Arka **Mitra**

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Education

Indian Institute of Technology, Kharagpur *Kharagpur, West Bengal*

B.Tech(Hons) in Electronics and Electrical Communication Engineering *July,2017 - Present*

- CGPA-9.39/10.00, till 6^{th} semester

Indian Institute of Technology, Kharagpur *Kharagpur, West Bengal*

Minor in Computer Science and Engineering *July 2017 - Present*

- CGPA-9.3/10.00 till 6^{th} semester

Central Board of Secondary Education(10+2) *Kolkata, West Bengal*

South Point High School *2015 - 2017*

- 94.8% in CBSE

Papers

Modified Particle Swarm Optimization Algorithms for the Generation of Stable Structures of Carbon Clusters, Cn (n= 3-6, 10) *2019*

Frontiers Chemistry *Prof Shamik Sural,Pratim Chattaraj*

- Application of PSO (and comparism with other optimistaion techniques)integrated with Density Functional Theory for the optimisation of Molecule energy.
- Was the second author of the paper.

A Systematic Search over Deep Convolutional Neural Network Architectures for Screening Chest Radiographs *2020*

EMBC *Prof Debdoot Sheet*

- Implemented various models in Pytorch to improve on the benchmark set by the ChexNet and tackled the uncertainties in the dataset in three distinct ways.
- Was the first author of the paper.

Towards Integrating Firefly Algorithm with Density Function Theory for Global Optimization of Al42- Clusters and its Implication in Aromaticity *2020*

TCA *Prof Shamik Sural,Pratim Chattaraj*

- Studied more algorithms and further ways to optimize. Improved the rate of convergance by imposing planarity on certain molecules.
- Studied the correlation between Aromaticity and Energy of Aromatic Structures along with the application of Density Functional Theory.
- Was the first author of the paper.

Causality Detection Using Sentence Embeddings in Financial Reports *2020*

Accepted in FNP-FNS COLING2020

- Applied Bert Sentence embedding to predict if the sentence is causal or not.
- Was the first author of the paper.

Automated Covid-19 Detection using Deep Learning Techniques *2020*

Computer-aided Design and Diagnosis Methods for Biomedical Applications *Prof Abdulhamit Subasi*

- Applied both classical machine learning techniques and deep learning algorithms to check their performance on COVID-19 dataset with low number of images.
- Was the first author of the book chapter.

Joint Paper on Drone vs Bird Detection Challenge *2020*

Ongoing

- Applied Faster-RCNN with a feature pyramid network to achieve the third position.
- Performed negative hard mining and analysed the problems on the dataset.

Determination of Stable Structure of a Cluster using Convolutional Neural Network and Particle Swarm Optimization *2020*

Ongoing Review in JPC *Prof Shamik Sural,Pratim Chattaraj*

- Applied Machine learning to generate the approximate energy of a cluster and find best cluster using methods like PSO.
- Was the first author of the paper.

Double Blind Review Ongoing *2020*

Ongoing Review in AAAI *Prof Samira A. Rahimi*

- Applied Machine learning models to forecast what the number of infections should have been.
- Helped in developing a model that can tackle prediction in regions having more than one peak.
- Was the first author of the paper.

Internships/Projects

Early Earthquake Detection System *Professor Tarun Kanti Bhattacharya*

Indian Institute of Technology Kharagpur *May 2019-July 2019*

- Helped in the detection of P and S waves from a series of miniseed data by using STA-LTA and other algorithms.

Improvement of CheXpert Dataset *Professor Debdoot Sheet*

Indian Institute of Technology Kharagpur *June 2019 - August 2019; August 2020 - Ongoing*

- Various experiments with different models and different methods were implemented to tackle uncertain data.
- Applied RISE and GradCAM after final training to detect the regions of the picture that described where the disease was.
- Checked the performance increase with increase in FLOPs in accordance to the EfficientNet paper.

Computational Chemistry Integrated with Machine Learning *Professor Shamik Sural*

Indian Institute of Technology Kharagpur *October 2018 - January 2020*

- Applied PSO and other optimisation techniques for finding most stable cluster of Molecules.
- Reduced time of convergence of the various algorithms in chemical structure search by imposing planarity on plausible molecules.
- Showed correlation between aromacity and energy for aromatic molecules.
- Developed a neural network and integrated it with other optimisation techniques to further improve the optimisation time.

Question Answering with Dynamic-Clip Attention Mechanism *Professor Pawan Goyal*

Indian Institute of Technology Kharagpur *August 2019 - December 2019*

- Implemented the paper on question answering with dynamic attention-clip in the latest keras and theano versions.
- Applied it to verify and predict specifications based on products.

Bird Pathway Prediction Algorithm *Shobha Rajashekar*

HoneyWell *June 2020 - July 2020*

- Implemented various object detection algorithms for finding birds.
- Plan to implement tracking on the birds and consequently determine which determine which way the bird might go to.
- Secured third position in 3^{rd} Drone vs Bird Challenge organized by WOSDETC.
- Appended the algorithm into Honeywell servers for access within the Honeywell servers.

Artificial Intelligence in Medical Domain *Professor Samira A. Rahimi*

McGill University *April 2020 - Ongoing*

- Calculated feature importance of various factors on death of a person affected by Covid-19.
- Developing an interactive platform for predicting the number of cases.
- Explored the impact of reopening of schools on the number of Covid-19 cases.

Covid-19 Detection from CT Scans *Professor Abdulhamit Subasi*

Effet University *June 2020 - August 2020*

- Evaluating different models to detect Covid-19 from CT scans.
- Implementing GANs for augmenting data.

Analysis of Diseases from Embedding Space *Professor Jackie N.K. Cheung*

MILA Institute *September 2020 - Ongoing*

- Data mining different medical abstracts from different sources.
- For a particular disease, trying to find important correlation among the symptoms of the disease.

Honors & Awards

2014 **NTSE**, Secured State Rank 14 in State of West Bengal in National Talent Search Examination.

2015-16 **KVPY**, Qualified for fellowship under Indian Institute of Science for pursuing basic science research.

2017 **JEE Advanced**, Obtained a rank within top 0.1% students of India for admission to IITs.

2017 **WBJEE**, Secured rank 22 in West Bengal Joint Entrance Examination out of 0.1 million candidates.

2017 **NSEC,RMO**, Cleared RMO and NSEA.

2017 **ISI**, Cleared ISI Kolkata with a rank of 14.

2020 **Google Research India Summer School**, Selected in Natural Language Understanding Track.

Technical Skills

Indian Institute of Technology,Kharagpur

Programming Languages and Frameworks

- Programming Languages: C, C++, Python, Java, Julia, MATLAB, Verilog, CUDA, Intel x86 Assembly, HTML, CSS, JavaScript.
- Frameworks: PyTorch, Tensorflow, Keras.
- Other libraries and softwares: LaTeX, Git, cuDNN, OpenCV, BeautifulSoup.

Coursework

Indian Institute of Technology,Kharagpur *L -> With Lab*

Relevant Coursework

- Data Structures and Algorithms (L) | Probability and Stochastic Processes | Differential Equations | Linear Algebra | Machine Learning | Microprocessors and Embedded Systems | Digital and Analog Communication (L) | VLSI Engineering (L) | Computational Number Theory | Digital Signal Processing (L) | Digital and Analog Electronics (L) | Electromagnetism | Control Systems | Semiconductor Devices (L) | Advanced Machine Learning(O) | Natural Language Processing(O) | Reinforcement Learning(O) | Information Retrieval(O)

Massive Open Online Courses *C -> With Certificate*

Online coursework

- Deep Learning Specialization[C] | Convex Optimization (Stanford University) | Stanford Online Courses (Cs231 224) | Mathematics Behind Machine Learning Specialization[C]

Extracurricular Activities

2017-2019 **NSS**, Best Volunteer Award in NSS Annual Camp.

2019-2020 **Student Welfare Group**, Mentor to a group of sophomores in their campus related problems.

2018-2020 **IEEE**, Webmaster at IEEE Student Branch.

2019-2020 **Tutorbin**, Tutor in an online portal with a rating of 4.8.

2020 **Deeplearning.ai**, An alpha-tester at Deeplearning.ai and Mentor of the NLP specialization.