

Fatemeh Lotfi

AI & ML RESEARCHER · REINFORCEMENT LEARNING · LARGE LANGUAGE MODELS · MULTIMODAL SYSTEMS

Clemson, South Carolina, USA

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Summary

Experienced AI researcher specializing in reinforcement learning, large language models (LLMs), multimodal systems, and representation learning. Proven expertise developing scalable AI methods for complex decision-making and optimization tasks, with publications in top-tier conferences and journals. Open to roles applying advanced AI techniques across diverse domains.

Education

Doctor of Philosophy in Electrical & Computer Engineering

Clemson University

Aug. 2022 - Nov. 2025 (Expected)

Clemson, SC

Master of Science in Electrical & Computer Engineering

University of Tehran

Skills

- **Programming:** Python, MATLAB
- **Deep Learning:** TensorFlow, PyTorch, Keras
- **Data Science:** Pandas, Numpy, Scikit-Learn, Jupyter
- **Tools:** Git, Docker, OpenAI Gym, MATLAB Simulink
- **Scientific Writing and Visualization:** Matplotlib, \LaTeX
- **Machine Learning Domains:** Reinforcement Learning (DRL, MARL), Foundation Models, LLMs, Prompt Learning, Representation Learning, Transfer Learning
- **Mathematics:** Probability, Stochastic Process, Statistics, Linear Algebra, and Optimization
- **Soft Skills:** Collaboration, Communication, Adaptability, Leadership, Critical thinking

Research Projects

LLM-Augmented Reinforcement Learning for Dynamic Decision-Making

Clemson University

Aug. 2024 - Present

Clemson, SC

- Developed a modular framework integrating domain-specific and general-purpose LLMs to support RL agents through context-aware prompting.
- Designed a dual-prompt learning mechanism that combines static domain-informed inputs with trainable prompt tokens for adaptable decision-making in dynamic environments.
- Implemented transformer-based models, including BERT, to extract contextual embeddings for adaptive prompt tuning and decision-making.
- Investigating improvements in sample efficiency and policy generalization across multi-agent RL tasks.
- The framework enables flexible multi-agent interaction and supports transferability across domains in complex decision-making systems.

Meta-Learning for Generalized Policy Optimization

Clemson University

Aug. 2023 - Present

Clemson, SC

- Designed a Model-Agnostic Meta-Learning (MAML) framework for improving generalization across diverse tasks.
- Applied few-shot learning principles using PyTorch Lightning to boost cross-task adaptability in non-stationary environments.
- Utilized Pandas, and PySpark for preprocessing interaction logs and training data streams.

Multi-Agent Deep Reinforcement Learning for Coordinated Decision-Making

Clemson University

Aug. 2022 - Present

Clemson, SC

- Designed a sharpness-aware optimization strategy to stabilize multi-agent DRL training and enhance policy robustness.
- Demonstrated significant improvements in convergence speed and generalization across complex multi-task scenarios.
- Results under review at *IEEE Transactions on Machine Learning in Communications and Networking* as "Sharpness-Aware O-RAN Resource Management Using Multi-Agent Reinforcement Learning."

Deep Metric Learning for Robust Feature Extraction

Clemson University

Aug. 2022 - May. 2023

Clemson, SC

- Engineered a contrastive loss framework for learning high-quality embeddings in low-data regimes.
- Applied this to imbalanced classification problems and validated improvements in class-wise F1-score and embedding separability.

Inverse Reinforcement Learning for Reward Modeling

Aug. 2022 - Aug. 2023

Clemson University

Clemson, SC

- Trained an IRL agent using expert trajectory data to infer optimal reward functions for unknown environments.
- Applied to sequential decision-making with real-world-inspired behavior policies.

Attention-Based Multi-Task Learning with Transformer Architectures

Jan. 2023 - Dec. 2023

Clemson University

Clemson, SC

- Applied attention mechanisms for adaptive loss weighting in RL frameworks, enabling dynamic prioritization across tasks in multi-agent settings, and leveraging shared transformer-based encoders for enhanced coordination.
- Achieved harmonized task optimization and reduced dominant modality bias.

Time-Series Forecasting using LSTM Networks

Aug. 2022 - Aug. 2023

Clemson University

Clemson, SC

- Implemented LSTM and GRU-based architectures to model user behavior trends and traffic dynamics.
- Preprocessed real-world sequence data using pandas and PySpark, optimizing prediction accuracy for long-tail temporal dependencies.

Semantic-Aware Reinforcement Learning for Contextual Decision Making

Jan. 2021 - Aug. 2022

University of Colorado Colorado Springs

Colorado Springs, CO

- Developed context-aware RL models that improve decision efficiency in dynamic environments through semantic feature extraction.

Work Experience

R&D Engineer

Sep 2013 - Sep 2020

Sepehr Co.

Tehran

- Applied advanced signal processing techniques (noise cancellation, Kalman filtering) to optimize system performance.
- Collaborated across teams and adapted to evolving technical needs.

Publication

- P1 **F. Lotfi**, H. Rajoli, F. Afghah, "ORAN-GUIDE: RAG-Driven Prompt Learning for LLM-Augmented Reinforcement Learning in O-RAN Network Slicing", *Under review at IEEE JSAC 2025*.
- P2 **F. Lotfi**, H. Rajoli, F. Afghah, "Prompt-Tuned LLM-Augmented DRL for Dynamic O-RAN Network Slicing", *Under review at IEEE ICASSB 2026*.
- P3 H. Rajoli, **F. Lotfi**, H. Kashiani, N. Alipour, & F. Afghah, (2025, Feb.). SAMPLE: Sharpness Aware Minimization based Prompt Learning for Vision Language Models. *Under review at WACV 2025*.
- P4 **F. Lotfi**, H. Rajoli, F. Afghah, "LLM-Augmented Deep Reinforcement Learning for Dynamic O-RAN Network Slicing", *IEEE ICC*, 2025.
- P5 **F. Lotfi**, H. Rajoli, F. Afghah, "Sharpness-Aware O-RAN Resource Management Using Multi-Agent Reinforcement Learning", *Under Review at IEEE TMLCN*, 2025.
- P6 **F. Lotfi**, F. Afghah, "Meta Reinforcement Learning Approach for Adaptive Resource Optimization in O-RAN", *IEEE WCNC*, 2025.
- P7 **F. Lotfi**, et al. "Joint path planning and power allocation of a cellular-connected uav using apprenticeship learning via deep inverse reinforcement learning." *Computer Networks* 254 (2024): 110789.
- P8 **F. Lotfi**, F. Afghah, "Open RAN LSTM Traffic Prediction and Slice Management using Deep Reinforcement Learning", *Asilomar Conference on Signals, Systems, and Computers*, Pacific Grove, CA, 2023.
- P9 **F. Lotfi**, F. Afghah, J. Ashdown, "Attention-based Open RAN Slice Management using Deep Reinforcement Learning", *IEEE GLOBECOM*, Kuala Lumpur, Malaysia, 2023.
- P10 H. Rajoli, **F. Lotfi**, A. Atyabi, and F. Afghah, "Triplet Loss-less Center Loss Sampling Strategies in Facial Expression Recognition Scenarios." *CISS*, 2023.
- P11 **F. Lotfi**, O. Semiari, and F. Afghah, "Evolutionary Deep Reinforcement Learning for Dynamic Slicing Management in O-RAN", *IEEE GLOBECOM*, 2022.
- P12 **F. Lotfi**, O. Semiari, and W. Saad, "Semantic-Aware Collaborative Deep Reinforcement Learning Over Wireless Cellular Networks", *IEEE ICC*, 2022.
- P13 **F. Lotfi** and O. Semiari, "Performance Analysis and Optimization of Uplink Cellular Networks with Flexible Frame Structure", *IEEE VTC 2021-Spring*.