

# MAINAK BISWAS

3rd year Ph.D. student at Brain and AI, Indian Institute of Science

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## ACADEMICS

Ph.D. in Brain and Artificial Intelligence

Indian Institute of Science, Bangalore

📅 Aug 2021 – Present   🎓 9.90/10  
Thesis title: Brain Age Prediction Using Diffusion Models

B.E. in Information Technology

Jadavpur University, Kolkata

📅 Aug 2017 – May 2021   🎓 9.51/10

ISC (XII) - Science and ICSE (X)

Don Bosco School, Liluah, Kolkata

📅 Apr 2004 – Mar 2017   🎓 97.25% and 96.00%

## PUBLICATIONS

### 👥 Conference Proceedings

- M. Biswas, M. U. Barath, S. Sunder, and D. Sridharan, "Does posner cueing engage attention or expectation? answers from an embedding-filtered deep convolutional network," in *2023 Conference on Cognitive Computational Neuroscience*, Oxford University, UK, 2023.
- M. Biswas, S. Rahaman, M. Mondal, and S. Gan Chaudhuri, "Multiple uniform circle formation by fat robots under limited visibility," in *Proceedings of the 24th International Conference on Distributed Computing and Networking*, Kharagpur, India: Association for Computing Machinery, 2023.

### 📄 Journal Articles

- M. Biswas, S. Rahaman, A. Ahmadian, K. Subari, and P. K. Singh, "Automatic spoken language identification using MFCC based time series features," *Multimedia Tools and Applications*, 2022.

### 📖 Books Chapters

- M. Biswas, M. Sahu, M. Agrebi, P. K. Singh, and Y. Badr, "Speech emotion recognition using deep cnns trained on log-frequency spectrograms," in *Innovations in Machine and Deep Learning: Case Studies and Applications*. Springer Nature Switzerland, 2023.
- M. Biswas, S. Rahaman, A. K. Jha, K. K. Singh, and S. G. Chaudhuri, "Uniform distribution of fat robots on a circle under limited visibility," in *Proceedings of International Conference on Advanced Computing Applications*. Springer Singapore, 2021.
- M. Biswas, S. Rahaman, S. Kundu, P. K. Singh, and R. Sarkar, "Spoken language identification of indian languages using MFCC features," in *Studies in Big Data*. Springer Singapore, 2021.

## RESEARCH PROJECTS

1. Predicting brain age with Supervised Domain Adaptation

📅 Jan 2024 – Ongoing   🎓 IISc  
• Customize several domain adaptation models to leverage out-of-distribution datasets in a supervised manner to solve data scarcity in dMRI datasets.

2. Generating Brain Connectivity Matrices using diffusion models

📅 Feb 2023 – Ongoing   🎓 IISc  
• Use diffusion models to generate brain DMRI connectivity matrices using conditioned on age

3. Predicting Brain age from DTI scans

📅 May 2023 – Ongoing   🎓 IISc  
• Predict brain age using supervised algorithms  
• Finally use the generative models in 1, to augment the small DTI datasets to improve age prediction

4. Decoding attention from EEG-scans

📅 Aug 2021 – Jan 2023   🎓 IISc  
• Aims to find neural signatures for attention and expectation using deep embedding-aided CNNs.  
• Uses saliency maps to their important spatiotemporal features  
• Addresses whether the Posner task is an attention/expectation cue using Transfer Learning

5. Spoken Language and Emotion Identification

📅 Jun 2019 – Jul 2021   🎓 JU  
• Classification of Indian languages using MFCC features.  
• Classification of Spoken emotion using speech spectrograms

## INDUSTRY EXPERIENCE

1. Text Normalization and Composite Word Separation using WFST

📅 May 2021 – Jul 2021   🎓 Samsung Research Institute, Bangalore  
• Developed a text normalization model (for several domains) using weighted finite state transducers.

## ACHIEVEMENTS

🏆 **PMRF fellowship**  
Direct Entry candidate 2021

★ **Examinations**  
Some of my academic achievements

- GATE 2021: AIR: 111, Score: 846/1000
- B.E. IT, JU: Department rank: 2
- Region topper in ISC 2017 (class 12)
- JEE Mains 2017: AIR-7698 (205/360); WBJEE: Rank-643
- Cleared NTSE round 1 (2014-15, District Rank: 1, WB).
- Top 10% in NSEJS 2013
- State rank in top 20 in NSTSE (thrice).

## TECHNICAL SKILLS

Linear Algebra   Probability Theory   Optimization   DSP

Information Theory   ML, DL, RL   NLP

Generative Models   Semi-supervised Learning   Neuroscience

DS & Algos   Python, Tensorflow   C, C++, Java   matlab

## ACADEMIC PROJECTS

1. Generative Models, Domain Adaptation, and Few Shot learning

📅 Aug 2022 – Dec 2022   🎓 IISc  
• Diffusion Model, VQ-VAEs, DC-GANS, DANN, and MAML

2. Safe RL using curriculum Learning

📅 Jan 2022 – May 2022   🎓 IISc  
• Safe-RL using curriculum learning on a dangerous gridworld

3. NLI, Mirror Descent

📅 Aug 2021 – May 2022   🎓 IISc  
• Natural language inference using LSTMs  
• Mirror descent optimization problems

4. Swarm robots forming geometric shapes

📅 Jul 2020 – Aug 2021   🎓 JU  
• Algorithm for multiple circle formation  
• Single uniform circle formation

5. Social Networking Site for Sports Lovers

📅 Jan 2019 – May 2019   🎓 JU  
• Java-based web application

## TEACHING EXPERIENCE

1. PMRF Taship

- Introduction to Mathematics for ML (JU, Aug 2023)
- Basic Calculus - I (NPTEL, Jan 2023)
- Introduction to ML (NPTEL, Aug 2022)
- Introduction to NLP (JU, Jan 2022)

2. IISc Taship

- Optimization for Machine Learning (Jan 2023)