Balagopal Unnikrishnan

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OBJECTIVE

3rd year Ph.D. candidate in Computer Science at UofT with a proven track record of impactful AI/Healthcare research and deployment. Eager to collaborate and contribute to real-world at-scale projects.

RESEARCH & PROFESSIONAL EXPERIENCE

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

- Ongoing research centered on detecting and mitigating biases and spurious confounders that affect AI models. Advised by Dr. Michael Brudno and Dr. Chris McIntosh and supported by the Vector Institute, University Health Network(UHN) & SickKids Hospital
- Curated a **200k large** X-ray dataset for pneumothorax detection to improve scan-to-intervention response times. Identified critical **co-location issues** that affected model generalization and created **proof of concept** tools for clinical usage.
- Developed a novel multi-view loss function that promotes learning of non-spurious features. It improved the performance of semi-supervised algorithms from .91 to .96 (AUC). It achieved 97% of fully supervised performance with **100 times fewer labels.**
- Built and deployed an annotation platform to source radiology labels, improving annotation efficiency by **2x** by dynamic task reformulations.

AI Engineer – Inst. for Infocomm Research, A*STAR, Singapore (2019 - 21)

- Worked on developing and translating intellectual property & algorithms, creating AI-augmented workflow for healthcare systems.
- Developed NoTeacher, a novel semi-supervised algorithm for reduction in annotation burden in radiology data, achieving 90% performance of fully supervised models with just 5% of labels for X-ray and CT data. Runner up for the **MICCAI Best Paper Award 2021**.
- Developed novel self-supervision tasks utilizing multi-resolution and semantic features in histopathology images.
- Built a machine-learning-based tool to flag anomalies in **automated CoVID qPCR testing** to enable faster inferences and error reduction in clinicians.

Research Intern – Inst. for Infocomm Research, A*STAR, Singapore (2018 - 19)

- Co-developed GAN-based and transfer-learning-based methods for anomaly detection in diabetic retinopathy.
- Created 2D and 3D segmentation pipelines for MRI data.

SELECTED PUBLICATIONS — Complete list of 15 articles on Google Scholar

- **Unnikrishnan, B**., Nguyen, C. M., Balaram, S., Foo, C. S., & Krishnaswamy, P. Semi-supervised classification of diagnostic radiographs with NoTeacher: A teacher that is not mean [MICCAI + Extended version in Medical Image Analysis]
- Koohbanani, N. A., **Unnikrishnan, B**., Khurram, S. A., Krishnaswamy, P., & Rajpoot, N. Self-path: Self-supervision for classification of pathology images with limited annotations [IEEE Transactions in Medical Imaging]
- **Unnikrishnan, B**., Singh, P. R., Yang, X., & Chua, M. C. H. Semi-supervised and Unsupervised Methods for Heart Sounds Classification in Restricted Data Environments [Project Report / Arxiv]
- Ouardini, K., Yang, H., **Unnikrishnan, B.**, Romain, M., Garcin, C., Zenati, H., & Foo, C. S. Towards practical unsupervised anomaly detection on retinal images. [DART/MICCAI 2019]

SKILLS

Programming – Python, PyTorch, TensorFlow, C++, Java

Web Development and AI Prototyping – HTML, CSS, JS, Flask, MongoDB, AWS, AutoML

Data Science – Pandas, R, Scikit-learn, SPSS JMP

Computer VIsion – OpenCV

EDUCATION

PhD in Computer Science University of Toronto (2021-Present) (GPA: 4/4)

Masters in Intelligent Systems National University of Singapore (GPA: 4.16/5)

B.Tech in Computer Science and Engineering University of Kerala (GPA: 8.5/10)

CERTIFICATIONS

Nanodegree in AI Product Management (Udacity)

AI for Medicine Specialization (Deeplearning.ai / Coursera)

Deep Learning Specialization (Deeplearning.ai / Coursera)

Machine Learning Specialization (Deeplearning.ai / Coursera)

VOLUNTEERING / AWARDS

Executive Council Member Computer Science Graduate Students' Benevolent Society

Mentor : Graduate Application Assistance Program –GAAP

Richard E Merwin Scholar : IEEE Computer Society

Youth Excellence Award for Most Promising Engineer

Reviewer : IEEE Transactions in Medical Imaging (TMI)

HOBBIES

Scuba diving, Reading