Aria Masoomi

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Boston, MA, USA

Education

- **Northeastern University** *Sep 2019 - Dec 2024*
  Ph.D. in Electrical and Computer Engineering Boston, USA
  - **Advisor**: Professor Jennifer Dy
  - **Thesis Title:** Making Deep Neural Networks Transparent
  - **GPA**: 4.00/4.0

- **Northeastern University** *Sep 2022 - Aug 2025*
  Ph.D. in Mathematics Boston, USA
  - **Advisor**: Professor Milen Yakimov
  - **Thesis Title:** Poisson Geometry of Flag Varieties and Representation Theory of their Quantum Deformations
  - **GPA**: 4.00/4.0

- **Northeastern University** *Sep 2017 - Aug 2019*
  M.S. in Electrical and Computer Engineering Boston, USA
  - **GPA**: 3.96/4.0

- **Sharif University of Technology** *Sep 2012 - Aug 2017*
  B.Sc. in Electrical Engineering Tehran, Iran
  - **GPA**: 3.7/4.0
  - **With Minor in Mathematical science**

Experience

- **ECE Department, Northeastern University** *Sep 2017 - Aug 2024*
  Graduate Research Assistant USA
  - Interpretability of black box models is often complicated and needs a prodigious amount of analysis. Our collaboration with Harvard medical school enables us to study the applicability of our methods on biomedical data, where we focus on developing novel learning algorithms to aid in the discovery of subtypes of a lung disease called Chronic Obstructive Pulmonary Disease (COPD).

- **Math Department, Northeastern University** *Sep 2024 - Aug 2025*
  Graduate Research Assistant USA
  - Classifying irreducible representations of the Quantum function algebra at a root of unity for partial flag varieties G/P_I, where G is a simply connected, semisimple algebraic group over a field K of characteristic 0, and ε is a primitive ℓ^{th} root of unity for ℓ an odd positive integer, and $\ell \geq 3$. Our approach involves descending the action of $O_\varepsilon(G/P_I)$ to a specific Normal Quantum Solvable algebra and employing techniques to classify the irreducible representations of such algebras.

- **Astar (Institute for Infocomm Research)** *May 2016 - Aug 2016*
  Researcher Singapore
  - Efficient WLAN connection of a client, moving from one access point to another with sensor assistance and power-efficient real-time WLAN data transfer. Setting up a WiFi module and measuring the power profile of WL1837MOD WlinkTM. Using sensors (accelerometer) for Motion detection by machine learning algorithms. Using sensors for detecting heart rate and breath rate.

- **ECE Department of Sharif University** *Sep 2015 - May 2017*
  Teaching Assistant Iran
  - Lab assistance for Principles of Electronics Course.

Honors and Awards

- **Best Ph.D. Thesis Award** *2025*
  Poisson Geometry of Flag Varieties and Representation Theory of their Quantum Deformations Mathematics
- **Ph.D. Spotlight** *2024*
  Computer Engineering and Mathematics Northeastern University
- **ICLR Spotlight Paper** *2022*
  Explanations of Black-Box Models based on Directional Feature Interactions ($\sim 5\%$ of submissions)
- **NeurIPS Spotlight Paper** *2021*
  Reliable Estimation of KL Divergence using a Discriminator in Reproducing Kernel Hilbert Space ($\sim 5\%$ of submissions)
- **Singapore International Pre-Graduate Award (SIPGA)** *2016*
  *A*STAR*
- **Among the best B.Sc. Thesis of Electrical Engineering Department** *2017*
  Sharif University of Technology
- **Ranked 58th (top 0.5%) in Iran University Entrance Exam for B.Sc. Degree** *2012*

Publications

C=Conference, J=Journal, P=Patent, S=In Submission, T=Thesis

[C.1] Max Torop, **Aria Masoomi**, et al. **DISCO: Disentangled Communication Steering for Large Language Models**. In *Proceedings of Conference on Neural Information Processing Systems (NeurIPS)* 2025.

[C.2] Davin Hill, Brian L. Hill, **Aria Masoomi**, et al. **OrdShap: Feature Position Importance for Sequential Black-Box Models**. In *Proceedings of Conference on Neural Information Processing Systems (NeurIPS)* 2025.

[C.3] Davin Hill, **Aria Masoomi**, et al. **Boundary-Aware Uncertainty for Feature Attribution Explainers**. In *International Conference on Artificial Intelligence and Statistics (AISTATS)* 2024.

[C.4] Zulqarnain Q. Khan, Davin Hill, **Aria Masoomi**, et al. **Analyzing Explainer Robustness via Probabilistic Lipschitzness of Prediction Functions**. In *Proceedings of International Conference on Artificial Intelligence and Statistics (AISTATS)* 2024.

[C.5] Max Torop*, **Aria Masoomi***, et al. **SmoothHess: ReLU Network Feature Interactions via Steins Lemma**. In *Proceedings of Conference on Neural Information Processing Systems (NeurIPS)* 2023.

[C.6] Ashutosh Singh, Ashish Singh, **Aria Masoomi**, et al. **Inv-Senet: Invariant Self Expression Network for Clustering Under Biased Data**. In *Proceedings of IEEE International Conference on Acoustics, Speech and Signal Processing (ICASSP)* 2023.

[C.7] **Aria Masoomi**, et al. **Explanations of black-box models based on directional feature interactions**. In *Proceedings of International Conference on Learning Representations (ICLR)* 2022.

[C.8] Chieh Wu*, **Aria Masoomi***, et al. **Deep Layer-wise Networks Have Closed-Form Weights**. In *Proceedings of International Conference on Artificial Intelligence and Statistics (AISTATS)* 2022.

[C.9] Sandesh Ghimire, **Aria Masoomi**, Jennifer Dy. **Reliable estimation of kl divergence using a discriminator in reproducing kernel hilbert space**. In *Proceedings of Conference on Neural Information Processing Systems (NeurIPS)* 2021.

[C.10] Zifeng Wang*, Tong Jian*, **Aria Masoomi**, et al. **Revisiting Hilbert-Schmidt Information Bottleneck for Adversarial Robustness**. In *Proceedings of Conference on Neural Information Processing Systems (NeurIPS)* 2021.

[C.11] **Aria Masoomi***, Chieh Wu*, et al. **Instance-wise Feature Grouping**. In *Proceedings of Conference on Neural Information Processing Systems (NeurIPS)* 2020.

[J.1] Élie Casbi, **Aria Masoomi**, Milen Yakimov. **The Poisson degeneracy locus of a flag variety**. In *Mathematische Zeitschrift* 2025.

[J.2] Md Navid Akbar, Mathew Yarossi, Sumientra Rampersad, Kyle Lockwood, **Aria Masoomi**, et al. **M2M-InvNet: Human Motor Cortex Mapping From Multi-Muscle Response Using TMS and Generative 3D Convolutional Network**. In *IEEE Transactions on Neural Systems and Rehabilitation Engineering* 2024.

[J.3] Rahul Suryadevara, Andrew Gregory, Robin Lu, Zhonghui Xu, **Aria Masoomi**, et al. **Blood-based transcriptomic and proteomic biomarkers of emphysema**. In *American Journal of Respiratory and Critical Care Medicine* 2024.

[J.4] Tingting Zhao, Zifeng Wang, **Aria Masoomi**, Jennifer Dy. **Deep Bayesian Unsupervised Lifelong Learning**. In *Neural Networks* 2022.

[J.5] Rahul Suryadevara, Andrew Gregory, **Aria Masoomi**, et al. **Blood transcriptomics-based machine learning prediction of emphysema in smokers**. In *CHEST Journal* 2021.

[J.6] Zifeng Wang, **Aria Masoomi**, et al. **Improved prediction of smoking status via isoform-aware RNA-seq deep learning models**. In *PLOS Computational Biology* 2021.

[J.7] AR El Boueiz, JG Dy, JC Ross, **Aria Masoomi**, et al. **Deep learning prediction of COPD progression using enriched densitometry phenotypes**. In *B101. Advances in COPD Pathogenesis* 2019.

[J.8] Qianfan Wu, Adel Boueiz, Alican Bozkurt, **Aria Masoomi**, et al. **Deep learning methods for predicting disease status using genomic data**. In *Journal of biometrics & biostatistics* 2018.

[T.1] **Aria Masoomi**. **Making Deep Neural Networks Transparent**. *Northeastern University*. 2024.

[T.2] **Aria Masoomi**. **Poisson Geometry of Flag Varieties and Representation Theory of Their Quantum Deformations**. *Northeastern University*. 2025.

Invited Talks

- **Maurice Auslander Distinguished Lectures and International Conference** — *Apr 2025*
  Woods Hole Oceanographic Institution — Woods Hole, MA
  Topic: Irreducible representations of quantum flag varieties at roots of unit
- **Joint Mathematics Meetings (JMM)** — *Jan 2025*
  Seattle Convention Center — Seattle, WA
  Topic: Irreducible Representations of Quantum Flag Varieties at Roots of Unity
- **Data to Actionable Knowledge Lab** — *Oct 2024*
  Harvard University — Cambridge, MA
  Topic: ReLU Network Feature Interactions via Steins Lemma: SmoothHess
- **American Mathematical Society (AMS)** — *Apr 2024*
  Howard University — Washington, DC
  Topic: Schemes of point modules of quantum flag varieties
- **American Mathematical Society (AMS)** — *Oct 2023*
  University of South Alabama — Mobile, AL
  Topic: Schemes of point modules of quantum flag varieties
- **American Mathematical Society (AMS)** — *May 2023*
  California State University — Fresno, CA
  Topic: Schemes of point modules of quantum flag varieties
- **Maurice Auslander Distinguished Lectures and International Conference** — *Apr 2023*
  Woods Hole Oceanographic Institution — Woods Hole, MA
  Topic: Schemes of point modules of quantum flag varieties
- **COPDGene Disease Progression Workshop** — *Jan 2021*
  Topic: From Prediction to Subtypes — Virtual
- **COPDGene Deep Learning Workshop and Investigators Meeting** — *Nov 2018*
  Topic: Classifying Smoking Status by Deep Neural Networks — Denver, CO

Leadership & Services

- **Summer School Organizer** — *2025*
  Machine Learning for Mathematicians and Physicists Summer School, Northeastern University
- **Conference Reviewer** — *2025*
  Advances in Neural Information Processing Systems (NeurIPS)
- **Conference Reviewer** — *2024*
  Association for the Advancement of Artificial Intelligence (AAAI)
- **Conference Reviewer** — *2021*
  Advances in Neural Information Processing Systems (NeurIPS)
- **Conference Reviewer** — *2021*
  Society for Artificial Intelligence and Statistics (AISTATS)

Skills

- **Programming Languages:** Python, MATLAB, C, C++, Maccaulay2, SageMath
- **Data Science & Machine Learning:** PyTorch, pandas, NumPy, scikit-learn, LaTeX
- **Version Control:** Git