Rohan Banerjee

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Education

Mila - Quebec AI Institute and Polytechnique Montreal **Aug. 2022 – May 2025**
M.Sc. (Thesis), Computer Science | CGPA: 4.0/4.0 *Montreal, Canada*

SRM University (KTR Campus) **Jun. 2016 – Jul. 2020**
B.Tech, Computer Science | CGPA: 3.5/4.0 *Chennai, India*

Research Experience

Montreal Heart Institute **Sep. 2024 – Present**
Research Engineer; ***Advisor:*** *Prof. Robert Avram* *Montreal, Canada*

- Led development of a quantization-based ECG tokenizer and multimodal LLM framework for ECG interpretation
- Built ECG–language datasets and clinically aligned LLM-based evaluations for factual assessment
- **Key Technologies:** Signal Tokenization, Multi-Modal Models, LLMs, Biosignals

Mila - Quebec AI Institute **Aug. 2022 – May 2025**
Graduate Research Assistant; ***Advisors:*** *Prof. Julien Cohen-Adad and Prof. Benjamin De Leener* *Montreal, Canada*

- Led the development state-of-the-art automated spinal cord segmentation method for fMRI echo planar imaging data - available as a command-line tool within Spinal Cord Toolbox [code]
- Built an open-source framework for the generation of spinal cord MRI templates [code]
- Actively contributing to the development of open-source software - Spinal Cord Toolbox [link]
- **Key Technologies:** Semantic Segmentation, Neuroimaging, Open-Source Software

Baylor College of Medicine, Rice University **Apr. 2021 – Dec. 2021**
Research Fellow at Fatima Fellowship; ***Advisor:*** *Dr. Muhammad Saad Shamim, Aiden Lab* *Texas, USA (Remote)*

- Developed unsupervised method to identify features in 2D genomic Hi-C data
- Played a key role in developing an annotation tool with Flask for HiC map annotation, enabling semantic segmentation through a semi-automated iterative process
- **Key Technologies:** Genomics, Unsupervised Learning, Semantic Segmentation

Harvard Medical School **Jan. 2020 – Dec. 2020**
Research Assistant; ***Advisor:*** *Prof. Hadi Shafiee, Shafiee Lab* *Boston, USA*

- Improved human embryo morphology analysis with CNNs by generating synthetic data using generative models
- Developed an object-detection pipeline for clinicians working on diagnosis of Non-Obstructive Azoospermia
- Gained proficiency in cell staining and the fabrication of imaging devices using 3D printing
- **Key Technologies:** Biomedical images, Unsupervised learning, Object detection, Domain adaptation

Publications and Presentations

- **Towards Clinically Faithful ECG Reports via Quantization-Based Tokenization** [NeurIPS BFM 2025]
  R. Banerjee, J. Delfrate, R. Avram

- **DeepECG.ai: An AI-Enhanced ECG Analysis Platform To Bridge the Expertise Gap from Primary Care to Cardiology** [*In submission*]
  A. Nolin-Lapalme, O. Tastet, A. Sowa, J. Delfrate, I.E. Adib, J. Morisset, R. Ahuja, **R. Banerjee**, M.G. Lessard, A. Vadeboncoeur, R. Avram

- **EPISeg: Automated segmentation of the spinal cord on echo planar images using open-access multi-center data** [Imaging Neuroscience & ISMRM 2025 **(Oral Power Pitch)**]
  R. Banerjee, M. Kaptan, …(36 co-authors) …, K. Weber II, B. De Leener, J. Cohen-Adad

- **Multimodal Pediatric Spinal Cord Template** [QBIN Scientific Day 2023]
  N. Blostein*, **R. Banerjee***, …, F. B. Mohamed, M. Laura Krisa, J. Cohen-Adad

- **Unsupervised annotation of differences between 3D genomic datasets using deep neural networks**
  E. Shemsu, **R. Banerjee**, A. Raheem [BlackAIR, Stanford University]
- **Improving the performance of deep convolutional neural networks (CNN) in embryology using synthetic machine-generated images** [ESHRE, Human Reproduction (Vol. 35), 2020]
  M. Kanakasabapathy, . . . , **R. Banerjee**, H. Shafiee

Other Experience

Co-Creating AI and Art Residency, Mila – Quebec AI Institute **Jun. 2024 – Sep. 2024**
AI Resident *Montreal, Canada*

- Co-created AI stacks for artists, including AR environments simulating masking behaviors in autistic individuals grounded in neuroscience research
- Built a Retrieval-Augmented Generation (RAG) framework for the "Huk: The Jaguaress" project, blending film-futurism and indigenous storytelling to highlight Amazonian protection and challenge colonial legacies in AI

Dell Technologies **Jun. 2021 - Jul. 2022**
Data Scientist *Bengaluru, India*

- Optimized the Order Management Team's workflow by proactively identifying and addressing bottlenecks
- Established an MLOps pipeline for unsupervised anomaly detection to manage fluctuations in order journey rates

Technical Skills

Languages: Python, Bash, C++, Markdown, Latex
Frameworks: PyTorch, Flask, MONAI, HuggingFace
Others: Git, SLURM, Inkscape, FSLeyes, TouchDesigner

Selected Projects

Spinal Cord Template | *Advised by: Dr. Julien Cohen-Adad and Dr. Benjamin De Leener* **Jan. 2023 – Jun. 2024**

- Developed an open-source framework that streamlines the entire spinal cord MRI template generation process into a single command-line operation, improving efficiency and reproducibility for researchers [code]

RE:GBDL | *Advised by: Dr. Tal Arbel* **Jan. 2023 – May 2023**

- Explored and replicated a bayesian deep learning architecture for semi-supervised medical image segmentation and conducted an evaluation of the model performance in out-of-distribution scenarios [report]

SAM-SC | *Advised by: Dr. Eva Alonso Ortis and Dr. Julien Cohen-Adad* **Feb. 2023 – Jun. 2023**

- Designed an automated segmentation method which uses a large-scale spinal cord data and is generalizable for out-of-distribution data by fine-tuning the Segment Anything Model [code]

Awards and Cocurriculars

- Winner of the SPORR 2025 Rigor and Reproducibility Award (1000 USD), Stanford Medicine **2025**
- Awarded Magna cum Laude Merit Award (Top 10%) at ISMRM Annual Meeting and Exhibition **2025**
- Reviewing for *Nature*, *NeurIPS BFM workshop*, *ICML NewInML workshop* **2025**
- CCAAI Art Residency work featured in *The Verge*, *XR Must*; nominated for the *2026 Annwn Prize* **2025**
- Awarded travel scholarship (1500 CAD) for AI Upperbound organized by University of Alberta **2025**
- Co-organized the NewInML affinity workshop at NeurIPS **2024**
- Awarded Master's Graduate Scholarship (38,000 CAD) from Polytechnqiue Montreal **2022 – 2024**
- Awarded the Graduate Excellence Scholarship (12,000 CAD) from Government of Quebec **2023**
- Fellows Coordinator — Fatima Al-Fihri Pre-Doctoral Fellowship **2022 - Present**

References

Dr. Julien Cohen-Adad - Mila and Polytechnique Montreal
Dr. Benjamin De Leener - Polytechnique Montreal
Dr. Hadi Shafiee - Harvard Medical School