Jon **Donnelly**

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Summary

I develop interpretable machine learning tools for high-stakes applications, with an emphasis on medical applications. I have introduced methods with impact across many settings:

- I built new tools for interpretable neural networks [4, CVPR; 10, NeurIPS], including a tool to enable domain experts to customize models in seconds [1, CVPR] and a tool-based interpretable LLM [17].;
- My tools for principled variable importance [3, NeurIPS Spotlight; 8, AAAI Oral] uncovered new genes that affect HIV expression [3];
- I introduced a new image marker that interpretably predicts future breast cancer development with near-state-of-the-art accuracy through bilateral dissimilarities, thereby leveraging an interpretable neural network for scientific discovery [2, Radiology];

Education

Duke University
PHD IN COMPUTER SCIENCE

Durham, NC

2022 - 2026

- NSF Graduate Research Fellow (2023 - Present)

University of Maine
BS IN COMPUTER SCIENCE, WITH HIGHEST HONORS; GPA 4.0/4.0

Orono, ME

2018 - 2022

Published Papers

* – Co-first authors; † – Mentored student

SELECTED PAPERS

1. **Jon Donnelly**, Zhicheng Guo, Alina Jade Barnett, Hayden McTavish, Chaofan Chen, Cynthia Rudin. Rashomon Sets for Prototypical-Part Networks: Editing Interpretable Models in Real-Time. CVPR, 2025. [link]
2. **Jon Donnelly**, Luke Moffett, Alina Jade Barnett, Hari Trivedi, Fides Shwarts, Joseph Lo, Cynthia Rudin. AsymMirai: Interpretable Breast Cancer Risk Prediction from Mammograms. Radiology, 2024. (Fifth most viewed paper in Radiology, 2024; highlighted in an editorial by Vivianne Freitas) [link]
3. **Jon Donnelly***, Srikar Katta*, Cynthia Rudin, Edward P. Browne. Getting RID of Single Model Explanations: The Rashomon Importance Distribution. NeurIPS, 2023 (Spotlight). [link]
4. **Jon Donnelly**, Alina Jade Barnett, Chaofan Chen. Deformable ProtoPNet: An Interpretable Image Classifier Using Deformable Prototypes. CVPR, 2022. [link]

OTHER PUBLISHED PAPERS

5. Samuel Waggoner†, **Jon Donnelly**, Rose Gurung, Laura Jackson, Chaofan Chen. Creating interpretable deep learning models to identify species using environmental DNA sequences. Nature Scientific Reports, 2025. [link]
6. Luke Moffett, Alina Jade Barnett, **Jon Donnelly**, Fides Regina Schwartz, Hari Trivedi, Joseph Lo, Cynthia Rudin. Multi-site validation of an interpretable model to analyze breast masses. PLoS One, 2025. [link]
7. Hayden McTavish*, Zachery Boner*, **Jon Donnelly***, Margo Seltzer, Cynthia Rudin. Leveraging Predictive Equivalence in Decision Trees. ICML, 2025. [link]
8. Ishaan Maitra†, Raymond Lin†, Eric Chen, **Jon Donnelly**, Sanja Šćepanović, Cynthia Rudin. How Your Location Relates to Health: Variable Importance and Interpretable Machine Learning for Environmental and Sociodemographic Data. AAAI, 2025. (Oral Presentation) [link]
9. Hayden McTavish*, **Jon Donnelly***, Margo Seltzer, Cynthia Rudin. Interpretable Generalized Additive Models for Datasets with Missing Values. NeurIPS, 2024. [link]
10. Chiyu Ma, **Jon Donnelly**, Wenjun Liu, Soroush Vosoughi, Cynthia Rudin, Chaofan Chen. Interpretable Image Classification with Adaptive Prototype-based Vision Transformers. NeurIPS, 2024. [link]
11. 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. ICML, 2024 (Spotlight). [link]
12. Julia Yang†, Alina Jade Barnett, **Jon Donnelly**, Satvik Kishore, Jerry Fang, Fides Regina Schwartz, Chaofan Chen, Joseph Y Lo, Cynthia Rudin. FPN-IAIA-BL: A Multi-Scale Interpretable Deep Learning Model for Classification of Mass Margins in Digital Mammography. CVPR DEF-AI-MIA Workshop, 2024. [link]
13. Dennis Tang†, Frankie Willard†, Ronan Tegerdine†, Luke Triplett†, **Jon Donnelly**, Luke Moffett, Lesia Semenova, Alina Jade Barnett, Jin Jing, Brandon Westover, Cynthia Rudin. ProtoEEGNet: An Interpretable Approach for Detecting Interictal Epileptiform Discharges. Medical Imaging Meets NeurIPS workshop, 2023. (Oral Presentation) [link]
14. **Jon Donnelly** and Peter Stechlinski. Analyzing the Influence of Agents in Trust Networks: Applying Nonsmooth Eigensensitivity Theory to a Graph Centrality Problem. SIAM Journal on Matrix Analysis and Applications 44 (3), 1271-1298. [link]
15. 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. MICCAI, 2025. [link]

ACCEPTED PAPERS

16. Ruixin Zhang†, **Jon Donnelly**, Zhicheng Guo, Ghazal Khalighinejad, Haiyang Huang, Alina Jade Barnett, Cynthia Rudin. It's LIT! LLMs with Interpretable Tools. Multi-Turn Interactions in Large Language Models Workshop @ NeurIPS, 2025.

SUBMITTED PAPERS

17. **Jon Donnelly***, Srikar Katta*, Emanuele Borgonove, Cynthia Rudin. Doctor Rashomon and the UNIVERSE of Madness: Variable Importance with Unobserved Confounding and the Rashomon Effect. Under Review, 2025.

Honors & Awards

2025	**Membership**, Sigma Xi Honor Society
2025	**Oral Presentation**, AAAI
2024	**Graduate Research Fellowship**, National Science Foundation
2024	**Spotlight Presentation**, ICML
2023	**Spotlight Presentation**, NeurIPS
2023	**Oral Presentation**, Medical Imaging Meets NeurIPS Workshop
2022	**Membership**, Phi Beta Kappa Honor Society
2022	**Outstanding Senior in Computer Science**, University of Maine
2018	**National Merit Award**, University of Maine
2018	**Semi-Finalist**, National Merit Scholarship

Media

2025	The CSR Journal. Hency Thacker, *AI Predicts Breast Cancer Five Years Before It Develops* [link]
2024	The Radiology Podcast. *Interpretable Deep Learning Model for Breast Cancer Risk Prediction* [link]
2024	RSNA News. *Researchers Develop Deep Learning Model to Predict Breast Cancer* [link]
2024	GreenMe. Ilaria Rosella Pagliaro, *Rivoluzione nella prevenzione: l'intelligenza artificiale prevede il cancro al seno con 5 anni di anticipo* [link]
2024	DOTmed. *AI model explains five-year risk for breast cancer in simple language* [link]
2024	OK Salute e Benessere. Francesco Bianco, *Intelligenza Artificiale prevedrà il tumore al seno con anni di anticipo* [link]
2024	Technology Networks. *Deep Learning Model Predicts Breast Cancer Risk From Mammograms*[link]
2024	Health Imaging. Chad Van Alstin, *New AI model predicts cancer risk based on breast asymmetry*[link]
2024	MedScape. Lisa Marshal, *New Transparent AI Predicts Breast Cancer 5 Years Out* [link]
2024	AuntMinnie. Amerigo Allegretto, *AI model predicts 5-year breast cancer risk from mammogram data*[link]

Employment History

NSF EPSCor Project · *Orono, ME*
STUDENT RESEARCHER II · *October 2021 - October 2022*

- Assembled large eDNA dataset
- Implemented several exploratory classification models
- Prepared theory for an interpretable species classifier based on DNA metabarcoding data

ASAP Media Services · *Orono, ME*
SOFTWARE DESIGNER AND DEVELOPER · *June 2018 - April 2022*

- Managed project teams and composed client-facing project proposals; conducted user and client research
- Collaborated to design and develop websites, mobile apps, and back end systems

Southwick and Associates · *Fernandina Beach, FL*
CONSULTANT · *April 2020 - May 2020*

- Prepared educational materials about back end systems for management
- Assisted in proposal development for large scale projects

Service

Pratt School of Engineering Graduate Program Bootcamp · *Durham, NC*
VOLUNTEER · *September 2023*

- Explained the key pros, cons, norms, and pitfalls of graduate school with undergraduates considering graduate school

Duke University Computer Science Department · *Durham, NC*
RECRUITMENT VOLUNTEER · *January 2023 - January 2025*

- Presented ongoing research at Duke with prospective students, helping guide their future research directions
- Helped prospective students develop a complete and honest evaluation of life in graduate school at Duke

Reviewer: NeurIPS (2024, 2025), AAAI (2025), ACML (2025), ICML (2025), CVPR (2023, 2024, 2025), CVPR XAI4CV (2023, 2024, 2025), European Journal of Operational Research (2025), ACCV (2024), ECCV (2024), Proceedings of Machine Learning Research (2024), IEEE Transactions on Neural Networks and Learning Systems (2023), ISIT (2023), ICCV (2023)

Teaching

Topics in AI: Explainability and Interpretability
GUEST LECTURER

University of British Columbia

Fall 2025
- Developed and conducted two remote guest lectures around interpretable machine learning

MBS Externship Exchange Program
TEAM LEADER

Rutgers University

Summer 2024
- Advised a team of business school students through an applied research project

CS474: Data Science Competition
TEAM LEADER

Duke University

Spring 2024
- Advised two teams of undergraduate and master students through research projects

CS671: Theory and Algorithms for Machine Learning
TEACHING ASSISTANT

Duke University

Fall 2023
- Designed and graded exploratory homework questions
- Held regular office hours for 20+ undergraduate and graduate students
- Led weekly recitations for groups of around 30 students

CS474: Data Science Competition
TEAM LEADER

Duke University

Spring 2023
- Advised two teams of undergraduate and master students through research projects

CS527: Introduction to Computer Vision
TEACHING ASSISTANT

Duke University

Spring 2023
- Held regular office hours for 5-10 undergraduate and graduate students
- Tested and refined homework and test questions

Invited Talks

Oct, 2025 **INFORMS**, Atlanta, Georgia
Nov, 2024 **Analytic Imaging Diagnostics Arena**, Linköping University Hospital, Linköping, Sweden
Jun, 2024 **Advanced X-ray Tomographic Imaging group**, Radboud University Medical Center, Nijmegen, Netherlands

Mentored Students

2024-2025 **Prashanth Areddy**, MBS Student, Rutgers University
2024-2025 **Muchang Bahng**, Undergraduate, Duke University
2024-2025 **Charlie Berens**, Undergraduate, Duke University
2025 **Russel Barton**, Undergraduate, Duke University
2025 **Liam Connor**, Masters Student, Duke University
2024-2025 **Adam Costarino**, Masters Student, Duke University
2024 **Alex Katapotis**, Undergraduate, Duke University
2023-2024 **Giyoung Kim**, Undergraduate, Duke University
2024-2025 **Hung Le**, Undergraduate, Duke University
2024 **Raymond Lin**, Undergraduate, Duke University
2024-2025 **Maximilian Machado**, Masters Student, Duke University
2024 **Ishaan Maitra**, Undergraduate, Duke University
2024 **Manny Mokel**, Undergraduate, Duke University
2024-2025 **Islina Shan**, Masters Student, Duke University
2024-2025 **TJ Stammer**, MBS Student, Rutgers University
2024-2025 **Duraid Syed**, MBS Student, Rutgers University
2023-2025 **Dennis Tang**, Undergraduate, Duke University
2023-2024 **Ronan Tegerdine**, Undergraduate, Duke University
2023-2024 **Luke Triplett**, Undergraduate, Duke University
2023-2025 **Sam Waggoner**, Undergraduate, University of Maine
2023-2024 **Frankie Willard**, Undergraduate, Duke University
2023-2024 **Julia Yang**, Masters Student, Duke University
2024 **Akshar Yeccherla**, Masters Student, Duke University
2024-2025 **Ruixin Zhang**, Masters Student, Duke University