Mahyar Khayatkhoei

Research Scientist, USC Information Sciences Institute
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Research Interests

Theory and application of generative models, multimodal large language models, visual question answering, bias and fairness, data-driven simulation and optimization.

Education

Rutgers University 2021
Ph.D. and M.Sc. in Computer Science
Thesis: Geometric and spectral limitations in generative adversarial networks
Advisor: Dr. Ahmed Elgammal

University of Tehran 2015
B.Sc. in Electrical Engineering
Thesis: Integrating model-based heuristics into model-free reinforcement learning
Advisor: Dr. Majid Nili Ahmadabadi

Professional Experience

California Institute of Technology, JPL 2024 – Present
Visiting Scholar
Modeling physical processes from unpaired data using physics-informed generative models

University of Southern California, Information Sciences Institute 2022 – Present
Research Scientist
Identifying and resolving limitations and biases in generative models

Liveperson 2021 – 2022
Research Scientist
Developing multimodal LLMs for generating intentful and controllable dialogues

Artrendex 2019
Research Intern
Re-identifying art pieces in large-scale cluttered pictures of art galleries

Verisk Analytics 2018
Research Intern
Table structure retrieval and recognition from images of documents

Rutgers University 2015 – 2021
Research Assistant and Teaching Assistant
Conducting research on limitations of deep neural networks, and holding recitations for graduate and undergraduate courses including machine learning, statistics, computer graphics, and computer architecture.

University of Tehran, Robotics and Artificial Intelligence Laboratory 2014 – 2015
Research Assistant
Fine displacement detection and measurement in earthquake test videos of structures

Honors and Awards

USC Institute for Creative Technologies Research Award ($190K) 2024
Role: Principal Investigator
Title: Reconstructing partially observable 3D structures with generative neural networks

USC ISI Exploratory Research Award ($100K) 2023
Role: Principal Investigator
Title: Will fiction trump fact? on the inevitability of identity inconsistency in deepfake videos

Best Paper Nominee at the AAAI Conference on Artificial Intelligence 2022
Title: Spatial frequency bias in convolutional generative adversarial networks

Best Poster Award in IEEE ICRoM Conference 2015
Title: A low-cost vision-based system for displacement analysis in earthquake research

Peer-Review Service

International Conference on Learning Representations (ICLR)	2022 – 2025
International Conference on Machine Learning (ICML) – Top-Reviewer	2021 – 2025
Advances in Neural Information Processing Systems (NeurIPS)	2021 – 2025
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)	2021
Science Advances	2025

Publications

[1] Zhang, Khayatkhoei, Chhikara, and Ilievski. MLLMs know where to look: Training-free perception of small visual details with multimodal LLMs. **International Conference on Learning Representations (ICLR)**, 2025. Link.

[2] Zhang, Hu, Khayatkhoei, Ilievski, and Sun. Exploring perceptual limitation of multimodal large language models. **Preprint arXiv:2402.07384**, 2024. Link.

[3] Li, Khayatkhoei, Zhu, Xie, Hussein, and AbdAlmageed. SABAF: Removing strong attribute bias from neural networks with adversarial filtering. **Preprint arXiv:2311.07141**, 2024. Link.

[4] Tian, Khayatkhoei, Mathai, and AbdAlmageed. Unsupervised multimodal deepfake detection using intra- and cross-modal inconsistencies. **Preprint arXiv:2311.17088**, 2024. Link.

[5] Zhu, Xie, Wu, Li, Khayatkhoei, Hussein, and AbdAlmageed. Shadow datasets, new challenging datasets for causal representation learning. **Preprint arXiv:2308.05707**, 2024. Link.

[6] Zhu, Xie, Wu, Li, Hussein, Khayatkhoei, and AbdAlmageed. Multi-scope representation learning for causal relation discovery with new challenging datasets. **British Machine Vision Conference (BMVC)**, 2024. Link.

[7] Song, Khayatkhoei, and AbdAlmageed. ManiFPT: Defining and analyzing fingerprints of generative models. **IEEE/CVF Conference on Computer Vision and Pattern Recognition (CVPR)**, 2024. Link.

[8] Zhang, Khayatkhoei, Chhikara, and Ilievski. Visual cropping improves zero-shot question answering of multimodal large language models. **NeurIPS Workshop on Robustness of Few-shot and Zero-shot Learning in Foundation Models**, 2023. Link.

[9] Li, Khayatkhoei, Zhu, Xie, Hussein, and AbdAlmageed. Information-theoretic bounds on the removal of attribute-specific bias from neural networks. **NeurIPS Workshop on Algorithmic Fairness through the Lens of Time**, 2023. Link.

[10] Song, Khayatkhoei, and AbdAlmageed. Formal definition of fingerprints improves attribution of generative models. **NeurIPS Workshop on Attributing Model Behavior at Scale**, 2023. Link.

[11] Khayatkhoei and Abdalmageed. Emergent asymmetry of precision and recall for measuring fidelity and diversity of generative models in high dimensions. **International Conference on Machine Learning (ICML)**, 2023. Link.

[12] Xie, Zhu, Khayatkhoei, Li, Hussein, and Abdalmageed. A critical view of vision-based long-term dynamics prediction under environment misalignment. **International Conference on Machine Learning (ICML)**, 2023. Link.

[13] Khayatkhoei and Elgammal. Spatial frequency bias in convolutional generative adversarial networks. **AAAI Conference on Artificial Intelligence**, 2022. Link.

[14] Khayatkhoei. *Geometric and spectral limitations in generative adversarial networks*. PhD thesis, **Rutgers, The State University of New Jersey**, 2021. Link.

[15] Berseth, Haworth, Usman, Schaumann, Khayatkhoei, Kapadia, and Faloutsos. Interactive architectural design with diverse solution exploration. **IEEE Transactions on Visualization and Computer Graphics (TVCG)**, 2019. Link.

[16] Khayatkhoei, Singh, and Elgammal. Disconnected manifold learning for generative adversarial networks. **Advances in Neural Information Processing Systems (NeurIPS)**, 2018. Link.

[17] Haworth, Usman, Berseth, Khayatkhoei, Kapadia, and Faloutsos. Code: Crowd-optimized design of environments. **Computer Animation and Virtual Worlds (CAVW)**, 2017. Link.

[18] Haworth, Usman, Berseth, Khayatkhoei, Kapadia, and Faloutsos. Using synthetic crowds to inform building pillar placements. **IEEE Virtual Humans and Crowds for Immersive Environments (VHCIE)**, 2016. Link.

[19] Haworth, Usman, Berseth, Khayatkhoei, Kapadia, and Faloutsos. Towards computer assisted crowd aware architectural design. **ACM Computer Human Interaction Conference Extended Abstracts on Human Factors in Computing Systems**, 2016. Link.

[20] Binaee, Khayatkhoei, Moradi, Nazemi, and Hosseini. A low-cost vision-based system for displacement analysis in earthquake research. **RSI International Conference on Robotics and Mechatronics (ICRoM)**, 2015. Link.

Mentoring

Jiarui Zhang – PhD student USC CS — 2022 – Present

Hae Jin (Hayley) Song – PhD student USC CS — 2022 – Present

Jiazhi Li – PhD student USC ECE — 2022 – Present

Mulin Tian – PhD student USC ECE — 2023 – Present

Technical Skills

Software

Python, PyTorch, Tensorflow, C/C++, Matlab, Mathematica, Git, Bash, CUDA, OpenCV, Unity3D, Blender, PHP, JavaScript, Verilog, Assembly, TEX, LATEX, MS Office, Adobe Creative Suite

Languages

English (Fluent), Persian (Native)