Balagopal (Balu) Unnikrishnan

www.balagopal.me | +1-437-991-1394 | balu@cs.toronto.edu | github.com/theidentity

Summary

Ph.D. researcher specializing in AI for healthcare, focusing on spurious confounders & algorithmic bias mitigation in deep learning models. Experienced in developing, managing, and deploying AI-driven health tech products and generating IP. Proven ability to work in interdisciplinary teams and advance AI research, with 15+ peer-reviewed publications and over 400 citations.

Professional & Academic Experience

Ph.D. Researcher, University of Toronto (2021 - Present)

- Developed **bias mitigation algorithms** – Utilized **conditional generative modelling** and **attention-based debiasing** to match oracle performance with 95% biased data.
- Co-created an **AI audit algorithm** and showed 21% performance overestimation in AI model performances across 13 large medical datasets across imaging, text and audio modalities—predicted generalization errors with 4% margin without external data.
- Engineered semi-supervised pipeline for clinical annotation from **detection and localization** of Papilledema from ultrasound videos – achieved 0.90 AUC for disease detection – deployed live for clinical studies.
- Designed proof-of-concept tool for clinical usage, addressing critical data bias and confounder issues in pneumothorax detection – curated a 200k large X-ray dataset and built a scalable pneumothorax detection pipeline.
- Enhanced semi-supervised algorithm for radiology data, improving AUC from .91 to .96 and achieving 97% of fully supervised performance with **100x fewer labels.**

AI Research Engineer, Institute for Infocomm Research (I2R / A*STAR), Singapore (2019 - 2021)

- Created NoTeacher, a semi-supervised algorithm reducing annotation burden, achieving 90% of fully supervised model performance with only 5% of labels – **MICCAI Best Paper Award** runner-up.
- Developed a self-supervised algorithm for histopathology images, achieving state-of-the-art performance on whole slide images with limited annotations.
- **Translated research into licensed IP**: "A Semi-Supervised Process to Guide Annotation for Image Classification Tasks."

Public Engagements & Media Appearances

Guest Speaker, ATGO-AI Podcast (2024)

Discussions on Accountability, Trust, Governance, and Oversight of Artificial Intelligence

- Engaged in two podcast episodes discussing research and recent publications on data biases in healthcare – now available on Spotify and Apple Podcasts.

Skillsets

- **Deep Learning / AI** : PyTorch, TensorFlow, Generative AI models, Semi-supervised learning, Explainable AI models
- **Creation & Deployment of AI Models** on Web Interfaces : Python, HTML, CSS, JS, Flask, SQL, MongoDB
- **Data Science**: Pandas, Scikit-Learn, SPSS
- **Cloud Platforms** : AWS, Google AutoML
- **Research**: Process & IP Generation, AI Healthtech domain expertise in radiology & ultrasound data

Education

- **Ph.D. in Computer Science**
  University of Toronto | Sept 2021 – est. Sept 2025 | CGPA: 4.0/4.0 | Advisors: Dr. Michael Brudno, Dr. Chris McIntosh
- **Masters in Intelligent Systems**
  National Univ. of Singapore (NUS) | 2019 | CGPA: 4.16/5.0 | Advised by Dr. Michael Chua
- **Bachelor of Technology in Computer Science and Engineering**
  University of Kerala | 2017 | CGPA: 8.49/10 | Advised by Dr. Vipin Vasu

Certifications

- AI Product Manager Nanodegree
- Deep Learning Specialization
- Machine Learning Specialization
- AI for Medicine Specialization

Awards & Leadership

- Schwartz Reisman Institute Graduate Fellowship – University of Toronto (2024)
- Vector Research Grant – University of Toronto (2021 – 2024)
- MICCAI Best Paper Award (Runner-up) – MICCAI Conference (2021)
- Youth Excellence Award – Most Reviewer – Nature Scientific Reports, IEEE Transactions on Medical Imaging (2022 – Present)
- Chairperson – Singapore Computer Society NUS Chapter (2018 – 2019)

Hobbies

- SCUBA (PADI-certified diver)
- Reading