Shuyue Jia (Bruce)

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Contact Information

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Special Notice: **United States F-1 CPT Available** & Hong Kong Resident with the IANG Working VISA

Research Statement

I am a Ph.D. candidate working on

- **Multimodal Foundation Models**, *e.g.*, Large Vision-Language Models (VLMs), for Medical Applications
- **Visual and Language Multimodal Learning**
- **Large Language Models (LLMs)** for Medical Applications
- **Retrieval-Augmented Generation (RAG)**, **Tool Using**, and **Automate Workflows**
- **Generative AI**, *e.g.*, Diffusion Probabilistic Models

My ultimate goal is to **develop safe, reliable, and extensible Artificial General Intelligence (AGI) systems** that can improve human lives. As part of my research, I actively develop open-source software, toolkits, and machine/deep learning libraries. I am also interested in creating new benchmark databases to further advance the field. Source codes of all my works will be shared on GitHub, the trained models and datasets will be released on 🤗 Hugging Face, and some of my applied research on Vision and Language will be developed as **products**.

Academic Appointments

Boston University, MA, USA **Research Assistant** May 2024 - Present

- Supervisor: Prof. Vijaya B. Kolachalama
- Projects: Multimodal Learning, Foundation Models, Generative AI, and Medical Imaging with AI

City University of Hong Kong, Hong Kong **Research Assistant** Sept 2021 - Apr 2023

- Supervisor: Prof. Shiqi Wang
- Projects: Image Quality Assessment (IQA) and Perceptual Optimization

Education

Boston University, Boston, MA, USA Sept 2023 - May 2028 (expected)

- Ph.D. Candidate in Computer Engineering, Department of Electrical and Computer Engineering
- Supervisor: Prof. Vijaya B. Kolachalama
- Expertise: Foundation Models, Generative Models, Vision and Language Multimodal Learning, Medical Imaging

City University of Hong Kong, Hong Kong May 2021 - June 2023

- M.Phil. in Computer Science, Department of Computer Science
- Supervisor: Prof. Shiqi Wang
- Expertise: Image Quality Assessment, Perceptual Optimization, and Deep Learning
- Thesis: No-reference Image Quality Assessment via Non-local Modeling

University of California, Irvine, Irvine, CA, USA Jul - Sept 2017

- Visiting Student, Department of Computer Science
- Selected coursework: Computer Systems and Architecture (A+), University Writing and Communication (Pass)

Peer-reviewed Publications

Journal Publications

- MedPodGPT: A Multilingual Audio-augmented Large Language Model for Medical Research and Education
  Shuyue Jia, Subhrangshu Bit, Edward Searls, Lindsey Claus, Pengrui Fan, Varuna Jasodanand, Meagan Lauber, Divya Veerapaneni, William Wang, Rhoda Au, Vijaya B. Kolachalama * [Product] [Paper] [Codes]
  Under Submission

- MedSyn: Text-guided Anatomy-aware Synthesis of High-Fidelity 3D CT Images [Paper] [Codes]
  Yanwu Xu, Li Sun, Wei Peng, **Shuyue Jia**, Katelyn Morrison, Shyam Visweswaran, Motahhare Eslami, Kayhan Batmanghelich *
  IEEE Transactions on Medical Imaging (IEEE T-MI, ***IF in 2024: 8.9****)*

- GCNs-Net: A Graph Convolutional Neural Network Approach for Decoding Time-resolved EEG Motor Imagery Signals [Paper] [Codes] [Slides] [Survey]
  Shuyue Jia, Yimin Hou, Xiangmin Lun, Ziqian Hao, Yan Shi, Yang Li, Rui Zeng, Jinglei Lv *
  IEEE Transactions on Neural Networks and Learning Systems (IEEE T-NNLS)
  IF in 2022: 14.255, Top 0.1% most cited articles published in Engineering in 2022
  GitHub Repo obtained **900+ stars and 200+ forks**

- Deep Feature Mining via Attention-based BiLSTM-GCN for Human Motor Imagery Recognition
  Shuyue Jia *, Yimin Hou, Xiangmin Lun, Shu Zhang, Tao Chen, Fang Wang, Jinglei Lv [Paper] [Codes] [Slides]
  Frontiers in Bioengineering and Biotechnology
  IF in 2021: 6.064, Top 1% most cited articles published in Engineering in 2022

- A Novel Approach of Decoding EEG Four-Class Motor Imagery Tasks via Scout ESI and CNN [Paper] [Codes]
  Yimin Hou, Lu Zhou *, **Shuyue Jia**, Xiangmin Lun
  Journal of Neural Engineering
  IF in 2020: 5.379, Top 1% most cited articles published in Engineering in 2020
  GitHub Repo obtained **190+ stars and 40+ forks**

- PMU Measurements based Short-term Voltage Stability Assessment of Power Systems via Deep Transfer Learning [Paper]
  Yang Li *, Shitu Zhang, Yuanzheng Li, Jiting Cao, **Shuyue Jia**
  IEEE Transactions on Instrumentation and Measurement (IEEE T-IM)
  IF in 2023: 5.6, Top 1% most cited articles published in Engineering in 2023

- Learning from Mixed Datasets: A Monotonic Image Quality Assessment Model [Paper] [Codes]
  Zhaopeng Feng, Keyang Zhang, **Shuyue Jia**, Baoliang Chen, Shiqi Wang *
  IET Electronics Letters
  Top 10% most cited articles published in Engineering in 2023

- Improving Performance: A Collaborative Strategy for the Multi-data Fusion of Electronic Nose and Hyperspectral to Track the Quality Difference of Rice [**E** Paper]
  Yan Shi, Hangcheng Yuan, Chenao Xiong, **Shuyue Jia**, Jingjing Liu, Hong Men *
  Sensors & Actuators: B. Chemical
  IF in 2021: 9.221, Top 10% most cited articles published in Engineering

Conference and Workshop Publications

- No-reference Image Quality Assessment via Non-local Dependency Modeling [Paper] [Codes] [Slides] [Poster]
  Shuyue Jia, Baoliang Chen, Dingquan Li, Shiqi Wang *
  IEEE 24^{th} *International Workshop on Multimedia Signal Processing (IEEE MMSP'22)* (**Poster Presentation**)

Thesis

- No-reference Image Quality Assessment via Non-local Modeling [Permanent Link] [Defense Slides]
  Shuyue Jia
  M.Phil. Thesis, City University of Hong Kong, May 2023.

- Brain-computer Interface Signals Classification and Its Applications based on Deep Learning Methods
  Outstanding Thesis Award [Related Publication] [Defense Slides]
  Shuyue Jia
  B.Eng. Thesis, Northeast Electric Power University, May 2020.

Note:

1. Google Scholar Profile
2. * denotes the Corresponding Author

Research Experience

Continual Pre-training of Large Language Models via Podcast Audio — Apr - Jul 2024

Mentor: Prof. Vijaya B. Kolachalama, Boston University

- Developed a computational framework designed to enhance **Large Language Models** leveraging the informational content of publicly accessible medical podcast data. [Product] [Paper] [Codes]
- Created and maintained GitHub Library **PodGPT**, a whole pipeline that consists of **Continual Pre-training**, **Low-Rank Adaptation (LoRA) for Efficient Fine-Tuning**, **Benchmarking**, and **Real-world Deployment**.

Non-local Modeling for Image Quality Assessment — May 2021 - Feb 2023

Mentor: Prof. Shiqi Wang, City University of Hong Kong

- Built a **Superpixel-based Graph Neural Network** model to explore the non-local interactions in quality prediction [Paper] [Codes]
- Presented the definitions of **Global Distortions** and **Local Distortions** for IQA. [Thesis] [Slides]

Graph Representation Learning for EEG-based BCI Classification — Oct 2018 - Feb 2020

Mentor: Prof. Yimin Hou, Northeast Electric Power University and Prof. Jinglei Lv, University of Sydney

- Introduced **Graph Modeling** and **Graph Representation Learning** to decode raw EEG signals by cooperating with the functional topological relationship of electrodes. [Paper] [Codes]

- Proposed a remarkably accurate and responsive recognition framework via **Bidirectional Long short-term Memory (BiLSTM)** with the **Attention Mechanism** and **Graph Neural Networks**. [Paper] [Codes]
- Created and maintained GitHub Library **EEG-DL** (**obtained 900+ stars and 200+ forks**), a Deep Learning library written by TensorFlow for EEG tasks classification.

Statistical Measures for Sonar Image Segmentation — June - Sept 2018

Mentor: Prof. Shengxi Jiao, Northeast Electric Power University

- Proposed a framework to enhance the contract between the ship and the reverberation area, which consists of **Image Filtering** by discrete cosine transform (DCT) → **Edge Detection** by the Roberts cross operator → **Object Localization** by thresholding 1D histogram → **Morphological Local Enhancement** by an expansion operator.
- Significantly improved the segmentation accuracy (86%) compared with that without the pre-processed stage (80%).
- A patent is issued based on the project and Codes.

Industry Experience

Philips Research, Shanghai, China — **Natural Language Processing Intern** — Jul - Oct 2020

Mentor: Dr. Shuang Zhou, Precision Diagnosis & Image Guided Therapy (PD&IGT) Department.

- **Medical Concept Mapping**: three levels to map a query to the standard term → **Byte-pair Encoding** and **FMM & BMM algorithms** for sub-words generation and matching (syntax-level), **Word2vec Cosine Similarity** (semantics-level), and **Knowledge Graph** (pragmatics-level).
- **Medical Named Entity Recognition**: compared the performances of different models → CRF++, Character-level BiLSTM + CRF, Character-level BiLSTM + Word-level BiLSTM / CNNs + CRF, and deployed the models using Flask and Docker as web apps.
- **Dynamic Webs Crawling**: crawled 620k pages from the NSTL via Python threading.

Open-source Projects

Software - **PodGPT** [Product] [Paper] [Codes]

- An online platform for deploying our latest multimodal foundation models for medical and clinical applications.

Library - **PodGPT Library** [Paper] [Code]

- A library for benchmarking multilingual medical Large Language Models (LLMs)

Library - **EEG Deep Learning Library** (**900+ stars and 200+ forks**) [Paper] [Code]

- A Deep Learning (DL) library written by TensorFlow for EEG tasks (signals) classification.

Toolkit - **PromptCraft** [Code] [PyPI Package]

- A prompt perturbation toolkit from the character, word, and sentence levels for prompt robustness analysis.

Benchmark Dataset - **GSM8K-Consistency** [Dataset (available on 🤗 Hugging Face)]

- A benchmark dataset for analyzing the consistency of Arithmetic Reasoning on GSM8K.

Awards and Services

Fellowships and Scholarships

Doctoral Research Fellowship, Boston University, USA — 2024 - 2028

Distinguished Computer Engineering Fellowship, Boston University, USA — 2023 - 2024

Research Assistantship, City University of Hong Kong, Hong Kong — 2021 - 2023

Innovation Scholarship, Northeast Electric Power University, China 2017 - 2019

Excellent Student Scholarship, Northeast Electric Power University, China 2016 - 2020

Mathematics and Physics Competition Awards

2019 Interdisciplinary Contest In Modeling, USA ***Honorable Mention Award*** [Thesis (English)] Apr 2019

2018 Mathematical Contest In Modeling, China ***First Prize*** [Thesis (Chinese)] Aug 2018

The 32^{nd} Chinese Physics Olympiad (CPhO), China ***Third Prize*** Oct 2015

2015 National High School Math League, China ***Second Prize*** Sept 2015

Academic Services

Speaker Program Chair, Keynotes and Panel Sessions, IEEE Local Conferences, Boston, USA 2024

Local Conference Committee Members, IEEE Boston Section, Boston, USA 2024

Invited Reviewer

More than 100 paper reviews

IEEE Transactions on Multimedia (T-MM)

IEEE Transactions on Circuits and Systems for Video Technology (T-CSVT)

IEEE Transactions on Neural Networks and Learning Systems (T-NNLS)

IEEE Transactions on Industrial Informatics (T-II)

IEEE Journal of Biomedical and Health Informatics (JBHI)

IEEE Open Journal of the Industrial Electronics Society (OJ-IES)

IEEE Open Journal of the Computer Society (OJ-CS)

IEEE MultiMedia (MM)

IEEE Sensors Journal

Journal of Medical Internet Research

The International Conference on Learning Representations (ICLR) 2025

Membership

China Computer Federation (CCF) Since 2017

Institute of Electrical and Electronics Engineers (IEEE) Since 2019

Association for Computing Machinery (ACM) Since 2019

Association for the Advancement of Artificial Intelligence (AAAI) Since 2022

ACM Special Interest Group on Artificial Intelligence (SIGAI) Since 2022

ACM Special Interest Group on Multimedia (SIGMM) Since 2022

ACM Special Interest Group on Computer Graphics (SIGGRAPH) Since 2023

ACM Special Interest Group on Security, Audit and Control (SIGSAC) Since 2023

Association for Computational Linguistics (ACL) Since 2023

American Association for the Advancement of Science (AAAS) Since 2023

Linguistic Society of America (LSA) Since 2023

American Medical Informatics Association (AMIA) Since 2024

Professional Skills

Coding: Python, MATLAB, C, R, HTML, CSS

Library: TensorFlow, PyTorch, Scikit-learn, Hugging Face (Transformers, PEFT, Datasets, etc.), vLLM

Tools: Git, SVN, Unix Shell, Vim, Markdown, LaTeX, Docker, K8s

Hardware: NVIDIA Jetson Nano (Ubuntu), Raspberry Pi (Raspbian OS), 80C52 Microcontroller (Embedded C)