Samrat Mukherjee

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Education

Degree/Certificate	Institute/Board	CGPA/Percentage	Year
Ph.D.	Indian Institute of Technology, Bombay	8.94	2023-Ongoing
M.Tech.	Indian Institute of Technology, Patna	9.69	2023
B.Tech.	Government College of Engineering and Leather Technology, Kolkata	9.34	2021

Projects

- **Enhancing Attention mechanism in CNN via Transformers using Self-supervision** *Sept. 2023 - Nov. 2023*
  Course project | Deep Learning-Theory and Practice | Supervised by. Prof. P.Balamurugan | IIT Bombay
  – Used Self-supervision using Swin Transformer blocks to have attentive CNNs
  – Improved Top-1 accuracy by 2.8% on ImageNet100 dataset using Multi-scale aggregation.
- **Reliability enhancement of Deep Neural networks against Adversarial examples.** *Feb. 2024 - May. 2024*
  Course project | Optimization in Machine Learning | Supervised by. Prof. G. Ramakrishnan | IIT Bombay
  – Estimated Sample difficulty using pre-trained models to measure the difficulty of test examples for classification.
  – Enhanced Adversarial robustness by 40% using sample difficulty aware Adversarial training algorithm.
- **Enhancing robustness of Medical Deep Neural Networks using Universal Adversarial examples** *May 2022 - June 2023*
  Master's Thesis | Supervised by: Prof. Asif Ekbal
  – Developed an algorithm to counter unseen Adversarial inputs for Diabetic Retinopathy systems.
  – Enhanced performance on average by 3.41 Cohen-kappa score on unseen Adversarial attacks.
- **Image Super Resolution using SR-ResNet** *Mar. 2022 - Apr. 2022*
  Course Project | Deep Learning | Supervised by: Prof. Arijit Mondal | IIT Patna
  – Achieved 30.685 PSNR and 25.981 PSNR on the Set-5 and Set-14 datasets.
  – Non-usage of BatchNorm layers was found helpful for better reconstruction.
- **Evaluating and Visualizing effects of Adversarial Attacks on SOTA image classifiers** *Sept. 2020 - June 2021*
  Quantified performance degradation upon using Adversarial samples
  – Designed a novel Robustness parameter to compare different architectures.
  – VGG16 was found 7 times more vulnerable than DenseNet169 and MobileNetV2.

Experience

- **Tata Consultancy Services - Research and Innovation Labs** *May 2022 - Jul. 2022*
  Research Intern Bengaluru, India (Remote)
  – Worked on Large-scale Point Cloud Segmentation problem for Autonomous Driving Scenarios.
  – Improved the mIoU by 2.2% upon using Dynamic Subsampling in the SemanticKITTI dataset.
- **Indian Institute of Science** *June 2019 - Aug 2019*
  Summer Research Intern Bengaluru, India
  – Worked on 3D surface reconstruction using ArUco markers for objects like Pot, Mask etc.
  – Achieved 7x better reconstruction using 1-marker erasure tolerant grids compared to erasure intolerant grid.

Key Courses Taken

- Algorithms, Machine Learning, Deep Learning, Linear Algebra, Probability, Computing Systems.

Technical Skills

- **Programming Languages/Libraries/Framework:** C/C++, Python, SQL, Pytorch, Scikit-learn, Pandas, Numpy

Positions of Responsibility

- **Teaching Assistant,** Machine Learning(DS303), Data Science (DS203) at IIT Bombay *February 2024 - Present*
- **Teaching Assistant,** Algorithm, Artificial Intelligence and DBMS-Lab at IIT Patna *July 2021 - May 2023*
- **Assistant Head Coordinator,** Training & Placement Cell, IIT Patna *May 2022 - May 2023*

Achievements

- **Institute Silver Medal** Highest CPI in M.Tech. batch (2021-2023), CSE-department, IIT Patna. *May. 2024*
- **All India Rank 45** Indian Statistical Institute Kolkata, Entrance test for M.Tech. *July. 2021*
- **All India Rank 487** out of 1 lakh candidates in Graduate Aptitude Test in Engineering *Feb. 2021*
- **World Rank 47** HackerEarth Deep Learning challenge *Feb. 2020*