

# Shantanu Ghosh<sup>(he/him)</sup>

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https://shantanu-ai.github.io/ • 📄 Google scholar  
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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

Doctor of Philosophy, Electrical Engineering

Advisor(s): [Dr. Kayhan Batmanghelich](#)

Boston, Massachusetts, USA

Jan 2023 – Dec 2026 (Expected)

### University of Pittsburgh (Transferred to BU)

Doctor of Philosophy, Intelligent Systems

Advisor(s): [Dr. Kayhan Batmanghelich](#)

Pittsburgh, Pennsylvania, USA

Aug 2021 – Dec 2022

### University of Florida

Master of Science, Computer Science, **3.88/4.00**

Advisor: [Dr. Mattia Prosperi](#)

Gainesville, Florida, USA

Aug 2019 – May 2021

## Publications

### Under-review/Preprint

#### [P1] **LADDER: Language Driven Slice Discovery and Error Rectification**

Shantanu Ghosh, Rayan Syed, Chenyu Wang, Clare B. Poynton, Shyam Visweswaran, Kayhan Batmanghelich  
[\[Paper\]](#)

### Conference Proceedings

#### [C7] **Semantic Consistency-Based Uncertainty Quantification for Factuality in Radiology Report Generation**

Chenyu Wang, Weichao Zhou, **Shantanu Ghosh**, Kayhan Batmanghelich, Wenchao Li  
2025 Annual Conference of the Nations of the Americas Chapter of the ACL (**NAACL, Findings**). [\[Paper\]](#)

#### [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%) [\[Project\]](#) [\[Paper\]](#) [\[Code\]](#)

#### [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%) [\[Project\]](#) [\[Paper\]](#) [\[Code\]](#)

#### [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's Disease 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

Batman Lab

Jan 2023 – Present

- **Advisor(s):** [Dr. Kayhan Batmanghelich](#)
- Currently developing a slice discovery and mitigation algorithm using vision language (VLM) models and LLMs to reason and fix classifier's mistakes.
- Developed the first vision language foundation model for 2D mammograms [C6]. (**Early**) **Accepted at MICCAI, 2024**
- Applied the mixture of interpretable models to (1) eliminate the class imbalance problem and (2) enable efficient transfer learning to an unseen domain with limited training data [C5]. (**Early**) **Accepted at MICCAI, 2023.**

## University of Pittsburgh

Graduate Student Researcher

Pittsburgh, Pennsylvania, USA

Batman Lab

Aug 2021 – Dec 2022

- **Advisor(s):** [Dr. Kayhan Batmanghelich](#), [Dr. Forough Arabshahi](#)
- Introduced an iterative algorithm to carve out 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. Also, our method detected and removed the shortcuts, enhancing robustness [C4]. **Accepted at ICML, 2023.**
- Localized Pneumonia and Pneumothorax from **MIMIC-CXR** dataset by leveraging the anatomical landmarks (weak labels) using the **Stanford RadGraph NLP pipeline** [C2, J3]. **Accepted at MICCAI, 2022.**
- Investigated why **lottery ticket hypothesis** works using: **Concept activation vectors (TCAV)** and **Grad-CAM**. [\[Code\]](#) [\[Report\]](#)

## University of Florida

Graduate Research Assistant

Gainesville, Florida, USA

Florida Institute for Cybersecurity (FICS) Research

Mar 2021 – Jul 2021

- **Advisor(s):** [Dr. Mattia Proserpi](#), [Dr. Kevin Butler](#)
- Developed a novel deep learning framework to (1) generate the counterfactual outcomes based on treatment using a Generative Adversarial Network with **information-theoretic** regularization; (2) utilized the counterfactual outcomes to estimate the individual treatment effect (ITE) using **doubly robust optimization** for faster convergence [C1]. **Accepted at AMIA Symposium (Oral), 2022.**

## University of Florida

Research Assistant

Gainesville, Florida, USA

Data Intelligence Systems Lab (DISL)

Jan 2020 – Feb 2021

- **Advisor(s):** [Dr. Mattia Proserpi](#), [Dr. Jiang Bian](#)
- Designed a novel algorithm using a Generative Adversarial Network to generate synthetic treated samples to remove imbalance within an observational dataset for **P propensity score matching** [J2]. **Accepted at Computer Methods and Programs in Bio-medicine Update.**
- Developed a **sparse autoencoder** to reduce the dimensionality of the covariates of the patients to calculate the **P propensity score** in an efficient way to estimate the average treatment effect (ATE) of the treatment [J1]. **Accepted at JAMIA**

## Industry Experience

### Amazon

Applied Scientist II 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.

## Skills

- **Languages.** Python, C/C++, Java, C#/.Net, Javascript, HTML/CSS
- **Machine Learning.** TensorFlow, PyTorch, Scikit-learn

- **Web Development.** Angular, Node.js, WCF
- **Database.** MySQL, Oracle 9i/10g, MS SQL Server, DB2

## Graduate Courses

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- 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

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- **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.

## Academic Service

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### Journal Review

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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

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

### Workshop Review

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SCSL@ICLR2025, GenAI4Health@NeurIPS2024, CRL@NeurIPS2023, SCIS@ICML2023, IMLH@ICML2023

## Teaching Experience

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- Introduction to Software Engineering (EC 327) - Fall 2023
- Deep Learning (EC 523) - Fall 2024

## Student Mentoring

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- [Rayan Syed](#), Undergraduate Student, Boston University
- [Abhishek Varshney](#), Masters Student, Boston University
- [Akshat Gurbuxani](#), Masters Student, Boston University

## Talks

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- *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 [\[Talk\]](#) [\[Slides\]](#)