Navid Rezazadeh

Machine Learning Research | AI Research | Generative Models, LLMs, and Scientific Computing

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Research Profile

Machine learning research engineer with a Ph.D. in optimization and stochastic systems. I work on LLM robustness and decoding, generative modeling, time-series learning, and GPU-accelerated scientific computing. My research combines mathematical modeling, careful empirical validation, and production-quality experimentation for ML/AI systems.

Experience

Apple

San Diego, CA

Machine Learning Research Engineer — *Jun 2022 – Present*

- **Transformer Forecasting:** Developed modified transformer-based models for short-horizon prediction on high-resolution time-series signals.
- **System Inference:** Built customized deep learning methods to infer multidimensional system behavior from single-dimensional measurements.
- **Generative Modeling:** Built customized GAN and generative modeling workflows to produce data matching real-data distributions.
- **GPU Scientific Computing:** Accelerated large-scale ML and simulation pipelines with vectorized GPU-accelerated compute.
- **Vertex-Softmax:** Developed an exact softmax optimization method that yields tighter certified bounds for transformer verification than standard relaxation-based approaches; open-sourced at github.com/navidrezazad/VertexSoftmax.
- **Geometry-Aware Decoding:** Co-developed a geometry-aware LLM decoding algorithm combining Wasserstein-regularized truncation with mass penalties to produce more reliable generation; ICML 2026 spotlight.
- **Backtracking Dynamics:** Investigated backtracking behavior and reasoning dynamics in LLMs and proposed early-exit criteria for efficient generation.

University of California, Irvine

Irvine, CA

Graduate Research Assistant — *Jun 2016 – Jun 2022*

- **Learning for Control:** Developed learning methods for stable control policies using offline data.
- **Probabilistic Estimation:** Built estimation and localization methods for noisy networked systems.
- **Distributed Optimization:** Developed algorithms for multi-agent decision making with provable guarantees.
- **Private Networked Systems:** Designed privacy-preserving consensus methods.

Education

University of California, Irvine — 2017 – 2022

Ph.D. Mechanical & Aerospace Engineering, GPA 3.99/4.00

Thesis: Distributed Strategy Selection Over Graphs: Optimality and Privacy

University of California, Irvine — 2016 – 2017

M.S. Mechanical & Aerospace Engineering, GPA 4.00/4.00

Sharif University of Technology — 2010 – 2014

B.S. Mechanical Engineering, GPA 3.85/4.00

Selected Coursework: Deep Learning and Sequence Models; Probabilistic Learning; Bayesian Data Analysis; Advanced Estimation and Detection; Convex Optimization; Advanced Optimization Methods; Algorithms; Stochastic Processes; Real Analysis; Linear Algebra; Advanced Calculus; Optimal Control.

Core Technical Skills

ML/AI: LLM decoding, transformer verification, sequence models, generative models, simulator surrogates, time-series learning, calibration, model validation.

Mathematics: Optimization, stochastic processes, graph algorithms, control and estimation, linear algebra, Monte Carlo methods.

Research engineering: Python, GPU acceleration, vectorized scientific computing, reproducible experiments, large-scale model and simulation workflows.

Publications and Manuscripts

[1] **arXiv** *Vertex-Softmax: Tight Transformer Verification via Exact Softmax Optimization.*
Navid Rezazadeh and Arash Gholami.

[2] **arXiv** *Backtracking Dynamics and Early Exit.*
Navid Rezazadeh, Arash Gholami, and Pouya Pezeshkpour.

[3] **ICML 2026 (spotlight)** *Geometry-Aware Decoding with Wasserstein-Regularized Truncation and Mass Penalties for LLMs.*
Arash Gholami Davoodi, **Navid Rezazadeh**, Seyed Pouyan Mousavi Davoudi, and Pouya Pezeshkpour.

[4] **IEEE RA-L, 2022; NeurIPS SafeRL Best Paper Award** *Learning Contraction Policies From Offline Data.*
Navid Rezazadeh, Maxwell Kolarich, Solmaz S. Kia, and Negar Mehr.

[5] **IEEE TCNS, 2024** *A Study of Privacy Preservation in Average Consensus Algorithm via Deterministic Obfuscation Signals.*
Navid Rezazadeh and Solmaz S. Kia.

[6] **Automatica, 2023** *Distributed Strategy Selection: A Submodular Set Function Maximization Approach.*
Navid Rezazadeh and Solmaz S. Kia.

[7] **IEEE CDC, 2022** *Distributed Submodular Maximization: Trading Performance for Privacy.*
Navid Rezazadeh and Solmaz S. Kia.

[8] **Automatica, 2021** *A Sub-Modular Receding Horizon Solution for Mobile Multi-Agent Persistent Monitoring.*
Navid Rezazadeh and Solmaz S. Kia.

[9] **IEEE CDC, 2021** *Multi-Agent Maximization of a Monotone Submodular Function via Maximum Consensus.*
Navid Rezazadeh and Solmaz S. Kia.

[10] **IFAC-PapersOnLine, 2019** *A Sub-Modular Receding Horizon Approach to Persistent Monitoring for a Group of Mobile Agents Over an Urban Area.*
Navid Rezazadeh and Solmaz S. Kia.

[11] **arXiv, 2019** *Privacy Preservation in Continuous-Time Average Consensus Algorithm via Deterministic Additive Obfuscation Signals.*
Navid Rezazadeh and Solmaz S. Kia.

[12] **ACC, 2018** *Privacy Preservation in a Continuous-Time Static Average Consensus Algorithm Over Directed Graphs.*
Navid Rezazadeh and Solmaz S. Kia.

Honors

- NeurIPS SafeRL Best Paper Award
- Holmes Fellowship, UCI MAE
- Samueli Endowed Fellowship, UCI
- Iran National Elite Foundation Fellowship
- Semifinalist, Iran National Physics and Mathematics Olympiads
- Ranked 250th among 300,000+ in Iran national university entrance exam