# Jimut Bahan Pal

Research Fellow

Centre for Machine Intelligence and Data Science (C-MInDS)
Indian Institute of Technology Bombay

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## Research Interests

Conducting research in Deep Learning methodologies for medical image segmentation, with a focus on developing statistically grounded and interpretable supervised algorithms. My work emphasizes model robustness under constraints such as limited data availability, incorporation of mathematical priors, low computational budgets, and the presence of outliers across diverse imaging modalities.

Currently, my research explores the integration of visual data and Natural Language Processing (NLP) of clinical reports to develop unified diagnostic systems that enhance accuracy and provide deeper clinical insights.

## Education

**Ph.D. in Machine Intelligence and Data Science** *2022 – Present*
Indian Institute of Technology Bombay, Mumbai

**M.Sc. in Computer Science** *2019 – 2021*
Ramakrishna Mission Vivekananda Educational and Research Institute, Belur, Howrah
Thesis: Instance Segmentation of Peripheral Blood Smear and Refining Classification via Domain Adaptation

**B.Sc. (Hons.) Computer Science** *2016 – 2019*
St. Xavier's College, Kolkata
Dissertation: Wisp: A Preference Based Location Finder Application

## Awards & Honors

**Prime Minister's Research Fellowship (PMRF)** *October 2023*
Awarded as a Lateral Fellow of Cycle 11

**C-MInDS Fellowship** *June 2022*
For securing highest scores in CMInDS entrance, IIT Bombay

**MICCAI-2024 RISE Registration Grant** *2024*
Travel grant for international conference participation

**1st Runner Up - Generative AI Art Competition** *ICIP 2024*
International Conference on Image Processing

**Google Cloud Arcade Champion** *2025*
Google Cloud competition winner

## Publications

### Refereed Journal Publications

- **[Core-B, Q1, IF: 8.5]** Pal, J. B., Bhattacharyea, A., Banerjee, D., & Maharaj, B. T. (2024). Advancing instance segmentation and WBC classification in peripheral blood smear through domain adaptation: A study on PBC and the novel RV-PBS datasets. *Expert Systems with Applications*, 123660.

- **[Q2, IF: 1.175]** Pal, J. B., & Mj, D. (2023). Improving multi-scale attention networks: Bayesian optimization for segmenting medical images. *The Imaging Science Journal*, 71(1), 33-49.

### Refereed Conference Publications

- **[Core-A, WACV 2025]** Pal, J. B., Welling, S., Saini, H., & Awate, S. (2025). Reviving Poor Object Segmentations in OOD Medical Images using Variational Deep-PCA Modeling on Segmentation Maps with Sampling-Free Learning. *IEEE/CVF Winter Conference on Applications of Computer Vision*, 9364-9373.
- **[Core-A, MICCAI 2024]** Pal, J. B., & Awate, S. (2024). Convex Segments for Convex Objects Using DNN Boundary Tracing and Graduated Optimization. *International Conference on Medical Image Computing and Computer-Assisted Intervention*, 91-101.
- **[Core-B, ICIP 2024]** Pal, J. B., & Awate, S. (2024). A hard convex-shape constraint in DNNs for object segmentation. *IEEE International Conference on Image Processing*, 2074-2080.
- **[IEEE 2022]** Pal, J. B., & Paul, N. (2022). Classifying Chest X-Ray COVID-19 images via Transfer Learning. *Ethics and Explainability for Responsible Data Science*, 1-8.

### Workshop Papers & Preprints

- **[MICCAI Workshop 2022]** Pal, J. B. (2022). Holistic Network for Quantifying Uncertainties in Medical Images. In: Crimi, A., Bakas, S. (eds) *Brainlesion: Glioma, Multiple Sclerosis, Stroke and Traumatic Brain Injuries. BrainLes 2021. Lecture Notes in Computer Science*, vol 12963. Springer.
- **[2024]** Bran, H., ... Pal, J. B., ... Menze, B. (2024). QUBIQ: Uncertainty Quantification for Biomedical Image Segmentation Challenge. *CoRR*, abs/2405.18435.
- **[2022]** Eisenmann, M., Reinke, A., ... Pal, J. B., ... Maier-Hein, L. (2022). Biomedical image analysis competitions: The state of current participation practice. *arXiv:2212.08568*.
- **[2020]** Pal, J. B. (2020). How to cluster nearest unique nodes from different classes using jjcluster in wisp application? *CoRR*, abs/2002.05886.

### Manuscripts Under Review

- **[Medical Image Analysis]** Pal, J. B., et al. Segmenting convex and near-convex objects using hard geometric constraints within deep Markov-chain boundary model.
- **[MELBA]** Pal, J. B., et al. Learning a sampling-free variational DNN plugin from tiny training sets to refine OOD segmentation with uncertainty estimation.

## Teaching Experience

**Instructor: CS/BDA 411** *2024 – 2025*
Applications of Computer Vision and Deep Learning (3 credits), RKMVERI
Course Websites: 2026 | 2025 | 2024

**Teaching Assistant: CS 736** *2026*
Medical Image Computing (6 credits), IIT Bombay

**Teaching Assistant: CS 663** *2025*
Digital Image Processing (6 credits), IIT Bombay

**Teaching Assistant: DS 203** *2023*
Programming for Data Science (6 credits), IIT Bombay

**Computer Application Teacher** *2020*
RKMVERI, Belur, Howrah
Taught PGDY (2020-21) class of 12 students about computer applications

## Professional Activities

**Guest Lecturer** *2025*
Convolutional Neural Networks for CS772 DL-NLP, IIT Bombay
Resources: Slides | Recording | Demo | Code

**Conference Reviewer** *2025*
International Conference on Acoustics, Speech, and Signal Processing (ICASSP) 2025

**Journal Reviewer**
Multimedia Tools and Applications

**Committee Member** *2024 – Present*
Internal Quality Assurance Cell (IQAC), RKMVERI

**Interview Panel Member** *April 2024*
MSR admissions at C-MInDS, IIT Bombay, with Prof. Pushpak Bhattacharyya

## Professional Experience

**Project Intern** *Jan – March 2019*
Data Sutram, Kolkata
Analyzed, visualized and gained valuable insights from data

**Key-note Speaker** *September 2018*
Machine Learning Crash Course (Google Sponsored), St. Xavier's College, Kolkata
Created coursework and delivered lectures for ML seminars

**Developer** *Nov 2017 – Jan 2018*
Xavotsav 2018 Website, St. Xavier's College, Kolkata
Designed website for cultural fest of St. Xavier's College, Kolkata

## Leadership & Volunteering

**Coordinator & Teacher, NSS** *Aug 2018 – Jan 2019*
National Service Scheme, St. Xavier's College
Coordinated and organized educational tours for underprivileged communities

**Event Head** *February 2019*
ENIGMA Coding Event, Science Association, St. Xavier's College
Planned, organized and executed the annual coding event

**Head of Graphics Design Team** *July – Sep 2018*
Analytica, Department of Mathematics, St. Xavier's College
Led team of 5 designers to create graphics content for the event

## Open Source Contributions

**Jimutmap** *February 2019*
Python tool for downloading satellite images and road maps
Over 20K total downloads from PyPI

**Jimner** *January 2019*
Python library for creating ASCII art in terminal
314 unique text styling samples

**Management Information System** *November 2018*
CRUD system built using Python3 and Tkinter from scratch

## Technical Skills

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|---|---|
| **Programming:** | Python, LaTeX, Java, C/C++ |
| **Deep Learning:** | PyTorch, Keras, TensorFlow, Computer Vision, Medical Imaging |
| **Tools:** | Linux, Git |
| **Web Development:** | HTML, CSS, JavaScript, Jekyll |

## Certifications & Specializations

**Deep Learning Specialization** *2019*
DeepLearning.AI, Coursera

**TensorFlow in Practice Specialization** *2019*
DeepLearning.AI, Coursera

**Applied Data Science Specialization** *2018*
IBM, Coursera

**Python for Everybody Specialization** *2018*
University of Michigan, Coursera

## Additional Information

- **Research Blog:** Maintain active technical blog at jimut123.github.io/blog.html
- **Projects Portfolio:** Developed several interactive games and applications
- **Misc:** Selected in second phase of Service Selection Board (SSB), Indian Army (2016)
- **Social Work:** Participant in NSS, organizing educational tours for underprivileged communities
- **Academic Networks:** Erdös Number: 4, Dijkstra Number: 4

*References available upon request*