

# KAUSHIK DUTTA

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## PROFESSIONAL SUMMARY

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Ph.D candidate in Imaging Science with 4+ years of research experience in deep-learning, applied machine learning, optimization, computer vision, image processing and quantitative data science. Key skills include a strong understanding of machine learning fundamentals, hands-on experience in building and deploying deep-learning frameworks to solve clinical imaging problems along-with strong presentation and communications skills.

## EDUCATION

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<b>Ph.D. in Imaging Science</b>	Expected August 2024
<i>Washington University in St. Louis ; Current GPA : 3.94/4.00</i>	St. Louis, USA
<b>M.S. in Electrical Engineering</b>	2019 - 2021
<i>Washington University in St. Louis ; Degree GPA : 3.94/4.00</i>	St. Louis, USA
<b>B.Tech. in Electronics and Communications Engineering</b>	2014 - 2018
<i>Heritage Institute of Technology ; Degree GPA : 8.86/10.00</i>	Kolkata, India

## SKILLS

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<b>Programming</b>	Python, MATLAB, SQL, R, Java, C/C++
<b>Libraries/Platforms</b>	Tensorflow, Pytorch, Scikit-Learn, SimpleITK, OpenCV, QuPath, ImageJ, AWS, Git
<b>Domain Knowledge</b>	Machine Learning, Deep Learning, Image Processing, Computer Vision, Algorithm

## PROFESSIONAL EXPERIENCE

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**Data Science Intern, Bristol Myers Squibb, New Jersey USA** May 2023 - August 2023  
*Key Skills: Deep Learning, Machine Learning, Clinical Data Science, AWS, Git, SQL*

- Developed a deep-learning framework leveraging large multi-institutional dataset (~98k patients) for automatic classification (~98% accuracy) and segmentation(~97% Dice Score) of multi-modal MR images to support downstream image analysis pipelines.
- Constructed an automatic pipeline to extract radiomics features from baseline CT images (~2.5k patients with NSCLC) to estimate overall survival (OS) using machine learning.
- Implemented a machine learning methodology to analyze Real World Data (RWD) and clinical trial data to predict the probability of early mortality and identifying interpretable features contributing to this outcome through the utilization of SHAP (SHapley Additive exPlanations) values.

**Assistant Systems Engineer, Tata Consultancy Services** November 2018 - July 2019

- Designed front-end (UI/UX) using AngularJS and back-end solutions using Java for web-based applications for an insurance company in collaboration with the consultants and client-team.

## RESEARCH EXPERIENCE

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**Washington University in St. Louis** *St. Louis, USA*

**Doctoral Research Projects:** August 2019 - Present

*Key Words: Deep Learning, Medical Imaging, Machine Learning, Quantitative Imaging, Image Quality*

- Developed a novel deep-learning architecture DR2U-Net for automatic tumor segmentation in preclinical multi-contrast MR Imaging along-with quantitative validation of radiomics features to tumor probability boundaries. [\[Paper\]](#) [\[Code\]](#)
- Developed novel deep-learning framework for generation of standard-count PET (SC-PET) images from different realizations of low-count PET (LC-PET) images using supervised and unsupervised learning principle, followed by multi-objective task-based performance evaluation. [\[Code\]](#)
- Developing deep-learning based correlational network to analyze the correlation and interpretability between radiological and histological biomarkers in assessing therapeutic predictions.

**Coursework Projects:** August 2019 - Present

*Key Words: Deep Learning, Machine Learning, Optimization, Imaging, Algorithm*

- Automatic Active Neuronal Activity Detection in Calcium Fluorescence Imaging using Bayesian Deep Learning Framework. (*Course:Practicum in Imaging Science*)
- Predicting Football Match Results using Hierarchical Bayesian Modelling. [\[Code\]](#) (*Course:Bayesian ML*)

- Densely Connected Recurrent Residual (Dense R2UNet) Convolutional Neural Network for Segmentation of Lung CT Images. [\[Paper\]](#) [\[Code\]](#) (*Course: Computer Vision*)
- Deep learning based cardiac MR reconstruction from randomly undersampled sub-Nyquist k-space data. (*Course: Biological Imaging Technology*)

## Heritage Institute of Technology

Kolkata, India

### Undergraduate Research Projects:

August 2016 - July 2018

- Developed an automatic evaluation and diagnosis algorithm to analyze the optical nerve head for detecting Glaucoma using Machine Learning. [\[Paper\]](#) Later deep-learning architecture was utilized to boost diagnostic capability with 94% accuracy. [\[Paper\]](#) [\[Code\]](#)

## SELECTED JOURNAL PUBLICATIONS AND PREPRINTS

- **K. Dutta**, S. Roy, T.D. Whitehead, J Luo, A.K. Jha, S. Li, J. Quirk, K.I. Shoghi. *Deep Learning Segmentation of Triple-Negative Breast Cancer (TNBC) Patient Derived Tumor Xenograft (PDX) and Sensitivity of Radiomic Pipeline to Tumor Probability Boundary*. Cancers July 2021. [\[Link\]](#)
- **K. Dutta** *Densely Connected Recurrent Residual (Dense R2UNet) Convolutional Neural Network for Segmentation of Lung CT Images*. arXiv Preprint February 2021. [\[Link\]](#)
- R.Mukherjee, S.Kundu, **K.Dutta** and A.Sen. *Predictive diagnosis of glaucoma based on analysis of focal notching along the neuro-retinal rim using machine learning*. Springer's Pattern Recognition and Image Analysis September 2021. [\[Link\]](#)

## SELECTED CONFERENCE PAPERS AND POSTERS

- **K. Dutta**, R.Laforest, K.I. Shoghi. *Self-Supervised learning framework to generate preclinical Standard-Count PET from Low-Count PET and multi-objective task-based performance evaluation*. IEEE Nuclear Science Symposium, Medical Imaging Conference (NSS/MIC) November 2023, Vancouver Canada [\[Link\]](#) (**Oral Presentation**)
- **K. Dutta**, Z.Liu, R.Laforest, A.K. Jha, K.I. Shoghi. *Deep learning framework to synthesize high-count preclinical PET images from low-count preclinical PET images*. SPIE Medical Imaging 2022:Physics of Medical Imaging February 2022, San Diego USA [\[Link\]](#) (**Paper and Oral Presentation**)
- **K. Dutta**, Z.Liu, R.Laforest, A.K. Jha, K.I. Shoghi. *Deep learning generation of high count preclinical PET images from low count PET images*. World Molecular Imaging Congress, October 2021. (**Oral Presentation**)
- **K.Dutta**, R.Mukherjee, S.Kundu, T. Biswas and A.Sen *Automatic Evaluation and Predictive Analysis of the Optic Nerve Head for the Detection of Glaucoma*. IEEE International Conference on Electronics, Materials Engineering & Nano-Technology May 2018, Kolkata India. [\[Link\]](#) (**Paper and Oral Presentation**)

## RELEVANT GRADUATE COURSEWORK

**Washington University in St.Louis:** *Large Scale Optimization, Bayesian Methods in Machine Learning, Practicum in Imaging Science, Computer Vision, Theoretical Imaging Science, Machine Learning and Pattern Recognition, Human-in-the-Loop Computation, Mathematics of Imaging Science, Computational Methods of Imaging Science, Biological Imaging Technology, Probability and Stochastic Methods.*

## TEACHING AND MENTORING EXPERIENCE

**Assistant in Instruction**, Washington University in St Louis

January 2022 - May 2022

Guided students on coding assignments and final projects for *Biological Imaging Technology* course. Also delivered supporting lectures, designed assignments and assisted in grading the examination.

## ACHIEVEMENTS AND AWARDS

**Best Poster Award** - Informatics in Cancer Research (ITCR) 2022, National Cancer Institute (NCI)

**Best Student Poster Award** - Oncological Imaging Program (OIP) 2022, Siteman Cancer Center

**Best Poster Award** - WashU Imaging Science Retreat 2022

**Outstanding Leadership Award** - WashU Imaging Science McKelvey School of Engineering (2023)

## LEADERSHIP EXPERIENCE

**Graduate Representative**, WashU Board of Trustees

2023 - Present

**Graduate Student Ambassador**, McKelvey School of Engineering WashU

2021 - Present

**Executive Member**, Graduate Student Affairs Advisory Board (GSAAB)

2021 - Present

**President**, Association of Graduate Engineering Students (AGES)

2021 - 2022