GUANGTAO ZHENG

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SUMMARY

I specialize in machine learning and generative AI, with expertise spanning computer vision, natural language processing (NLP), and bioinformatics. My research focuses on enhancing model reliability by addressing superficial learning, including the detection and mitigation of spurious correlations, reasoning shortcuts, and alignment challenges.

EDUCATION

University of Virginia **Charlottesville, United States**
Doctor of Philosophy in Computer Science (4.0 / 4.0 GPA) Aug 2019 – Present
- Advisor: Aidong Zhang

University of Science and Technology of China **Hefei, China**
Master of Engineering in Electrical Engineering Sep 2015 – Jun 2018
- Advisor: Chen Gong

Sun Yat-Sen University **Guangzhou, China**
Bachelor of Science in Electrical Engineering Sep 2011 – Jun 2015
- Advisor: Ming Jiang

RESEARCH EXPERIENCE

AI Alignment from a Spurious Bias Perspective
University of Virginia Jan 2021 – Present
- Focus on aligning AI models with human cognitive capabilities by mitigating spurious bias in the models
- Developed data-centric approaches for spurious bias mitigation via novel data augmentation techniques
- Developed concept-centric approaches for spurious bias mitigation via vision-language models
- Developed model-centric approaches for spurious bias mitigation by exploiting neuron activations or prediction behaviors of models

Building Foundation Models for Genomics
University of Virginia Jul 2024 – Present
- Curate a large set of genomic intervals along with text descriptions for training large language models (LLMs)
- Design training algorithms to build mappings between genomic data and natural languages in LLMs
- Build a Retrieval Augmented Generation (RAG) based architecture for search relevant biology texts
- Fine-tune the trained LLMs to follow instructions tailored for various downstream tasks

Improving Multimodal Understanding of Vision-Language Models
University of Virginia Oct 2024 – Present
- Created a benchmark dataset to systematically evaluate multimodal understanding of large vision-language models
- Developed token-pruning methods to improve alignment between vision and language modalities

RECENT PUBLICATIONS

[ECCV'24] **Guangtao Zheng**, Wenqian Ye, and Aidong Zhang, Benchmarking Spurious Bias in Few-Shot Image Classifiers, *The 18th European Conference on Computer Vision (ECCV)*, 2024

[KDD'24] **Guangtao Zheng**, Wenqian Ye, and Aidong Zhang, Spuriousness-Aware Meta-Learning for Learning Robust Classifiers, *The 30th ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD)*, 2024

[IJCAI'24] **Guangtao Zheng**, Wenqian Ye, and Aidong Zhang, Learning Robust Classifiers with Self-Guided Spurious Correlation Mitigation, *The 33rd International Joint Conference on Artificial Intelligence (IJCAI)*, 2024

[NARGAB'24] **Guangtao Zheng**, Julia Rymuza, Erfaneh Gharavi, Nathan J LeRoy, Aidong Zhang, and Nathan C Sheffield, Methods for Evaluating Unsupervised Vector Representations of Genomic Regions, *Nucleic Acids Research Genomics and Bioinformatics*, 2024

[AAAI'24] **Guangtao Zheng**, Mengdi Huai, and Aidong Zhang, AdvST: Revisiting Data Augmentations for Single Domain Generalization, *The 38th Annual AAAI Conference on Artificial Intelligence (AAAI)*, 2024

[ICMLW'24] Wenqian Ye, **Guangtao Zheng**, Xu Cao, Yunsheng Ma, and Aidong Zhang, Spurious Correlations in Machine Learning: A Survey, *ICML Workshop on Data-Centric Machine Learning Research*, 2024

[WRBFM'24] Wenqian Ye, **Guangtao Zheng**, Yunsheng Ma, Xu Cao, Bolin Lai, James M. Rehg, and Aidong Zhang, MM-SpuBench: Towards Better Understanding of Spurious Biases in Multimodal LLMs, *NeurIPS Workshop on Responsibly Building the Next Generation of Multimodal Foundational Models*, 2024

[NARGAB'24] Nathan J LeRoy, Jason P Smith, **Guangtao Zheng**, Julia Rymuza, Erfaneh Gharavi, Donald E Brown, Aidong Zhang, and Nathan C Sheffield, Fast Clustering and Cell-Type Annotation of scATAC Data Using Pre-trained Embeddings, *Nucleic Acids Research Genomics and Bioinformatics*, 2024

[BioEng'24] Erfaneh Gharavi, Nathan J LeRoy, **Guangtao Zheng**, Aidong Zhang, Donald E Brown, and Nathan C Sheffield, Joint Representation Learning for Retrieval and Annotation of Genomic Interval Sets, *Bioengineering*, 2024

[NAR'24] Julia Rymuza, Yuchen Sun, **Guangtao Zheng**, Nathan J LeRoy, Maria Murach, Neil Phan, Aidong Zhang, and Nathan C Sheffield, Methods for Constructing and Evaluating Consensus Genomic Interval Sets, *Nucleic Acids Research*, 2024

[SDM'23] **Guangtao Zheng**, Qiuling Suo, Mengdi Huai, and Aidong Zhang, Learning to Learn Task Transformations for Improved Few-Shot Classification, *SIAM International Conference on Data Mining (SDM)*, 2023

[ICDM'22] **Guangtao Zheng**, and Aidong Zhang, Knowledge-Guided Semantics Adjustment for Improved Few-Shot Classification, *IEEE International Conference on Data Mining (ICDM)*, 2022

[ICDMW'21] **Guangtao Zheng**, and Aidong Zhang, Few-Shot Class-Incremental Learning with Meta-Learned Class Structures, *IEEE International Conference on Data Mining (ICDM) Workshop*, 2021

[Bioinfo'21] Erfaneh Gharavi, Aaron Gu, **Guangtao Zheng**, Jason P Smith, Hyun Jae Cho, Aidong Zhang, Donald E Brown, and Nathan C Sheffield, Embeddings of Genomic Region Sets Capture Rich Biological Associations in Lower Dimensions, *Bioinformatics*, 2021

[ACL'20] Hanjie Chen, **Guangtao Zheng**, and Yangfeng Ji, Generating Hierarchical Explanations on Text Classification via Feature Interaction Detection, *In Proceedings of the 58th Annual Meeting of the Association for Computational Linguistics (ACL)*, 2020

INVITED TALKS

- Microsoft Applied Research Talk Series, Mitigating Spurious Bias: Building AI Models with Generalizable Knowledge, March 10, 2025
- Standford @ Aghaeepour Laboratory, job talk on my research, including mitigating superficial learning and machine learning applications on Genomics, January 30, 2025
- Oracle Labs East, From Surface Learners to Deep Thinkers: Building AI Models with Generalizable Knowledge, December 18, 2024

SKILLS AND LANGUAGES

- **Languages**: English (Proficient), Chinese (Native)
- **Programming**: Python, MATLAB, C/C++, LaTeX, HTML, CSS, Typst
- **Packages**: PyTorch, Tensorflow, scikit-learn, Gensim, Numpy, Jupyter Notebook, matplotlib, SciPy, pandas
- **Deep Neural Networks**: ResNet, ViT, LLMs (e.g. BERT/Llama/GPTs), VLMs (e.g., CLIP, BLIP)
- **Miscellaneous**: GitHub, Hugging Face, AWS, Linux command line

HONORS AND AWARDS

AAAI 2024 Scholarship and Volunteer — **Vancouver, Canada**
Issued by *AAAI Conference on Artificial Intelligence* — Feb 2024

SDM 2023 Travel Award — **Minneapolis, United States**
Issued by *SIAM International Conference on Data Mining* — Apr 2023

ICDM 2022 Travel Award — **Orlando, United States**
Issued by *IEEE International Conference on Data Mining* — Dec 2022

Computer Science Fellowship — **Charlottesville, United States**
Issued by *University of Virginia* — Aug 2019

OTHERS

- **Reviewer**: IEEE BigData (2020), ACM BCB (2020), ICDM (2020, 2023), AAAI (2021, 2022), KDD (2024,2025), COLM (2024,2025), NeurIPS (2024,2025), ICLR (2025), AISTATS (2025), ICML (2025)
- **Teaching assistant**: Foundations of Data Analysis (CS4964, Spring 2022, University of Virginia), Cloud Computing (CS4740, Spring 2021, University of Virginia), Operating System (CS4414, Fall 2020, University of Virginia)