Minkyu **Choi**

Research Scientist · Research Engineer

Austin, TX

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Education

The University of Texas at Austin *2023 - Present*

Ph.D. in Electrical and Computer Engineering (Advisor: Sandeep Chinchali) *Austin, TX*

- **Research Interest:** Neuro-symbolic AI, Computer Vision, Computer Vision Assurance, Video Understanding
- **Courses:** Probability and Stochastic Processes, Generative Models in ML, Grounded NLP, Adv. Computer Vision

Georgia Institute of Technology *2018 - 2021*

M.S. in Analytics *Atlanta, GA*

- **Courses:** Deep Learning, Simulation, Big Data Analy, Computational Data Analy, High-Dimensional Data Analy

Baruch College *2014 - 2017*

B.B.A in Computer Information System *New York, NY*

Publication

Conference

[CoRL] **M. Choi***, Y, Yang*, N. P. Bhatt*, K. Gupta, S. Shah, A. Rai, D. Fridovich-Keil, U. Topcu, and S. Chinchali. "Privacy-Constrained Video Streaming." (Under Review) *2024*

[ECCV] **M. Choi**, H. Goel, M. Omama, Y. Yang, Sahil Shah, and S. Chinchali. "Towards Neuro-Symbolic Video Understanding." (Accepted for oral presentation) [Project][PDF][Code] *2024*

[IROS] A. Narayanan, P. Kasibhatla, **M. Choi**, P. Li, R. Zhao, and S. Chinchali. "PEERNet: An End-to-End Profiling Tool for Real-Time Networked Robotic Systems." [PDF][Code] *2024*

[CoDIT] T. T. Walker, J. S. Ide, **M. Choi**, M. Guarino, and K. Alcedo. "Multi-Agent Reinforcement Learning with Epistemic Priors." [PDF] *2023*

[ICUAS] **M. Choi***, M. Filter*, K. Alcedo, T. T. Walker, D. Rosenbluth, and J. S. Ide. "Soft actor-critic with inhibitory networks for retraining UAV controllers faster." [PDF] *2022*

Preprint

[arXiv] **M. Choi***, S. P. Sharan*, S. Shah, H. Goel, M. Omama, and S. Chinchali. "Neuro-Symbolic Evaluation of Text-to-Video Models using Formal Verification." [PDF] *2024*

[arXiv] S., Jonathan, S. Wanna, **M. Choi**, and M. Pryor. "Temporal and Semantic Evaluation Metrics for Foundation Models in Post-Hoc Analysis of Robotic Sub-tasks." [PDF] *2024*

Experience

Lockheed Martin *2021 - Present*

Staff AI Research Engineer and Scientist *Remote, USA*

- Led research and development of LLM applications for tactical operations and planning, investigating advanced techniques (e.g., task decomposition, planning, reflection, memory, symbolic extraction); developed a real-time Retrieval Augmented Generation (RAG) system featuring multimodal sensory inputs and collaborative tools to support human operators in dynamic environments; managed +10 engineers
- Architected intelligent cognitive system with RL agents for UAS, integrating Computer Vision System and Cognitive Signal System; developed agents for Man and Unman Teaming (MUM-T) ISR tasks; designed in-house RL distributed training engine
- Developed a neuro-symbolic radar target classification system for automated inference of behaviors and intentions across radar tracks

Chief Digital and Artificial Intelligence Office *2019 - 2021*

Subject Matter Expert in AI *Washington, D.C.*

- **Architected and implemented DoD AI/ML infrastructure:** Designed the foundation for DoD's AI/ML platform, formulated AI/ML OPS strategy incorporating DevSecOps best practices, and developed sustainable end-to-end data and machine learning pipelines to automate data engineering and model development processes across multiple cloud environments (AWS, Azure) for various security levels. [JCF101] [JCF Video]
- **Developed AI/ML applications in critical DoD missions:** Supported US Army and Marine Corps' predictive maintenance initiatives, provided technical guidance on AI/ML implementation across 5+ DoD Mission Areas, and developed the data strategy for the Joint Common Foundation (JCF), showcasing expertise in applying AI solutions to diverse military operations.
- **Established enterprise-wide data governance and security frameworks:** Designed and developed multi-cloud data ingestion pipelines to meet stringent data security requirements across different network levels, produced an Enterprise Data Governance Framework for the Joint Artificial Intelligence Center (JAIC) aligned with DoD CIO and CDO data strategies, ensuring cohesive and secure data management. [News]

TechField LLC *2018 - 2019*

Big Data Engineer & Data Scientist *Atlanta, GA*

- Managed +10 consultants in the big data and data science team, supporting projects such as a cloud data pipeline solution and an automated application platform with a machine learning system; worked with Fortune 500 clients in order to accomplish a goal of the data pipeline project for the entire batch and streaming processing and achieved a cost reduction and efficient processing time

Endpoint Clinical *2018*

Data Engineer *Remote, USA*

- Worked as a back-end database developer of IRT system – providing integrated solutions of clinical trials (e.g., patient record, drug supply management, and site management) in order to provide technical solutions for large size of pharmaceutical clients

Argus Information and Advisory Services *2016 - 2017*

Data Analyst Intern *White Plains, New York*

- Developed strategies, best practices, and technical requirements to improve data manipulation and analysis by querying millions of rows of data across multiple databases, using MS SQL Server to identify and resolve data issues, and leveraging large sets of data to define benchmark models to enable client's objectives to better manage data and drive insights

Research Project

2024 **Text as Compressed Representation for Image Retrieval [PDF],** The University of Texas at Austin *Austin, TX*

2024 **Diffusion Based Adaptive Video Compression [PDF],** The University of Texas at Austin *Austin, TX*

2019 **Rule-based Phenotyping vs Unsupervised Phenotyping via Clustering,** Georgia Institute of Technology *Atlanta, GA*

2018 **Mortality Prediction – Classification,** Georgia Institute of Technology *Atlanta, GA*

Award

2023-25 **Cockrell School of Engineering Fellowship,** The University of Texas at Austin *Austin, TX*

Presentation

The 18th European Conference on Computer Vision ECCV 2024 *2024*

Towards Neuro-Symbolic Video Understanding *Milano, Italy*

AI Summit at Lockheed Martin *2024*

End-To-End Multi-Agent Generative Reward Pipeline (MA-GRPL) *Remote, USA*

LG AI Tech Connect *2024*

Research Spotlight Presentation *San Francisco, CA*

Korea Polytechnic University *2023*

Roadmap to Becoming an Artificial Intelligence Researcher *Incheon, S. Korea*

AI Summit at Lockheed Martin *2023*

Incorporating Terrain into Mission Planning using LLM Agents *Remote, USA*

Deploying Field of view Control RL agent to UAS

Skill

AI/ML	Pytorch, TensorFlow, Jax, OpenCV, OpenAI Gym, Ray
Dev & ML Ops	AWS, Azure, Docker, Podman, Kubernetes, CI/CD, Airflow, Kubeflow
Data Engineering	Hortonworks, Cloudera, RDBMS, NoSQL (Cassandra, HBase, Elasticsearch, DynamoDB, MongoDB), Spark, Kafka, Flink, Flume HDFS, MapReduce, Hive, Sqoop, Oozie, Airflow, Nifi, Kibana
Programming	Python, R, Scala, Java, LaTeX

Service

Reviewing ICRA (2024), CASE (2024)