Shantanu Ghosh(he/him)

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Research Interests

Method: Robustness, Generalization, Trustworthy Machine Learning, Multimodal learning, Explainable AI. **Applications:** Joint modeling of medical images (chest-X-rays or 2D mammograms) and reports for lung diseases (e.g., pneumonia) and breast cancer predictions.

Education

Boston University — **Boston, Massachusetts, USA**
Doctor of Philosophy, Electrical Engineering — *Jan 2023 – Dec 2026 (Expected)*
Advisor(s): **Dr. Kayhan Batmanghelich**

University of Pittsburgh *(Transferred to BU)* — **Pittsburgh, Pennsylvania, USA**
Doctor of Philosophy, Intelligent Systems — *Aug 2021 – Dec 2022*
Advisor(s): **Dr. Kayhan Batmanghelich**

University of Florida — **Gainesville, Florida, USA**
Master of Science, Computer Science, ***3.88/4.00*** — *Aug 2019 – May 2021*
Advisor: **Dr. Mattia Prosperi**

Publications

Working papers

[W1] ***Domain-Specific representations correctly diagnose key mammographic findings***
Shantanu Ghosh, Vedant Parthesh Joshi, Rayan Syed, Aya Kassem, Abhishek Varshney, Payel Basak, Hari M. Trivedi, Imon Banerjee, Clare B. Poynton, Shyam Visweswaran, Kayhan Batmanghelich

Conference Proceedings

[C8] ***LADDER: Language Driven Slice Discovery and Error Rectification***
Shantanu Ghosh, Rayan Syed, Chenyu Wang, Vaibhav Choudhary, Binxu Li, Clare B. Poynton, Shyam Visweswaran, Kayhan Batmanghelich
Findings of 2025 Conference on Association for Computational Linguistics (**ACL**) **[Project] [Paper] [Code]**

[C7] ***Semantic Consistency-Based Uncertainty Quantification for Factuality in Radiology Report Generation***
Chenyu Wang, Weichao Zhou, **Shantanu Ghosh**, Kayhan Batmanghelich, Wenchao Li
Findings of the Association for Computational Linguistics: NAACL 2025 (**NAACL**). **[Paper] [Code]**

[C6] ***Mammo-CLIP: A Vision Language Foundation Model to Enhance Data Efficiency and Robustness in Mammography***
Shantanu Ghosh, Clare B. Poynton, Shyam Visweswaran, Kayhan Batmanghelich
International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2024. (**Early accept, top 11%**) **[Project] [Paper] [Reviews] [Code]**

[C5] ***Distilling BlackBox to Interpretable models for Efficient Transfer Learning***
Shantanu Ghosh, Ke Yu, Kayhan Batmanghelich
International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2023. (**Early accept, top 14%**) **[Project] [Paper] [Reviews] [Code]**

[C4] ***Dividing and Conquering a BlackBox to a Mixture of Interpretable Models: Route, Interpret, Repeat***

Shantanu Ghosh, Ke Yu, Forough Arabshahi, Kayhan Batmanghelich
International Conference on Machine Learning (**ICML**), 2023. **[Project] [Paper] [Code]**

[C3] ***DR-VIDAL - Doubly Robust Variational Information-theoretic Deep Adversarial Learning for Counterfactual Prediction and Treatment Effect Estimation***
Shantanu Ghosh, Zheng Feng, Jiang Bian, Kevin Butler, Mattia Prosperi
American Medical Informatics Association (**AMIA**) Symposium, 2022 (**Oral**). **[Paper] [Code]**

[C2] ***Anatomy-Guided Weakly-Supervised Abnormality Localization in Chest X-rays***
Ke Yu, **Shantanu Ghosh**, Zhexiong Liu, Christopher Deible, Kayhan Batmanghelich
International Conference on Medical Image Computing and Computer Assisted Intervention (**MICCAI**), 2022. **[Paper] [Code]**

[C1] ***Causal AI with Real World Data: Do Statins Protect From Alzheimer'sDisease Onset?***
Mattia Prosperi, **Shantanu Ghosh**, Zhaoyi Chen, Marco Salemi, Tianchen Lyu, Jiang Bian
International Conference on Medical and Health Informatics (**ICMHI**), 2021. **[Paper]**

Journal Articles

[J3] ***Anatomy-specific Progression Classification in Chest Radiographs via Weakly-Supervised Learning***
Ke Yu, **Shantanu Ghosh**, Zhexiong Liu, Clare Poynton, Christopher Deible, Kayhan Batmanghelich
Radiology: Artificial Intelligence, (**RAD: AI**), ***IF:8.1***, 2024 **[Paper] [Code]**.

[J2] ***Propensity Score Synthetic Augmentation Matching using Generative Adversarial Networks (PSSAM-GAN)***
Shantanu Ghosh, Christina Boucher, Jiang Bian, Mattia Prosperi
Journal of Computer Methods and Programs in Bio-medicine Update, 2021. **[Paper] [Code]**

[J1] ***Deep Propensity Network using a Sparse Autoencoder for Estimation of Treatment Effects***
Shantanu Ghosh, Jiang Bian, Yi Guo, Mattia Prosperi
Journal of the American Medical Informatics Association (**JAMIA**), ***IF:4.7***, 2021. **[Paper] [Code]**

Peer reviewed workshops

[W3] ***Distributionally robust self-supervised learning for tabular data***
Shantanu Ghosh, Tiankang Xie, Mikhail Kuznetsov
Table Representation Learning Workshop (**TRL**), NeurIPS, 2024. **[Paper] [Code]**

[W2] ***Tackling Shortcut Learning in Deep Neural Networks: An Iterative Approach with Interpretable Models***
Shantanu Ghosh, Ke Yu, Forough Arabshahi, Kayhan Batmanghelich
Workshop on Spurious Correlations, Invariance and Stability (**SCIS**), ICML, 2023. **[Paper] [Poster]**

[W1] ***Bridging the Gap: From Post Hoc Explanations to Inherently Interpretable Models for Medical Imaging***
Shantanu Ghosh, Ke Yu, Forough Arabshahi, Kayhan Batmanghelich
Workshop on Interpretable Machine Learning in Healthcare (**IMLH**), ICML, 2023. **[Paper] [Poster]**

Research Experience

Boston University

Graduate Research Assistant **Boston, Massachusetts, USA**
Advisor(s): ***Dr. Kayhan Batmanghelich*** *Jan 2023 – Present*

- Currently extending Mammo-CLIP to develop the 1^{st} generative foundation model using screening mammograms for breast, capable of diagnosing breast cancer (diagnosis), predicting risk of having breast cancer (prognosis), and automated report generation.
- Developed **LADDER**, a slice discovery and mitigation algorithm using vision language (VLM) models and LLMs to reason and fix the classifier's mistakes. **Accepted at ACL, 2025 (Findings)**
- Developed **Mammo-CLIP** the first vision language foundation model for 2D mammograms. **Accepted at MICCAI, 2024 (top 11%)**
- Applied the mixture of interpretable models for efficient transfer learning to an unseen domain with limited training data. **Accepted at MICCAI, 2023 (top 14%)**.

University of Pittsburgh

Graduate Student Researcher **Pittsburgh, Pennsylvania, USA**
Advisor(s): ***Dr. Kayhan Batmanghelich***, ***Dr. Forough Arabshahi*** *Aug 2021 – Dec 2022*

- Developed an iterative algorithm to extract a mixture of interpretable models from a Blackbox, each specializing in a different subset of data to provide instance-specific First-order logic-based explanations using human-understandable concepts. **Accepted at ICML, 2023**.

University of Florida

Graduate Research Assistant **Gainesville, Florida, USA**
Advisor(s): ***Dr. Kevin Butler***, ***Dr. Jiang Bian***, ***Dr. Mattia Prosperi*** *Jan 2020 – Jul 2021*

- Developed novel deep learning frameworks to estimate propensity score, namely DPN-SA (**JAMIA 2021**), PSSAM-GAN (**CMPB-U 2021**), and DR-VIDAL (**AMIA 2022, oral**), to compute propensity scores for the efficient estimation of individual treatment effects (ITE).

Industry Experience

Amazon

Applied Scientist Intern **Pasadena, California, USA**
AWS Optimus. Mentor: ***Dr. Ankan Bansal*** *May 2025 – Aug 2025*

- Detecting and mitigating biases in the multi-modal LLM coding agents.

Amazon

Applied Scientist Intern **NYC, New York, USA**
AWS, Security Analytics and AI Research (SAAR). Mentor: ***Dr. Mikhail Kuznetsov*** *Jun 2024 – Sep 2024*

- Developed a framework to learn robust representations to fix systematic errors in pre-trained self-supervised models for tabular data. Publication at **TRL@NeurIPS 2024**.

Lexmark International India Pvt Ltd

Software Engineering Professional II **Kolkata, India**
Oct 2016 – Jul 2019

- Developed the ISP component of the product **Publishing Platform for Retail (PPR)**.

Cognizant Technology Solutions India Pvt Ltd

Associate, Projects **Kolkata, India**
Mar 2013 – Sep 2016

- Developed **WCF** web services in the Contract First Approach using Service Oriented Architecture.

Graduate Courses

▪ Fundamentals of Machine Learning ▪ Machine Learning ▪ Advanced Machine Learning ▪ Deep Learning for Computer Graphics ▪ Causal Inference and Machine Learning ▪ Visual Learning and Recognition ▪

Mathematics for Intelligent Systems ▪ Fundamentals of Probability ▪ Numerical Optimization ▪ Analysis of Algorithms ▪ Advanced Data Structures

Honors & Awards

- **Achievement Award** of 4500 USD during the admission of graduate studies at UF in Fall 2019.
- **Star Employee** award in Q4, 2013 and Q4, 2015 in Cognizant Technology Solutions.
- **Outstanding reviewer** in NeurIPS 2024, conference registration waived.

Academic Service

Journal Review

Transactions on Machine Learning Research (TMLR), IEEE Transactions on Medical Imaging (IEEE-TMI), Journal of Biomedical Informatics (JBI), Medical Image Analysis (MedIA), Journal of the American Medical Informatics Association (JAMIA), Journal of Computer Methods and Programs in Biomedicine (CMPB), Biometrical Journal, Information Fusion

Conference Review

WACV (2025), ICCV (2025), ICML (2025), ICLR (2024, 2025, 2026), AAAI (2024, 2025, 2026), AISTATS (2025), NeurIPS (2023, 2024, 2025), MICCAI (2024, 2025), CVPR (2024, 2025, 2026), CLeaR (2024, 2025), ACM BCB (2022)

Workshop Review

SRW@ACL (2025), SCSL@ICLR (2025), GenAI4Health@NeurIPS (2024, 2025, 2026), CRL@NeurIPS (2023), SCIS@ICML (2023), IMLH@ICML (2023)

Teaching Experience

- Special Topics: Medical Imaging With AI (EC 500) - Guest Lecturer (Fall 2025)
- Deep Learning (EC 523) - Teaching Assistant (Fall 2024)
- Introduction to Software Engineering (EC 327) - Teaching Assistant (Fall 2023)

Student Mentoring

- Rayan Syed, Undergraduate Student, Boston University
- Abhishek Varshney, Masters Student, Boston University
- Akshat Gurbuxani, Masters Student, Boston University

Talks

- *DR-VIDAL for Counterfactual Prediction and Treatment Effect Estimation*, Oral Talk, AMIA 2022 Annual Symposium, Nov 2022 **[Talk]** **[Slides]**
- *Divide and Conquer: Carving Out Concept-based Models out of BlackBox for More Efficient Transfer Learning*
  - Fall ISP AI Forum, University of Pittsburgh, Nov 2023 **[Talk]** **[Slides]**
  - MedAI Group, Stanford University, Oct 2024 **[Talk]** **[Slides]**
- *A Domain-Specific Foundation Model Surpassing Generalist AI for Integrated Mammographic Diagnosis, Prognosis and Reporting*
  - Annual Boston Medical Imaging Workshop, MIT CSAIL, Oct 2025 **[Slides]**