

WRIK BHADRA

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RESEARCH INTERESTS

Medical Image Analysis, Computer Vision, Machine Learning

WORK EXPERIENCE

The University of Iowa, Iowa City

- *Graduate Research Assistant*

Jan 2023 – present

Roy J. Carver Department of Biomedical Engineering

Rakuten India, Bangalore

- *Software Engineer II - Machine Learning*
- *Software Engineer I - Machine Learning*
- *Software Engineer I*

Jan 2022 – Oct 2022

Aug 2021 – Dec 2021

Aug 2020 – Jul 2021

EDUCATION

The University of Iowa, USA

Graduate student in Biomedical Engineering

2023 – present

IIIT Delhi, India

M.Tech. in Computer Science and Engineering

2018 – 2020

PUBLICATIONS

Transcriptional advantage influence odorant receptor gene choice

Briefings in Functional Genomics (Oxford Academic journal) [published Dec 2022]

<https://doi.org/10.1093/bfgp/elac052>

Method, Apparatus, and Computer Readable Medium (Patent)

US Patent and Trademark Office (app. number: [17/645,726](#)) [filed Dec 2021]

Generalized Prediction of Hemodynamic Shock in Intensive Care Units

AAAS Science Translational Medicine

[medRxiv 2021.01.07.21249121](#)

CONFERENCES

- [Rising BME Scholars Regional Conference 2024](#), University of Illinois Chicago Jun 2024
Poster: Shape priors improve lung segmentation in ARDS-afflicted subjects

INVITED TALKS

- [ECE:5995 - Applied Machine Learning](#), The University of Iowa Feb 2024
Topic: Lung nodule detection and classification for cancer diagnosis
Host: [Dr. Mathews Jacob](#)

SELECTED PROJECTS

Shape priors for injured lung segmentation

{segmentation, shape priors, large-scale training}

Team size: 1

Deep-learning based automated lung segmentation framework for animal models of ARDS injury (Acute Respiratory Distress Syndrome).

- Developed project from ground-up to incorporate shape information using VAEs for better injured lung segmentation in multi-center multi-species animal dataset (porcine, ovine, canine).
- Developed the framework to train and analyze about 200 deep learning models with extensive hyperparameter tuning on SGE High Performance Computing (HPC) systems.
- Incorporated batch processing to cut down inference time drastically (from about 12 hrs to less than 20 mins overall, for 100 test images each taking roughly 8 mins sequentially) .
- Experiments performed on both high resolution (1mm isotropically resampled) and low resolution (3mm isotropically resampled) preprocessed (smoothed, resampled, HU-clipped, normalized, cropped) 3D- & 4D-CT NIFTI data.
- Implemented solutions to generate and visualize experiment intermediates during model training using Tensorboard in PyTorch.
- Additionally, performed statistical analysis using Python packages to compare and visualize performance of various baseline and proposed methods on test dataset.

5G Cellular Antenna Damage Detection

{object detection, large-scale training, transfer learning}

Team size: 2

A computer vision-based fully automated system for detecting physical damage to 5G cellular antenna towers, which impact their operational effectiveness.

- Part of a two-member sub-team responsible for developing the core AI solution.
- Devised a method for semi-automated curation of a labelled 2D dataset from video footages. This technique was submitted as a utility patent application at USPTO in Dec 2021.
- Developed a framework for fine-tuning Faster R-CNN ResNet-50 FPN on the curated labelled dataset of about 100k images of cellular antenna towers.
- The best-performing model achieved 95% validation accuracy within a 3° tolerance.
- Additionally, implemented solutions for crack detection, fire detection and intruder detection in the vicinity of towers.

RELEVANT COURSEWORK

- Deep Learning in Medical Imaging - The University of Iowa (Fall 2024 - ongoing)
- Applied Machine Learning - The University of Iowa (Spring 2023)
- Medical Imaging Physics - The University of Iowa (Fall 2023)
- Regression & ANOVA in Health Sciences - The University of Iowa (Spring 2024)
- Communicating Data Through Stories - The University of Iowa (Spring 2024)
- Teaching & Learning in Higher Education - The University of Iowa (Spring 2024)
- Machine Learning for Biomedical Applications - IIIT Delhi (Monsoon 2019)
- Computer Vision - IIIT Delhi (Winter 2019)
- Digital Image Processing - IIIT Delhi (Monsoon 2018)
- Artificial Intelligence - IIIT Delhi (Monsoon 2018)

SKILLS

Machine Learning frameworks PyTorch, TensorFlow

Packages / Softwares 3DSlicer, MONAI, SimpleITK, TensorBoard, pandas, numpy, matplotlib

Programming languages Python, C++

Application development Flask, MongoDB, SQL, Docker, Kafka

Tools Bash, Git, ~~LaTeX~~TeX, Zotero, Jupyter Notebook/Lab

SERVICE

The University of Iowa

- Summer 2024 – Mentored a BME undergrad student on a project involving lung segmentation on human 3DCT scans.
- Apr 2024 – Invited by the BME Department to moderate a session for [BME Senior Design Day 2024](#).
- Mar 2024 & Summer 2023 – Conducted initial discussion-cum-interview for five prospective graduate students.
- Spring 2024 & Fall 2023 – Peer Mentor for two incoming international graduate students under the [iPeer Mentorship Program](#).

Rakuten India

- Jun 2021 & Mar 2021 – Conducted technical interviews for a prospective full-time and three intern candidates for a separate business unit.
- Nov 2020 - Jan 2021 – Mentored a CS undergrad intern on a project involving application of image processing techniques.
- Feb 2020 – Attended and manned booth on behalf of Rakuten India as tech representative. [certificate](#)