Mainak **Pal**

B.E. (Electronics & Telecommunication), Jadavpur University

🌐 mpalrocks.github.io   @ mainak.pal08@gmail.com   ○ github.com/mpalrocks   in mainak-pal-a69566136   🎓 Google Scholar

📍 Kolkata, West Bengal, India

Education

Jun 2021 **Jul 2017**	**Jadavpur University** B.E. (Hons.), Electronics & Telecommunication │ CGPA: 8.88 _Thesis:_ _Data augmentation using Generative Adversarial Networks to improve Generalizability and Robustness of Finger-Induced Motor Imagery Classification._	**Kolkata, India**

Experience

Serre Lab │ Brown University [⊘]   **Providence, USA**
Present
May 2020
Summer Research Intern │ Advisor: Prof. Thomas Serre
Working on developing computational models of vision. Developed autoregressive models to perform unsupervised activity recognition of animal locomotion.

Artificial Intelligence Laboratory │ Jadavpur University   **Kolkata, India**
Jun 2021
Apr 2019
Undergraduate Research Assistant │ Advisor: Prof. Amit Konar
Worked on exploring Visual Cognition with generative models and adversarial attacks. Experimented on various Brain-Computer Interface tasks and developed efficient computational models.

Xu Lab │ Carnegie Mellon University [⊘]   **Remote**
Dec 2020
Jan 2020
Remote Intern │ Advisor: Prof. Min Xu
Worked on exploring various methods to extract information from tomographic data.

Visual and Image Processing Lab │ IIT Bombay [⊘]   **Mumbai, India**
Jul 2019
May 2019
Summer Research Intern │ Advisor: Prof. Biplab Banerjee
Explored zero-shot learning application on various domains. Worked on various generative and discriminative models to achieve better latent layer representation of multimodal visual feature space.

NLP Lab │ Jadavpur University   **Kolkata, India**
May 2019
Aug 2018
Undergraduate Research Assistant │ Advisor: Prof. Sudip Kumar Naskar
Worked on sentiment analysis of tweets and participated at task 6 on SemEval-2019.

Publications   (* = Equal Contribution)

A Generative Model Based Approach for Zero-shot Breast Cancer Segmentation Explaining Pixels' Contribution to the Model's Prediction [🔗]
Preeti Mukherjee*, <u>Mainak Pal</u>*, Lidia Ghosh, Amit Konar
Interpretable Artificial Intelligence - A Perspective of Granular Computing, Springer-Verlag

Generative Model-driven Structure Aligning Discriminative Embeddings for Transductive Zero-shot Learning [🔗]
Omkar Gune, <u>Mainak Pal</u>*, Preeti Mukherjee*, Biplab Banerjee, Subhasis Chaudhuri
Under review at Journal of Visual Communication and Image Representation, ELSEVIER

Multi-resolution Hierarchical Clustering by Vector Quantization [🔗]
<u>Mainak Pal</u>*, Preeti Mukherjee*, Amit Konar
International Conference on Cybernetics, Cognition and Machine Learning Applications, Goa, India (ICCCMLA 2019)

Efficient Machine Learning and Neural Network Approaches for Identifying and Categorizing Offensive Language in Tweets [🔗]
Preeti Mukherjee*, <u>Mainak Pal</u>*, Somnath Banerjee, Sudip Kumar Naskar
Proceedings of the 13th International Workshop on Semantic Evaluation (SemEval-2019), Minneapolis, USA

Selected Research Projects

Enhancing Generalizability and Robustness of BCI Tasks Using Generative Networks   Feb'21 - Present
Bachelor Thesis | Advisor: Prof. Amit Konar

> Designed a generative network to generate synthetic fNIRS data that are very similar to original data.

> Designed an end-to-end paradigm to perform classification based on the image biomarkers for finger tapping tasks.

Automatic Behavioral Analysis of C.Elegans Locomotion   May. 2020 - Present
Advisor: Prof. Thomas Serre

> Implemented autoregressive HMM and other statistical models to quantify and analyze worm locomotion.

> Working on various recurrent neural models to automate behavioral analysis of C.Elegans locomotion.

Domain Adaptation in Cryo-electron Tomography   Jan. 2020 - Dec. 2020
Advisor: Prof. Min Xu

> Incorporated a wasserstein distance based metric and a domain critic to leverage adversarial domain adaptaion in Cryo-ET data of different SNR levels.

> Exploring various methods to extract information from tomographic data.

Zero-shot Breast Cancer Segmentation [📄]   Nov. 2019 - Mar. 2020
Advisor: Prof. Amit Konar

> Trained the BiGan model on healthy data so that the trained model can construct nearest healthy samples from unhealthy data.

> Based on RISE model, we proposed a novel architecture for automatic segmentation of the tumor region from our previous understandings.

> Our approach is capable of segmenting tumors without using any unhealthy samples while training.

Transductive Zero-shot Learning [📄]   May. 2019 - Jul. 2019
Advisor: Prof. Biplab Banerjee

> Worked on the Transductive extension of Structure Aligning Discriminative Latent Embedding for Zero-Shot Learning.

> Explored zero-shot application on various domains.

> Explored implementation of various autoencoders on latent space and semantic space.

Vector Quantization Clustering [📄] [⌥]   Mar. 2019 - Feb 2020
Advisor: Prof. Amit Konar

> In existing clustering algorithms, larger attributes have more contribution in the distance measure in comparison to the attributes of small values. Thus, attributes of smaller values even if differ by larger magnitude are not encountered in the clustering algorithms - causing false clustering.

> To overcome this problem, we have proposed an novel clustering algorithm based on quantization at each attribute level.

> Our approach performs better than state-of-arts and also computationally less expensive. We have worked on several gene-micro array datasets, breast cancer dataset. Proposed method is also helpful in time-series modeling.

Identifying and Categorizing Offensive Language in Social Media [📄] [⌥]   Sep. 2018 - Feb. 2019
Advisor: Prof. Sudip Kumar Naskar

> Sentiment analysis on a set of tweets. Automatic identification of offensive tweets and target of offence.

> Explored multiprocessing and implemented different techniques of machine learning (like Logistic Regression, Linear SVC, LinearSVC with L1-based feature selection , Multinomial NB, Bernoulli NB etc.)

> Implemented several Deep Learning networks like CNN-word2vec, attention based Bi-RNN with LSTM.

Skill-sets

> **Operating Systems:** Linux • Windows
> **Programming Languages:** Python • C++ • C • Matlab
> **Data Science Libraries:** Numpy • Scikit-learn • SciPy • Matplotlib • Pandas • Gensim
> **Deep Learning Libraries:** Pytorch • Keras • Tensorflow
> **Web Development:** HTML • JavaScript • CSS • Node.js • React
> **Typesetting Tools:** LaTeX • Markdown
> **Version Control**: Git

Responsibilities

IEEE Computer Society Student Chapter, Jadavpur University   *Founder and Chairperson*   Mar. 2019 - Aug. 2020

> The Computer Society of the JU, IEEE student branch aims to to be a leading provider of technical information, community services, and personalized services to the world's computer professionals. It is our goal to integrate our activities beyond the realms of competitive coding into the broader aspects of Computer Science.

IEEE Jadavpur University Student's Branch   *Webmaster and Technical Lead*   [⊕] [○]   Feb. 2019 - Aug. 2020

> The Jadavpur University IEEE student branch, founded in 2010, belongs to the Kolkata section of Region 10 of the organization.
> Developed and maintained the website of the student branch. [○] [⊕]
> Lead the technical team of 12 members. Technical team of the student branch is responsible for providing any kind of technical assistance during events.

Extracurricular

IEEE TechX Congress: Eastern India Techno-Leadership Summit 2020   *Technical co-lead*   [⊕]   Feb. 2020

> Managed the technical team of 18 members.
> Developed and maintained the website for aforesaid event. [○]

ML Accelerator Summit   *Head Coordinator*   [⊕]   Oct. 2019

> ML Summit is a tiny step to help students, engineers and tech enthusiasts live the AI dream.
> Developed and maintained the website for aforesaid event. [○]

Think.AI : The IEEE Machine Learning Summit'19   *Head Coordinator*   [⊕]   Apr. 2019

> Two day workshop on Machine Learning organised by IEEE CS, Jadavpur University.
> Developed and maintained the website for aforesaid event. [○]

Electrophoria'18   *Core Member of Web Development Team*   [⊕]   Oct. 2018

> Departmental freshers' - ETCE, Jadavpur University.
> Developed and maintained the website for aforesaid event. [○]

References

Dr. Thomas Serre
Associate Professor
CLPS, Brown University, USA
@   thomas_serre@brown.edu

Dr. Amit Konar
Professor
ETCE, Jadavpur University, India
@   amit.konar@jadavpuruniversity.in

Dr. Biplab Banerjee
Assistant Professor
CSRE, IIT Bombay, India
@   bbanerjee@iitb.ac.in

Dr. Sudip Kumar Naskar
Associate Professor
CSE, Jadavpur University, India
@   sudip.naskar@gmail.com