Beepul Bharti

Biomedical Engineering Department & Mathematical Institute of Data Science, JHU
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Research Interests

- Theory of reliable & ethical AI: interpretability, explainablity, and algorithmic fairness
- Uncertainty in learning: calibration, conformal prediction, etc
- Applications: high-stakes decision areas such as governance and healthcare

Education

2020– Ph.D. in Biomedical Engineering, Johns Hopkins University
Advisor: Dr. Jeremias Sulam
Relevant Coursework: Statistical Learning, Matrix Analysis, Causal Inference, Nonlinear Optimization, Sparsity in ML/CV, Learning Theory

2016–20 B.S. in Biomedical Engineering & B.A. in Mathematics, Duke University
Honors: Cum Laude, Departmental Distinction
Relevant Coursework: Real Analysis, Abstract Algebra, Ordinary & Partial Differential Equations, Fluid Dynamics, Biostatistics, Probability, Multivariable Calculus

Experience

Sum' 2024 **Genentech**, Machine Learning Research Intern — San Francisco, CA
Deep Learning Theory and Algorithms Lab (DELTA)
- Explainability for motif discovery in genomic neural networks

Sum' 2017 **Duke University**, Bass Connections Fellow — Durham, NC
Department of Biostatistics
- Machine learning to predict schizophrenia admittance

Publications

Journal Papers (*Indicates Equal Contribution)

(j.3) Paul H Yi, Preetham Bachina, Beepul Bharti, Sean P Garin, Adway Kanhere, Pranav Kulkarni, David Li, Vishwa S Parekh, Samantha M Santomartino, Linda Moy, Jeremias Sulam, Pitfalls and Best Practices in Evaluation of AI Algorithmic Biases in Radiology. *Radiology*, 2024. (Upcoming)

(j.2) David Li, Beepul Bharti, Jinchi Wei, Jeremias Sulam, Paul H Yi. Sex imbalance produces biased deep learning models for knee osteoarthritis detection. *Canadian Association of Radiologists Assosciation*, 2023.

(j.1) Jacopo Teneggi*, Beepul Bharti*, Yaniv Romano, Jeremias Sulam. SHAP-XRT: The Shapley Value Meets Conditional Independence Testing. *Transactions on Machine Learning Research*, 2023.

Conference Proceedings

(c.2) Beepul Bharti, Paul Yi, Jeremias Sulam. Sufficient and Necessary Explanations (and What Lies in Between). *Conference on Parsimony and Learning*, PMLR, 2024. **Oral**

(c.1) Beepul Bharti, Paul Yi, Jeremias Sulam. Estimating and Controlling for Equalized Odds via Sensitive Attributes. *Neural Information Processing Systems*, 2023.

Preprints & Working Papers

(p.3) Beepul Bharti, Mary Versa Clemens-Sewall, Paul Yi, Jeremias Sulam. Multiaccuracy and Multicalibration via Proxy Groups, *Under Review*, 2025.

(p.2) Ryan Pilgrim*, Beepul Bharti*, Jeremias Sulam, Rene Vidal, On the (Non)uniqueness of Local Model Explanations, 2025.

(p.1) Beepul Bharti, Gabrielle Scalia, Alex Tseng. Uncovering BioLOGICAL Motifs and Syntax via Suffiency and Necessary Explanations, *Under Review*, 2024.

Honors & Awards

2023 Alpha Eta Mu Beta: National Biomedical Engineering Honor Society

2022 JHU Mathematical Institute for Data Science Fellowship

2020 JHU Institute of Computational Medicine Fellowship

2016–2020 Duke University Dean's list

2019–2020 Duke University Pratt Fellowship

2019 Tau Beta Pi: The Engineering Honor Society

Teaching

Teaching Assistant

2023 EN.580.69: Biomedical Data Design, JHU

2021 EN.580.697: Computational Cardiology, JHU

2018 ECE 110L: Fundamentals of Electrical and Computer Engineering, Duke

Presentations

Talks

2025 Sufficient vs. Necessary Explanations
Machine Learning in Healthcare Club, University of North South Wale

2024 SHAP-XRT: The Shapley Value Meets Conditional Independence Testing
Explainable AI Seminars at Imperial College London

Algorithmic Fairness in Machine Learning and Data Science
EN.540.464: Advanced Biomedical Data Science for Biomedical Engineering

2023 Evaluating Fairness of AI Models in Radiology
Radiological Society of North America (RSNA) Annual Meeting

Fairness in Machine Learning
EN.540.464: Advanced Biomedical Data Science for Biomedical Engineering

2022 Shapley Values and Hypothesis Testing
QMUL Intelligent Sensing Winter School

Posters

2024 Certifying Fairness with Incomplete Sensitive Information
SIAM Conference on Mathematics of Data Science

2024 Certifying Fairness with Incomplete Sensitive Information
SIAM Conference on Mathematics of Data Science

2023 Fairness via Sensitive Attribute Predictors
Columbia University Workshop on Fairness in Operations and AI

Fairness with Missing Sensitive Attributes
Johns Hopkins AI-X Foundry Fall Symposium

Shapley Values and Hypothesis Testing
Bern Interpretable AI Symposium

2018 Using Machine Learning to Predict Schizophrenia Admittance
Duke School of Medicine Clinical Research Day

Service

2024 High School Student Mentor
JHU Whiting School of Internships in Science and Engineering (WISE)

2023 Mentor Liasion
JHU Biomedical Engineering Application Assistance Program (BMEAAP)

Reviewing

ICLR, TMLR, FAccT, ISIT, AISTATS, NeurIPS, CPAL

Other

Skills Python, PyTorch, Matlab, R, LaTeX
Languages English, Hindi (fluent)
Interests Running, soccer, pickleball, reading, volunteering