pre-training, fine-tuning, aligning (through reinforcement learning) and productionizing (for latency/throughput) LLMs and LLM-based agents.	09/2023 – Present
Harvard Medical School & Massachusetts General Hospital , Boston, MA <i>Research Associate</i> <ul style="list-style-type: none">Developing Healthcare LLMs at Harvard Medical School and Massachusetts General Hospital.	05/2021 – 09/2023
Mayo Clinic , Phoenix, AZ <i>Research Intern/Research Affiliate</i> <ul style="list-style-type: none">Applying NLP in radiation oncology.Developing Mayo Clinic's 4D robust optimization engine for cancer treatment plan generation.	09/2021 – 09/2023
University of Georgia , Athens, GA <i>Instructor/TA</i> <ul style="list-style-type: none">CSCI 6550 Artificial Intelligence & CSCI 6380 Data Mining.Teach and grade both Graduate & Undergraduate students.	09/2021 – 09/2023

PUBLICATIONS & PROJECTS

- AgriBERT: Knowledge-Infused Agricultural Language Models for Matching Food and Nutrition (**IJCAI 2022**)
- A generalist vision-language foundation model for diverse biomedical tasks (**Nature Medicine 2024**)
- Polaris: A Safety-focused LLM Constellation Architecture for Healthcare** (<https://arxiv.org/abs/2403.13313>; work done at Hippocratic AI)
- TrustLLM: Trustworthiness in Large Language Models (**ICML, 2024**)
- Ma-sam: Modality-agnostic sam adaptation for 3d medical image segmentation (**Medical Image Analysis, 2024**)
- Fine-Tuning Large Language Models for Radiation Oncology, a Highly Specialized Healthcare Domain (International Journal of Particle Therapy, 2024)
- MGH Radiology Llama: A Llama 3 70B Model for Radiology (<https://arxiv.org/abs/2408.11848>)
- Mask-guided BERT for few-shot text classification (Neurocomputing, 2024)
- ClinicalRadioBERT: Knowledge-Infused Few Shot Learning for Clinical Notes Named Entity Recognition (**MICCAI-MLMI 2022**).
- Graph Representation Neural Architecture Search for Optimal Spatial/Temporal Functional Brain Network Decomposition (**MICCAI-MLMI 2022**)
- Embedding Human Brain Function via Transformer (**MICCAI 2022**)
- Survey on natural language processing in medical image analysis (**Journal of Central South University Medical Sciences, 2022**)
- Eye-gaze-guided Vision Transformer for Rectifying Shortcut Learning (arXiv:2205.12466)
- Discovering Dynamic Functional Brain Networks via Spatial and Channel-wise Attention (arXiv:2205.09576)
- Coarse-to-fine Knowledge Graph Domain Adaptation based on Distantly-supervised Iterative Training (2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM))
- Context Matters: A Strategy to Pre-train Language Model for Science Education (**accepted by AIED 2023**)
- ChatAug: Leveraging ChatGPT for Text Data Augmentation** (arXiv:2302.13007; under review by IEEE Big Data Journal)
- DeID-GPT: Zero-shot Medical Text De-Identification by GPT-4 (arXiv:2303.11032)
- When Brain-inspired AI Meets AGI (**accepted by Meta-Radiology**)
- Evaluating Large Language Models on a Highly-specialized Topic, Radiation Oncology Physics** (Frontiers in Oncology, 2023)

- **ImpressionGPT: An Iterative Optimizing Framework for Radiology Report Summarization with ChatGPT (IEEE Transactions on Artificial Intelligence)**
- Exploring the Trade-Offs: Unified Large Language Models vs Local Fine-Tuned Models for Highly-Specific Radiology NLI Task (arXiv:2304.09138)
- Accurate and Efficient Deep Neural Network Based Deformable Image Registration Method in Lung Cancer (2022 AAPM 64th Annual Meeting)
- Deep-Learning-based Fast and Accurate 3D CT Deformable Image Registration in Lung Cancer (**Medical physics 50 (11), 6864-6880**)
- ChatABL: Abductive Learning via Natural Language Interaction with ChatGPT (arXiv:2304.11107)
- Differentiate ChatGPT-generated and Human-written Medical Texts (arXiv:2304.11567)
- Fine-grained Artificial Neurons in Audio-transformers for Disentangling Neural Auditory Encoding (**ACL 2023**)
- Community Graph Convolution Neural Network for Alzheimer's Disease Classification and Pathogenetic Factors Identification (**accepted by IEEE TNNLS; impact factor = 11.683**)
- **Radiology-GPT: A Large Language Model for Radiology (under review by EMNLP 2023)**
- **Artificial General Intelligence for Medical Imaging (invited submission to IEEE Reviews in Biomedical Engineering, CiteScore = 27.8)**
- **CohortGPT: An Enhanced GPT for Medical Diagnosis (under review by EMNLP 2023)**
- **Zero-shot Relation Triplet Extraction as Next-Sentence Prediction (under review by EMNLP 2023)**
- **AD-AutoGPT: An Autonomous GPT for Alzheimer's Disease Infodemiology (<https://arxiv.org/abs/2306.11892>; under review by American Journal of Public Health)**
- Fuzzy Hypergraph Generative Adversarial Network for Brain Disease Risk Prediction Using Imaging Genetic Data (**under review by IEEE TNNLS**)
- Surviving ChatGPT in Healthcare (**accepted by Frontiers in Radiology**)
- AGI for Agriculture (**under review by Computers and Electronics in Agriculture**)
- Beam mask and sliding window-facilitated deep learning-based accurate and efficient dose prediction for pencil beam scanning proton therapy (arXiv:2305.18572)
- Individual Functional Network Abnormalities Mapping via Graph Representation-based Neural Architecture Search (**ADMA 2023**)
- Exploring New Frontiers in Agricultural NLP: Investigating the Potential of Large Language Models for Food Applications (**IEEE Big Data, 2024**)
- Segment Anything Model (SAM) for Radiation Oncology (<https://arxiv.org/abs/2306.11730>)
- SAMAug: Point Prompt Augmentation for Segment Anything Model (<https://arxiv.org/abs/2307.01187>)
- Review of Large Vision Models and Visual Prompt Engineering (<https://arxiv.org/abs/2307.00855>)
- Differentiating brain states via multi-clip random fragment strategy-based interactive bidirectional recurrent neural network (**accepted by Neural Networks; impact factor = 9.657**)
- Exploring Multimodal Approaches for Alzheimer's Disease Detection Using Patient Speech Transcript and Audio Data (**accepted by the Brain Informatics 2023**)
- A generic framework for embedding human brain function with temporally correlated autoencoder (**accepted by Medical Image Analysis; impact factor = 13.828**)
- **PharmacyGPT: The AI Pharmacist (<https://arxiv.org/abs/2307.10432>)**
- CohortGPT: An Enhanced GPT for Participant Recruitment in Clinical Study (**under review by AAAI 2023**)
- **RadLLM: A Comprehensive Healthcare Benchmark of Large Language Models for Radiology (under review by Nature Machine Intelligence; impact factor = 25.898)**
- A deep learning method for autism spectrum disorder identification based on interactions of hierarchical brain networks (**accepted by Behavioural Brain Research; impact factor = 3.352**)
- Structure Mapping Generative Adversarial Network for Multi-view Information Mapping Pattern Mining (**under review by IEEE Transactions on Pattern Analysis and Machine Intelligence; impact factor = 24.314; major revision**)
- **Radiation Oncology NLP Database (under review by AAAI 2023)**
- Mapping Dynamic Spatial Patterns of Brain Function with Spatial-wise Attention (**under review by Journal of Neural Engineering**)
- Survey on Individual Differences in Visualization. **Computer Graphics Forum (EuroVis 2020)**, 39: 693-712.
- Let's Gamble: How a Poor Visualization Can Elicit Risky Behavior (**IEEE VIS 2020**).
- Icons are Best: Ranking Visualizations for Proportion Estimation (**IEEE VIS 2019 poster**).
- Artificial General Intelligence for Radiation Oncology (Meta-radiology, 100045)
- Functional brain network identification and fMRI augmentation using a VAE-GAN framework (**Computers in Biology and Medicine**)
- Benchmarking a foundation LLM on its ability to re-label structure names in accordance with the AAPM TG-263 report (**Practical Radiation Oncology, 2024**)

- ChatRadio-Valuer: A Chat Large Language Model for Generalizable Radiology Report Generation Based on Multi-institution and Multi-system Data (<https://arxiv.org/abs/2310.05242>)
- A Deep Learning Method for Autism Spectrum Disorder Identification Based on Interactions of Hierarchical Brain Networks (SSRN)
- Tailoring Large Language Models to Radiology: A Preliminary Approach to LLM Adaptation for a Highly Specialized Domain (MICCAI-MLMI, **International Workshop on Machine Learning in Medical Imaging**, 464-473)
- Transformation vs Tradition: Artificial General Intelligence (AGI) for Arts and Humanities (<https://arxiv.org/abs/2310.19626>)
- Structure Mapping Generative Adversarial Network for Multi-view Information Mapping Pattern Mining (**IEEE Transactions on Pattern Analysis and Machine Intelligence**)
- Evaluating Large Language Models in Ophthalmology (<https://arxiv.org/abs/2311.04933>)
- Evaluating multiple large language models in pediatric ophthalmology (<https://arxiv.org/abs/2311.04368>)
- Evaluating the potential of leading large language models in reasoning biology questions (<https://arxiv.org/abs/2311.07582>)
- Holistic evaluation of gpt-4v for biomedical imaging (<https://arxiv.org/abs/2312.05256>)
- Noisy probing dose facilitated dose prediction for pencil beam scanning proton therapy: physics enhances generalizability (<https://arxiv.org/abs/2312.00975>)
- Chat2brain: A method for mapping open-ended semantic queries to brain activation maps (2023 IEEE International Conference on Bioinformatics and Biomedicine (BIBM))
- Ophtha-llama2: A large language model for ophthalmology (<https://arxiv.org/abs/2312.04906>)
- Multimodality of ai for education: Towards artificial general intelligence (<https://arxiv.org/abs/2312.06037>)
- Review of large vision models and visual prompt engineering (Meta-Radiology, 100047)
- On the promises and challenges of multimodal foundation models for geographical, environmental, agricultural, and urban planning applications (arXiv preprint arXiv:2312.17016)
- Differentiating ChatGPT-Generated and Human-Written Medical Texts: Quantitative Study (JMIR Medical Education 9 (1), e48904)
- Understanding llms: A comprehensive overview from training to inference (<https://arxiv.org/abs/2401.02038>)
- Large language models for robotics: Opportunities, challenges, and perspectives (<https://arxiv.org/abs/2401.04334>)
- Trustllm: Trustworthiness in large language models (**ICML 2024**)
- Assessing Large Language Models in Mechanical Engineering Education: A Study on Mechanics-Focused Conceptual Understanding (<https://arxiv.org/abs/2401.12983>)
- The Radiation Oncology NLP Database (<https://arxiv.org/abs/2401.10995>)
- Revolutionizing finance with llms: An overview of applications and insights (<https://arxiv.org/abs/2401.11641>)
- Beam mask and sliding window-facilitated deep learning-based accurate and efficient dose prediction for pencil beam scanning proton therapy (Medical Physics 51 (2), 1484-1498)
- Generalizable and promptable artificial intelligence model to augment clinical delineation in radiation oncology (Medical Physics, 2024)
- LLMs for Coding and Robotics Education (<https://arxiv.org/abs/2402.06116>)
- Reasoning before Comparison: LLM-Enhanced Semantic Similarity Metrics for Domain Specialized Text Analysis (<https://arxiv.org/abs/2402.11398>)
- Mapping dynamic spatial patterns of brain function with spatial-wise attention (Journal of Neural Engineering)
- ALDM-Grasping: Diffusion-aided Zero-Shot Sim-to-Real Transfer for Robot Grasping (<https://arxiv.org/abs/2403.11459> ; submitted to IROS 2024)
- Eye-gaze Guided Multi-modal Alignment Framework for Radiology (submitted to NeurIPS 2024)
- Polaris: A Safety-focused LLM Constellation Architecture for Healthcare (<https://arxiv.org/abs/2403.13313>)
- Instruction-ViT: Multi-modal prompts for instruction learning in vision transformer (Information Fusion 104, 102204)
- CE-GAN: Community Evolutionary Generative Adversarial Network for Alzheimer's Disease Risk Prediction (IEEE Transactions on Medical Imaging)

SKILLS

Programming Languages: Python, JavaScript, PHP, C/C++, MATLAB, LaTeX, R

AI & Machine Learning: PyTorch, Tensorflow, Keras, OpenCV, CUDA, Hugging Face transformers, scikit-learn, NLTK

Data Visualization: D3.js, Tableau, seaborn, plotly, Matplotlib, PowerBI

Data Science: pandas, NumPy, SciPy, dplyr (in R), Hadoop, Apache Spark

Backend/Deployment: Amazon AWS, Docker, Redis, MySQL, Postgres, Jenkins

LLM Inference: SGLang, vLLM, Lepton

Past Mentees

David Liu: High school → Princeton University (undergraduate)

Siyi Luo: Xi'an Jiaotong University (undergraduate) → Xi'an Jiaotong University (master's program)

Yiwei Li: Southeast University → University of Georgia (PhD program)

Yue Huang → Sichuan University → Lehigh University (PhD program)