Balagopal Unnikrishnan

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OBJECTIVE : AI/Healthcare researcher with a proven track record of developing and deploying impactful AI solutions. Expertise in algorithmic bias, semi-supervised learning, and medical image analysis. Seeking opportunities to apply my skills to solve real-world problems at scale.

RESEARCH & PROFESSIONAL EXPERIENCE

Ph.D. Researcher *2021 - Present*
Dept of Computer Science, University of Toronto

- **Diffusion for bias mitigation –** Developed a bias mitigation algorithm which debiased classifiers while training on 95% biased data. Achieved similar performance (~within 1% AUC) to models trained on 0% biased data.
- **Papilledema detection from ultrasound videos –** Built and deployed a semi-supervised GUI pipeline for clinical annotation. Utilized deep learning models to detect disease regions (.90 AUC) and localize them (< 2% normalized MSE) and studied the impact of bias due to acquisition devices.
- **Bias Detection and Generalization –** Co-developed an algorithm to study AI model generalization without external data. Showed an average of 21% performance overestimation across 13 medical datasets and correctly predicted external accuracies (<4% error) without external data estimates.

AI Research Engineer *2019 - 2021*
*Institute for Infocomm Research, A*STAR, Singapore*

- Algorithm development / translation – Developed semi-supervised and self-supervised algorithms for 2D/3D medical imaging data – resulting publication was runner up for best paper-award at MICCAI.
- Performed IP development and translation work for semi-supervised guided medical image annotation.

Research Intern *2018 – 2019*
*Institute for Infocomm Research, A*STAR, Singapore*

- Co-developed and trained patch-based **semi-supervised GANs** and transfer-learning-based methods for **abnormality/anomaly detection** in diabetic retinopathy and retinopathy of prematurity (ROP) detection
- Developed 2D and 3D segmentation pipelines for MRI data

SELECTED PUBLICATIONS

Complete list of 16 articles on Google Scholar – 331 Citations | h-index 6

- "Shortcut Learning in Medical AI Hinders Generalization: Method for Estimating AI Model Generalization without External Data" - Ly, C, O* ., Unnikrishnan, B* et. al. (2023). [Under review in npj Digital Medicine]
- "Semi-supervised classification of radiology images with NoTeacher: A teacher that is not mean" - Unnikrishnan, B., Nguyen, C., et. al. (2021). [MICCAI + Extended version in Medical Image Analysis]
- "Self-path: Self-supervision for classification of pathology images with limited annotations" - Koohbanani, N. A., Unnikrishnan, B., et. al. (2021) [IEEE Transactions on Medical Imaging]
- "Semi-supervised deep learning for abnormality classification in retinal images" - Lecouat, B., Chang, K., Foo, C. S., Unnikrishnan, B., et. al(2018). Machine Learning for Health (ML4H) Workshop at NeurIPS [ML4H / NeurIPS]

SKILLS

Programming – Python, PyTorch, TensorFlow, C++

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

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