Aneesh Komanduri

CONTACT INFORMATION

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scholar.google.com/citations?user=IMtCc1QAAAAJ&hl=en

SUMMARY

I am currently a fourth-year Ph.D. student in Computer Science at the University of Arkansas researching robust and trustworthy Artificial Intelligence through the lens of causality. Specifically, my research currently focuses on causal representation learning and counterfactual generation with applications in trustworthy AI. I have published papers in prestigious conferences and journals such as IJCAI, ECAI, AAAI, and TMLR and served as a reviewer for several top-tier peer-reviewed conferences and journals, such as IJCAI, NeurIPS, ICML, ICLR, TMLR, and Pattern Recognition.

EDUCATION

University of Arkansas Fayetteville, Arkansas

Ph.D., Computer Science **2021 - 2026**

- **Advisor:** Dr. Xintao Wu

M.S., Computer Science, GPA: 4.0 **2021 - 2024**

- **Relevant Courses:** Statistical Methods, Regression Analysis, Machine Learning, Deep Learning, Computer Vision, Natural Language Processing, Advanced Information Retrieval, AI Ethics

B.S., Computer Science/Engineering & Applied Mathematics **2017 - 2021**

- Graduated *Summa Cum Laude*

SKILLS

- Languages: Python, C/C++, Java, Javascript, SQL
- ML Frameworks: PyTorch, Tensorflow, scikit-learn, Pyro
- Machine Learning: Large Language Models, Diffusion Probabilistic Models, Parameter Efficient Fine-tuning (e.g., LoRA), Variational Autoencoders, Normalizing Flows, Causality
- Technologies: Flask, Django, AWS, Databricks, Postgres, Apache Spark, ReactJS
- Applications: LaTeX, Jupyter Notebook, VSCode, PyCharm, Git, RStudio, MATLAB

RESEARCH EXPERIENCE

Social Awareness & Intelligent Learning Lab (SAIL) Fayetteville, Arkansas

Graduate Research Assistant **Oct 2021 - Present**

- Proposed theory and learning frameworks toward identifiable causal representation learning in the label-supervised setting using VAE and flow-based models
- Currently working on counterfactual generation via diffusion-based causal representation learning, applications of causal generative models in fairness-aware learning, and causality in large-scale generative models such as large language models (LLMs) and pre-trained diffusion models

Data Science & Artificial Intelligence Lab Fayetteville, Arkansas

Undergraduate Research Assistant **Aug 2019 - May 2021**

- Research focused on graph representation learning and using Bayesian methods to account for uncertainty in noisy graph data to improve node classification
- Designed and developed a cyber-argumentation discourse-based platform and utilized natural language processing and knowledge graph-based models for user opinion modeling

PEER-REVIEWED PUBLICATIONS

Aneesh Komanduri. "Toward Causal Generative Modeling: From Representation to Generation." *Proceedings of AAAI Conference on Artificial Intelligence (**AAAI**)*. 2025. (Doctoral Consortium)

Aneesh Komanduri, Chen Zhao, Feng Chen, and Xintao Wu. "Causal Diffusion Autoencoders: Toward Counterfactual Generation via Diffusion Probabilistic Models." *Proceedings of 27th European Conference on Artificial Intelligence (**ECAI**)*. 2024.

Aneesh Komanduri, Yongkai Wu, Feng Chen, and Xintao Wu. "Learning Causally Disentangled Representations via the Principle of Independent Causal Mechanisms." *Proceedings of the 33rd International Joint Conference on Artificial Intelligence (**IJCAI**)*, 2024.

Aneesh Komanduri, Xintao Wu, Yongkai Wu,and Feng Chen. "From Identifiable Causal Representations to Controllable Counterfactual Generation: A Survey on Causal Generative Modeling." *Transactions on Machine Learning Research (**TMLR**)*. 2024.

Aneesh Komanduri, Yongkai Wu, Wen Huang, Feng Chen, and Xintao Wu. "SCM-VAE: Learning Identifiable Causal Representations via Structural Knowledge." *IEEE International Conference on Big Data (**BigData**)*, 2022.

Aneesh Komanduri and Justin Zhan, "Neighborhood Random Walk Graph Sampling for Regularized Bayesian Graph Convolutional Neural Networks." *IEEE International Conference on Machine Learning and Applications (**ICMLA**)*, 2021.

Honors and Awards

1st Place Graduate Student Poster @ NSF 2024 DART Conference ($1,500) — Sep. 2024
Awarded by Arkansas Economic Development Commission (AEDC)

Doctoral Academy Fellowship ($48,000) — 2021-2025
University of Arkansas Graduate School and International Education

Congressional Letter for STEM Outreach — July 2021
U.S. House of Representatives

Lawrence Jesser Toll, Jr. Endowed Scholarship ($1,000) — 2020-2021
University of Arkansas Department of Mathematical Sciences

Silas Hunt Distinguished Scholarship ($32,000) — 2017-2021
University of Arkansas

Service

Conference Reviewer

- European Conference on Artificial Intelligence (ECAI'25)
- ACM SIGKDD Conference on Knowledge Discovery and Data Mining (KDD'25)
- Pacific-Asia Conference on Knowledge Discovery and Data Mining (PAKDD'25)
- International Joint Conference on Artificial Intelligence (IJCAI'25)
- International Conference on Machine Learning (ICML'25)
- International Conference on Learning Representations (ICLR'25)
- Conference on Neural Information Processing Systems (NeurIPS'24)
- Learning on Graphs Conference (LoG'24)
- IEEE International Conference on Machine Learning and Applications (ICMLA'24)

Journal Reviewer

- Transactions on Machine Learning Research (TMLR)
- International Journal of Data Science and Analytics (IJDSA)
- Pattern Recognition Journal
- IEEE Access

Workshop Reviewer

- Causality and Large Models Workshop (CaLM@NeurIPS'24)
- Structured Probabilistic Inference and Generative Modeling Workshop (SPIGM@ICML'24)

Teaching & Mentorship Experience

UNITE, Army Educational Outreach Program (AEOP) Fayetteville, Arkansas

Lead Research Mentor (`https://github.com/akomand/AEOP_Research_2021`) **2020, 2021**

- Guided High School students from underrepresented communities with research in data science
- Created lesson plans to teach data/text preprocessing, classification/regression, word embeddings, entity extraction, topic modeling, language models, transformers, implementations in Python, deep learning pipeline in PyTorch, and applications in question answering
- Assisted students in the development of a machine learning research paper and helped students present research to be evaluated by the Department of Defense education initiative

University of Arkansas Fayetteville, Arkansas

Teaching Assistant **Jan 2020 - Dec 2020**

- **Courses:** CSCE 2004 (Programming Foundations I) and CSCE 3193 (Programming Paradigms)
- Taught two lab sections weekly for a total of over 45 computer science & engineering students and held office hours for over 200 students
- Created, debugged, graded, and provided feedback on object-oriented and functional programming assignments (C++/Java/Python) and exams and held office hours for 200+ students

Industry Experience

Phillips 66 Bartlesville, Oklahoma

Digital Security and Cloud Engineering Intern **May 2020 - Aug 2020**

- Developed infrastructure as code templates with Terraform and built CI/CD pipelines for the creation of resources such as SQL Servers, Blob Storages, Key Vaults, and Firewall rules for Azure Data Factory in a production environment
- Automated the process of keeping inventory on cloud instance security group rules for accounts throughout the company by creating a Python script to pull data using the Dome9 REST API