Debajit Chakraborty

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Education

B.Tech. in Electronics with Minor in Computer Science & Micro Specialization in AI **GPA: 9.63/10.0**
Indian Institute of Technology, West Bengal, Kharagpur *AGPA:9.79/10.0 | Graduating June 2022*
Advisor: Prof. Partha P Chakrabarti

Senior Secondary School Examination **Percentage: 98.2%**
Amity International School, Gurgaon *2018*

Research Interests

Reinforcement Learning, Dexterous Hand Manipulation, Robotics & AI, Natural Language Processing, Sentiment Analysis, Multi-Agent Control, Machine Learning, Deep learning, Information Retrieval, Medical Imaging

Publications and Workshops

- D Chakraborty, P Das, B P Reddy, S Sarkar, A Mukherjee. When expertise gone missing: Uncovering the loss of prolic contributors in Wikipedia In *The 23rd International Conference on Asia-Pacific Digital Libraries, ICADL 2021* **(Aug'21)**
- D Chakraborty, D Saha, N Paharia, P Saha, A Mukherjee. Ensembling strategies for Transformer-based Offensive language Detection. In *The First Workshop on Speech and Language Technologies for Dravidian Languages, EACL 2021* **(Mar'21)**[PDF]
  - Overall **Winner** outperforming next candidate by **5%** F1-score | **1st, 1st, 2nd** in Tamil, Malayalam & Kannada respectively
  - Coined ensemble technique like Fusion Ensemble, Multi-seed Ensemble for robust hate-detection in Dravidian codemix dataset
- Selected for Workshop on Algorithms on Big Data and ML | ACM India Winter School 2021 | India **(Jan' 21)** [PDF]

Experience

Quadeye Securities **Gurgaon, India**
Quantitative Strategist *June 2021 - July 2021*
- Built robust models which predicted price movement to generate buy-sell triggers for novel **aggressive** intraday-trading strategy
- Used an event-driven architecture to aggregate data trends and tracked various market activities through **Limit Order Book**
- Extracted features and designed indicators from daily market data to predict risk and profitability of securities with high accuracy
- Quantitatively analyzed the **correlation** between indicator values and future returns to improve reliability of predicted alphas

Graphics Research Group, IIIT Delhi **Delhi, India**
Research Assistant, Virtual Endoscopy Project *Jan 2021 - Apr 2021*
- Worked with **Medical Imaging(Cryogenic)**, surveyed existing techniques, configured whole human body from millions of slices
- Registered the various human body parts, Collaborated with team of **40+** researchers for deployment after passing test routines
- Performed parameters exploration on Visible Human Dataset, working on **Large Volume Production Data**(in TeraBytes)

Complex Networks Research Group, IIT Kharagpur **IIT Kharagpur, 2021**
Summer Intern, Exploiting BERT for End-to-end Aspect Based Sentiment Analysis *May 2020 – Aug 2020*
- Formulated strategy for data **Collection**, **Annotation** and Preprocessing of Tourist Reviews, with aspect and opinion extraction
- Achieved state-of-art performance (**77% acc.**) in Sentiment Analysis on custom made dataset, compared to gold standard datasets
- Made an **end-to-end** pipeline of ensembled classification models with interpretable report, Performed benchmarking on 8 models

Projects

Research Project *Advisor: Vikash Kumar | May 2021 – Present*
- Currently Working on generating Deep Data-Driven Reinforcement Learning Datasets for offline reinforcement learning algorithms
- Working on Dexterous Hand Manipulation Techniques using latent space reference points
  Research Areas: Dexterous Hand Manipulation, Offline Reinforcement Learning

Bachelor Thesis Project, IIT Kharagpur *Advisor: Prof. Partha P Chakrabarti | February 2021 – Present*
- Performed extensive literature review of existing Multi Agent algorithms on emergent communication in **supply chain setting**
- Implemented a novel strategy of introducing **communication, competition and collaboration** to maximise shared rewards
- Creating a **Scalable end to end framework** with novel evolutionary algorithm in multi agent setting for Multi-Agent Systems
  Research Areas: Multi-Agent Reinforcement Learning, Active Reinforcement Learning, Emergent Communication

Loss of prolific contributors in Wikipedia *Advisor: Animesh Mukherjee | December 2020 - April 2021*

- Achieved **massive improvements of 20%** in identifying Wikipedia Editors leaving the platform helping in **early retention**
- Extracted the User information of Wikipedians and performed sentiment analysis **(65% acc.)** to gauge **levels of satisfaction**
- Created **16 different features** about Wikipedians and ran Fusion Net on these features with different sentence embeddings

*Research Areas: Natural Language Processing, Machine Learning, Information Retreival (Currently accepted in **ICADL 2021**)*

Kharagpur Robosoccer Students' Group *Advisor: Alok Kanti Deb | Mar 2019 - Present [CODE]*

- Built **cooperative multi-agent** systems in highly dynamic adversarial environment of RoboSoccer, Wrote coordinated plays
- Developed a **virtual simulator** for connecting local cameras with simulation client using ROS and pygame graphic user interface
- Inspected end-to-end **Warehouse Management** Solutions by implementing RRT/RRT* Planning Algorithms on real-life robots
- Worked on skills like passing & defense on top of C++ framework; Controlled movement using p-controller in ROS Turtlesim

Research Areas: Motion Planning, Reinforcement Learning, Finite State Machines, Algorithms

Compute vs Data Transfer: Memory Optimizations for Neural Networks *Feb 2021-Apr 2021 [CODE]*

- Proposed a efficient Layer-Adaptive memory optimization algorithm based on online profile, resulting in a trade-off between saving **50%** GPU memory and **100%** better execution time. Trained neural networks using lower GPU budget without sacrificing speed.
- Validated the **trade-off** between Extra Forward Computation and CPU-GPU Transfer as optimisations in training in CNNs and successfully **Implemented algorithms** based on transfer and compute sensitive layers.

Research Areas: Neural Networks, High Performance Parallel Programming, Optimization, GPU Scheduling using CudNN

Privacy preserved stable Real-Time Pricing *Advisor: Soumyajit Dey | Sep 2020 – May 2021*

- Experimented the behavior of privacy preserved as well as without privacy systems on various types of **time series** data showing both its robustness and stability. Used diverse solvers to solve **non-convex** problems for combinations of suppliers and consumers.
- Coded an entire system of consumers and suppliers following our **novel algorithm** for stability in Privacy preserved stable real time pricing considering real life scenarios. Achieved better, quicker and robust results than existing algorithms for privacy preservation

Research Areas: Optimization Techniques, Privacy in Grid Networks, Stability

Winter Intern, IIT Delhi *Advisor: Abhijit R. Abhyankar | Dec 2019 – Jan 2020 [CODE]*

- Implemented novel techniques of CNNs on time series data instead of standard approach of RNN's on sequential data. Benchmarked Deep Learning models such as CNN,RNN+LSTM,GRU,RESNET Models on AMPDs dataset; Performed extensive literature review.
- Devised **end-to-end models** which predicted which monitored supply of electrical items given power and voltage time series data.

Research Areas: Deep Learning, Electrical Grid Networks, Convolutional Neural Networks

Technical Skills

- **Coursework:** Reinforcement Learning, Natural Language Processing, Machine Learning, Deep Learning, Parallel Programming
- **Languages:** C++, C, Python, MATLAB, SQL, JAVA, CudNN, OpenMP, MPI
- **Software:** Linux Shell Utilities, Git, Robot Operating System, Slicer3D
- **Others:** Tensorflow, Pytorch, Pytorch3D, Keras, ITK, Pybullet, RLlib, OpenCV, pandas, Scikit-learn, numpy, BeautifulSoup

Awards and Achievements

- 2021: Top 1% among 1400+ undergraduate students in the institute; Ranked 4th in department
- 2021: Second Runners Up in **Uber Hacktag** Grand Finale among 12,000+ registered teams | Developed a MVP [$Code$]
- 2020: Part of the **only team from India(KRSSG)** to qualify for International Robocup, 2020 (Bourdeux, France) [$Code$]
- 2018: Overall **Gurgaon City Topper** as well as School Topper in Science in CBSE **(98.2%)**; Felicitated by National Newspapers
- 2018: **AIR 245 (top 0.0001%)** and **AIR 550 (top 0.001%)** in JEE Main and JEE Advanced respectively among 1.3 million
- 2018: Rank **29 (top 0.0001%)** in West Bengal Joint Entrance Examination India among 0.25 million
- 2018: **AIR 372 (top 0.005%** in Kishore Vaigyanik Protsahan Yojana Scholar (SX) - Indian Institute of Science, Bangalore
- 2017: **AIR 73 (top 0.0001%)** in Kishore Vaigyanik Protsahan Yojana Scholar (SA) - Indian Institute of Science, Bangalore
- 2016: National Talent Search Examination Scholar by Government of India

Mentorship and Leadership

IEEE Mentor, Winter School of AI & Robotics, IIT Kharagpur *March 2021*

- Mentored a 7 day hands-on course on **"Machine Learning and basics of Computer Vision"** to 200+ 1st year students
- Formulated challening problem statements for end-workshop evaluation and mentored students on their projects

Artificial Intelligence Team Member, Kharagpur Robosoccer Students Group *Mar 2019 – Present*

- **Regular Speaker** at weekly reading groups of research Group. Mentored and Guided sophomores in various fields of Robotics.
- Co-hosted a **pan-India robosoccer simulation** knockout tournament on FIRE bots with 40+ teams.

Institute Mentor and Student Mentor, Grimoire of Code *Aug 2020 – Present*

- Responsible for guiding 6 freshmen, focusing on their academic and holistic development and providing counsel
- **Mentoring** and guiding a group of 5 first year students get acquainted with competitive programming

Senior Consultant, 180DC IIT Kharagpur Chapter *Mar 2020 – Dec 2020*

- Responsible for on-boarding projects; Interacting with clients; Delivered Project on child healthcare NGO(**Smile Foundation**)