

Mahyar Khayatkhoei

Research Scientist, USC Information Sciences Institute
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<https://mahyarkoy.github.io>

Research Interests

Theory and application of generative models, multimodal large language models, visual question answering, bias and fairness, deepfake video detection, 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

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 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 – 2024
International Conference on Machine Learning (ICML) – Top-Reviewer Award	2021 – 2024
Advances in Neural Information Processing Systems (NeurIPS)	2021 – 2024
IEEE Transactions on Pattern Analysis and Machine Intelligence (TPAMI)	2021

Publications

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- [1] Zhang, [Khayatkhoei](#), Chhikara, and Ilievski. Towards perceiving small visual details in zero-shot visual question answering with multimodal LLMs. **Preprint arXiv:2310.16033**, 2024. [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, Bash, CUDA, OpenCV, Git, Unity3D, Blender, PHP, JavaScript, Verilog, Assembly, T_EX, L^AT_EX, MS Office, Adobe Creative Suite

Languages

English (Fluent), Persian (Native)