LESIA SEMENOVA

lesia.semenova@rutgers.edu | https://lesiasemenova.github.io | Google Scholar

My ***theoretical*** work creates a foundation for the existence of accurate simpler, including interpretable, machine learning models. I introduced a new simplicity measure of a learning problem and proposed first methods to measure the Rashomon set (the set of equally well-performing models), which enabled the shift in the machine learning community towards model multiplicity and underspecification. My ***applied*** work with immunologists has led to understanding of how cannabis affects the immune system of people with HIV. Student teams that I've coached have won the ASA Data Challenge Expo (twice) and placed third in a competition on a scholarly document processing.

RESEARCH INTERESTS

Responsible and Trustworthy AI, Interpretability, Model Multiplicity, Machine Learning, Human-Centered Design, AI in Healthcare, Reinforcement Learning, Reasoning.

EMPLOYMENT HISTORY

Assistant Professor, Rutgers University, New Brunswick, NJ, USA — July 2025 – Present
Department of Computer Science

Postdoctoral Researcher, Microsoft Research, NYC, USA — July 2024 – June 2025
Machine Learning Team

Research Intern, Pinterest Labs, Palo Alto, CA, USA — Summer 2020, Summer 2021
Applied Science Team

Software Engineer, Samsung R&D Institute, Kyiv, Ukraine — 2012 – 2014
Interaction Lab, Augmented Reality Team

EDUCATION

Duke University, Durham, NC, USA
Ph.D. in Computer Science — 2016 – 2024
Advisors: Cynthia Rudin, Ronald Parr

Taras Shevchenko National University of Kyiv, Kyiv, Ukraine
MS in Applied Mathematics — 2012 – 2014
BS in Applied Mathematics — 2008 – 2012

PUBLICATIONS

Google Scholar
(* denotes equal contributions)

1 Bohdan Turbal, Iryna Voitsitska, **Lesia Semenova**. ElliCE: Efficient and provably robust algorithmic recourse via the Rashomon sets. *Neural Information Processing Systems (NeurIPS), 2025 (**Spotlight**).*

2 Ethan Hsu, Tony Cao, **Lesia Semenova**, Chudi Zhong. The Rashomon set is all you need: A framework for analyzing trustworthiness of trees under multiplicity. *Neural Information Processing Systems (NeurIPS), 2025.*

3 Dennis Tang, Jon Donnelly, Alina Jade Barnett, **Lesia Semenova**, Jin Jing, Peter Hadar, Ioannis Karakis, Olga Selioutski, Kehan Zhao, M. Brandon Westover, Cynthia Rudin. This EEG looks like these EEGs: Interpretable interictal epileptiform discharge detection with ProtoEEG-kNN. *International Conference on Medical Image Computing and Computer Assisted Intervention (MICCAI), 2025*

— A workshop version appeared at *2023 Workshop on Medical Imaging meets NeurIPS*

4 Gaurav Rajesh Parikh, Jenny Huang, Albert Sun, **Lesia Semenova**, Cynthia Rudin. Navigating progress: Enhancing public transit for more equitable communities via interpretable causal inference. *Harvard Data Science Review, 2025*

— A workshop version appeared at *NeurIPS 2022 Workshop on Causality for Real-world Impact*

— ***Won 2022 American Statistical Association Data Challenge Expo Student Competition***

5 Chloe Qinyu Zhu, Muhang Tian, **Lesia Semenova**, Jiachang Liu, Jack Xu, Joseph Scarpa, Cynthia Rudin. Fast and Interpretable Mortality Risk Scores for Critical Care Patients. *Journal of the American Medical Informatics Association (JAMIA), 2025*

6 Zachery Boner*, Harry Chen*, **Lesia Semenova***, Ronald Parr, Cynthia Rudin. Using noise to infer aspects of simplicity without learning. *Neural Information Processing Systems (NeurIPS), 2024.*

7 Cynthia Rudin, Chudi Zhong, **Lesia Semenova**, Margo Seltzer, Ronald Parr, Jiachang Liu, Srikar Katta, Jon Donnelly, Harry Chen, Zachery Boner. Amazing things come from having many good models. *International Conference on Machine Learning (ICML), 2024 (**Spotlight**).*

8 Siong Thye Goh*, **Lesia Semenova***, Cynthia Rudin. Sparse density trees and lists: an interpretable alternative to high-dimensional histograms. *INFORMS Journal on Data Science (IJDS), 2024.*

9 **Lesia Semenova**, Yingfan Wang, Shane Falcinelli, Nancie Archin, Alicia D Cooper-Volkheimer, David M Margolis, Nilu Goonetilleke, David M Murdoch, Cynthia D Rudin, Edward P Browne. Machine learning approaches identify immunologic signatures of total and intact HIV DNA during long-term antiretroviral therapy**.** *eLIFE, 2024*

10 **Lesia Semenova**, Harry Chen, Ronald Parr, Cynthia Rudin. A path to simpler models starts with noise. *Neural Information Processing Systems (NeurIPS), 2023.*

11 **Lesia Semenova**, Cynthia Rudin, Ronald Parr. On the existence of simpler machine learning models. *ACM Conference on Fairness, Accountability, and Transparency (FAccT), 2022.*

12 Cynthia Rudin, Chaofan Chen, Zhi Chen, Haiyang Huang, **Lesia Semenova**, Chudi Zhong. Interpretable machine learning: fundamental principles and 10 grand challenges. *Statistics Surveys, 2022.*

WORKSHOPS AND PREPRINTS

13 Ronald Parr, Cynthia Rudin, Harry Chen, Zachery Boner, Michal Moshkovitz, **Lesia Semenova**. Transition Noise Facilitates Interpretability. *Workshop on Interpretable Policies in Reinforcement Learning @RLC-2024*

14 Alex Oesterling, Angikar Ghosal, Haoyang Yu, Rui Xin, Yasa Baig, **Lesia Semenova**, Cynthia Rudin. Multitask learning for citation purpose classification. *Second Workshop on Scholarly Document Processing, ACL, 2021.*
— Won third place in 3C Shared Task Competition

15 Yingfan Wang, German G Gornalusse, David A Siegel, Alton Barbehenn, Rebecca Hoh, Jeffrey Martin, Frederick Hecht, Christopher Pilcher, **Lesia Semenova**, David M Murdoch, David M Margolis, Claire N Levy, Keith R Jerome, Cynthia D Rudin, Florian Hladik, Steven G Deeks, Sulggi A Lee, Edward P Browne. NF-κB dependent gene expression and plasma IL-1β, TNFα and GCSF drive transcriptomic diversity and CD4: CD8 ratio in people with HIV on ART. *bioRxiv, 2025*.

INVITED TALKS

Joint Statistics Meetings (JSM)	2025
18th International Joint Conference on Computational and Financial Econometrics (CFE) and Computational and Methodological Statistics (CMStatistics)	2024
INFORMS Annual Meeting	2024
Theory of Interpretable AI Seminar	2024
The 25th International Symposium on Mathematical Programming	2024
Johns Hopkins University, Applied Physics Lab, AI/ML seminar	2024
Oden Institute, UT Austin	2024
Lawrence Livermore National Laboratory	2024
Microsoft Research	2024
Conference on Information Sciences and Systems (CISS)	2023
Joint Statistics Meetings (JSM), Near-Optimization Topic-Contributed session	2021
INFORMS Annual Meeting	2020

SELECTED AWARDS AND HONORS

Top Reviewer at ICML	2025
PhD Dissertation Award from the Department of Computer Science at Duke University	2024
Rising Stars in Computational and Data Science, University of Texas at Austin	2024
1st place in American Statistical Association Data Challenge Expo Student Competition	2023
1st place in American Statistical Association Data Challenge Expo Student Competition	2022
3rd place in 3C Shared Task Competition	2021
SAMSI Fellowship	2018

Duke CS Department Fellowship	2016 – 2018
Scholarship of Mayor of Kyiv	2012 – 2014
Scholarship of Zavtra.UA competition	2012-2013 and 2013 – 2014
Scholarship of Academic Council of Taras Shevchenko National University	2011 – 2012
Scholarship of President of Ukraine	2008 – 2009

ADVISING AND MENTORING

Michael Xi, PhD Student, Rutgers
Shihan Feng, master, Duke University
Zach Boner, PhD Student, Duke University
Harry Chen, undergraduate, Duke University (now PhD student at MIT)
Ethan Hsu, undergraduate, Duke University (now at Amazon)
Tony Cao, undergraduate, Duke University

Research mentor in the RAI for Ukraine academic research program:
Bogdan Turbal, undergraduate, Taras Shevchenko National University of Kyiv (now PhD at Princeton)
Iryna Voitsitska, undergraduate, Ukrainian Catholic University

Former Advisees
Dennis Tang, undergraduate, Duke University (now research intern at Duke)
Chloe Zhu, undergraduate, Duke University (now PhD student at Duke)
Muhang (Tony) Tian, undergraduate, Duke University (now PhD student at NYU)
Flora Shi, undergraduate, Duke University (now PhD student at MIT)

Co-instructor for Duke Data Science teams that participated in various Data Science competitions
(9 teams total, 29 Duke undergraduate students)

TEACHING

Certificate in College Teaching, Duke Graduate School
Formal pedagogical training in the college teaching.

Institute of Advanced Study, Teaching Assistant
2022 Program for women and mathematics: "The Mathematics of Machine Learning"
Terng Lecture Course on Interpretable Machine Learning — May 2022

Duke University, Teaching Assistant

CS474, Data Science Competition	SP23, SP22, SP21
CS571, Probabilistic Machine Learning	SP18
— TA Award Honorable Mention	
CS101, Introduction to Computer Science	SP17

SERVICE

Organizer:
Interpretable AI: Past, Present and Future **Workshop @ NeurIPS 2024**
Navigating Model Uncertainty and the Rashomon Effect: From Theory and Tools to Applications and Impact **Workshop @ AAAI 2026**

Tutorial Presenter:
From Underspecification to Alignment: Breaking the One-Model Mindset for Reliable AI @ AAAI 2026

Area Chair:
NeurIPS: 2025 (position paper track)

Reviewer:
NeurIPS: 2024, 2025
ICLR: 2025
AISTATS: 2025
ICML: 2025
KDD: 2025
Journals: JMLR, Patterns, ACM Journal on Responsible Computing

Workshops: DeepMath (2022, 2023), International Workshop on Advances in Interpretable Machine Learning and Artificial Intelligence (2021, 2022, 2023)

Panelist:

Microsoft Research Undergraduate Internship 2024

Mentor:

Women in Machine Learning Workshop @ NeurIPS 2024
"Artificial Intelligence for Art and Fun" capstone event as a part of Duke's FEMMES+ (Females and Allies Excelling More in Math, Engineering, and Science) outreach program to introduce young female students (4^{th}-6^{th} grade) to math, science, and engineering 2021
RAI4Ukraine research program 2024-Present

Chair:

INFORMS Annual Meeting session "Emerging Trends in Interpretable Machine Learning" 2024
Discussion series "Controversial Topics in Precision Medicine and Learning" (collaboration between SAMSI and Duke Computer Science) 2019

Volunteer:

Procurement manager at "Razom for Ukraine" nonprofit 2022-2023
KDD 2017
ICML 2019
Study Zone tutor at King County Library System (provided homework help to K-12 students) 2015

Student Assistant:

NSF-sponsored Seamless/Seamful Human Technology Interaction (HTI) Workshop May 2021
Graduate student committee member for the Faculty Search and Prospective Student Visits for the Department of Computer Science, Duke University 2016–2019

Alumni of ComSciCon Triangle (science communication workshop for graduate students) 2018

Head of Scientific Association of Students and Postgraduates of Taras Shevchenko National University of Kyiv 2012 – 2013