Saptarshi Mandal

smandal4@illinois.edu | University of Illinois, Urbana-Champaign | 61801,Urbana, Illinois

Education

University of Illinois Urbana-Champaign *GPA : 4/4*

PhD in ECE(Ongoing) ; Advisor - R. Srikant Aug 2021 -

Indian Institute of Technology, Kharagpur *GPA : 9.34/10*

Joint B.Tech-M.Tech, major in EECE and minor in CSE Aug 2016 - April 2021

Work Experience

NVIDIA, Bangalore *India*

Project intern-digital profile 2019, May-June

- Automated the fault aggregation part of error collation from the IP metadata of the Orin SoC architecture accessing the Google Drive API in the Pearl script and parsing IP metadata efficiently.
- Built a comprehensive latency calculator using the maps between IPs in the same SoC architecture. Exponentially reduced the latency calculation time using shortest path algorithms and recursion in Python.

Research Projects

Single Use Restless Multi-arm Bandits: Models and Efficient Algorithms *Google Research, AI for Social Good*

Supervisor - Prof. Milind Tambe, Harvard; Collaborator: Assistant Prof. Niclas Boehmer, HPI, Germany Fall, 2023

- Worked on a real-world dataset developed to model the intervention effect of health workers across India to design efficient algorithms ensuring sequential decision-making under scarce resources .
- Contributed to the modeling of general Restless Bandit framework suitable for the intervention effect dataset in Google Research, India, and characterized the assumptions required for asymptotic optimality of different computationally effective policies.

Insights into Soft-Label Training: Why Fewer Neurons, Faster Convergence? *UIUC*

Supervisor - Prof. R. Srikant, UIUC; Collaborator : Prof. Lin Xiaojun, CUHK 2023 - 2024

- Theoretical insights for a few widely known phenomena of Knowledge Distillation including Model Compression (using traditional labels vs. soft labels for training in Supervised Classification task) using the tools of Neural Tangent Kernel.
- Proving a geometric convergence rate in Projected Gradient Descent for 2-layer Neural Networks for Binary Classification tasks, giving insight into why soft labels enjoy a superior convergence rate to hard labels in training.

Inferring Labels from Multi-type Crowdsourced Data *UIUC*

Supervisor - Prof. R. Srikant, UIUC; Collaborators: Seo Taek Kong, Dimitrios Katselis 2021 - 2022

- Extended the Dawid-Skene (DS) model to multi-type cases and analyzed the error bounds of existing algorithms. Focusing on the case where there are two types of tasks, we propose a spectral method to partition tasks into two groups that cluster tasks by type. Our analysis reveals that task types can be perfectly recovered if the number of workers scales logarithmically with the number of tasks.
- Link to the Paper: `https://arxiv.org/abs/2302.07393`

An Online Delay-reliable Efficient Algorithm for Multi-resource Allocation *M.Tech Project*

Supervisor - Prof. Goutam Das, IIT Kharagpur 2020 - 2021

- Proposed a polynomial time delay reliable scheduling strategy for multi-resource allocation in wired media optimal in the presence of adversarial packet arrival; Proposed an approximate solution for multiple types of packets for the same.

Optimal Scheduling Strategy for IoT Sensor Nodes with Energy Harvesting Minimizing the Service Delay *B.Tech Project*

Supervisor - Prof. Goutam Das, IIT Kharagpur 2020

- MDP formulation of a sensor network to choose between transmission and energy harvesting in a centralized fashion; For the case of 2 sensors, proposed the decentralized algorithm.

Parameter Calibration for EESM and TIESNR for 5G NR *Summer Research Fellowship(IAS)*

Supervisor - Prof. Neelesh B. Mehta, IISc 2020

- Calibrated the parameters of two widely used Effective SNR mappings(link quality matrices) - EESM(Exponential Effective SNR mapping) and TIESNR(Time-invariant Effective SNR) in 5G radio through link level simulations in MATLAB 5G Toolbox.

Relevant Graduate Courses with Grades

Machine Learning	Stat. Learning Theory(A), Stat. Reinforcement Learning(A), Neural Networks and Applications(A)
Probability	Random Processes(A+), High Dimensional Prob.(A+), Information Theory (A+), Queueing Theory(A+)
Optimization, Game Theory	Adaptive Systems(A+), Network Optimization(A+), Game Theory(A+)
Algorithms	Approximation and Online Algorithms(A), Communication Signal Processing and Algorithms(A+)

Teaching Experience

UIUC	**Graduate Course**: "Introduction to Optimization"	*2024*
IIT Kharagpur	**Under-Graduate Lab**: "VLSI Lab"	*2021*
IIT Kharagpur	**Under-Graduate Lab**: "Microcontroller Systems Lab"	*2020*

Technical Skills

Programming	Matlab, C, Python, verilog
Software and Platforms	Simulink, Omnetpp, CPLEX, Xilinx ISE,LaTeX, Beamer,git
Languages	English(Fluent), Hindi(Fluent), Bengali(Native)

Awards and Honors

IISc	**Scholarship**: "KVPY "	*2016*
IISc	**Fellowship**: "Summer Research Fellow" by "Indian Academy of Science"	*2020*

Extra Academic Activity

- Former Hardware Modelling Team Member, LBS hall, IIT Kharagpur
- Former captain, Bengali Dramatics - Nehru Hall, IIT Kharagpur
- A Master of Ceremonies in the main event in Bengali Student Organization, UIUC