Aneek Roy

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EDUCATION

New York University - *MS in Computer Engineering*　　　　　　**Sept 2022 - Aug 2024**
Courses : Computer Vision, Machine Learning, Deep Learning, Robot SLAM, ML in Cyber Security, Signal Processing　　*New York City, USA*

Jadavpur University - *BE in Computer Science and Engineering*　　　　**Aug 2014 - May 2018**
Courses : DSA, Data Science , Natural Language Processing, Operating Systems, Computer Networks, Data Mining　　*Kolkata, India*

WORK EXPERIENCE

Indian Institute of Technology Delhi | Research Associate　　　　*April 2025 – Present*

- Conducting cutting-edge research on downscaling large language models (LLMs) through model merging, pruning, and quantization techniques, aiming to preserve performance while drastically reducing computational cost.
- Developed a novel ensemble-based merging framework for sparsified submodels, achieving Pareto-optimal trade-offs between parameter count and inference accuracy across multilingual benchmarks.
- Designed reproducible pipelines for low-resource fine-tuning and active learning, enabling efficient domain adaptation with minimal labeled data.
- Collaborating with LCS2 lab faculty and peers to co-author a AAAI submission focused on geometric regularization techniques for model interpolation in language generation tasks.

New York University | Graduate Student Assistant　　　　**February 2023 - September 2024**

- ∗ Developed a foundation model using a modified SimCLR self-supervised learning framework, optimized for medical imaging datasets to improve lesion detection tasks across different modalities.
- ∗ Enhanced Biomedical Data Classification: Achieved a 5% improvement in diagnostic accuracy for biomedical histograms by incorporating information geometry and beta distributions, outperforming traditional classification methods.
- ∗ Optimized Feature Extraction Techniques: Demonstrated superior efficacy using high-dimensional foundational model feature space, compared to lower-dimensional beta representations, improving classification accuracy in lung nodule malignancy prediction and NSCLC prognostication.
- ∗ Utilized Riemannian Metric Spaces: Applied Fisher-Rao geometry to improve the consistency and interpretability of clustering and classification tasks, providing insights into the underlying data structure for medical datasets.
- ∗ Implemented Stability and Interpretability Measures: Employed saliency maps to identify biologically relevant regions, aligning model predictions with current tumor biology and enhancing the interpretability of prognostic outcomes.
- ∗ Explored Advanced Geometric Representations: Investigated the role of beta distributions and Riemannian metrics in modeling complex data structures, revealing a 5% increase in accuracy for clustering and classification tasks over Euclidean methods.
- ∗ Conducted Empirical Analysis Across Multiple Tasks: Validated model performance across three distinct tasks—lesion anatomical site classification, malignancy prediction, and NSCLC prognostication—highlighting the robustness of self-supervised foundational models in clinical applications.
- ∗ Contributed to Biomedical Research with Foundational Models: Built a comprehensive framework that integrates deep learning and geometric methods, demonstrating significant improvements in lesion detection, classification tasks, and patient prognosis modeling with fewer data samples.

General Electric Healthcare | **Senior Software Engineer**　　　　**July 2018 - August 2022**

- · Simplified and centralised system interaction logging to improve system boot time by $\approx 20\%$ and compile time improvement by $\approx 30\%$ while working for ECG division of Diagnostic Cardiology team.
- · Implemented security protocols for GDPR compliance of ECG firmware upgrade and improvement of data governance.
- · Designed system to filter noise in ECG wave-forms reducing warm up time for signal capture by $\approx 15\%$.
- · Prototyped AR software to assist paramedics and physicians with ECG lead placements.
- · Setup infrastructure for offline support of critical features in app used field engineer using Chrome service workers
- · Integrated a geolocation based inventory management and procure system for on location support of field engineers.
- · Migrated Billing and Financial Engine from internal cloud infrastructure to AWS without affecting any product features.
- · Created a tool for cost rollup for products belonging to all modalities, which improved cost tracking and reduced time spent by resource managers by $\approx 30\%$ across all measured statistics.

Samsung Research Institute | Bangalore, India | Software Engineering Intern　　　**May 2017 - July 2017**

- · Designed and implemented a system for developers to export compatible Google web store apps to Tizen Web Ecosystem.
- · Worked on json and manifest parsing along-with settings, privilege and certificate management for both the systems for fully functional integration from user perspective for a test set of around 100K apps.

TECHNICAL SKILLS

Languages: Python, Java, C, C++, JavaScript, SQL, NoSQL, R, XML, HTML, CSS
Technologies/Frameworks: Kubernetes, Docker, Apache Storm, Flink, Druid, Apache Kafka, Airflow, Presto, Terraform, Hadoop, Ansible, AWS, Springboot, ReactJS, Redux, QT, AngularJS, NodeJS, PolymerJS, Git, MongoDB, PyTorch, Keras, TensorFlow, OpenCV, Objective-C, Xcode, PostgreSQL, AWS, Snowflake

PROJECTS/ACHIEVEMENTS

* Designed a mouse pointer manipulation system guided by real time detection of hand gestures and fingers.Alternate Data for Micro-Forecasting for time series. Adversarial Attacks on Large Language Models. **Presentation — Video**
* Artistic Style Transfer Using Convolutional Neural Networks. **Seminar Slides — Abstract — Project Report**
* Implemented Neural Radiance Fields(NeRF) to create 3D representations to improve upon PixelNerf, RegNerf and SegNerf.

RESEARCH INTERNSHIPS

Jadavpur University | Kolkata | Undergraduate Research Assistant   **May 2016 - July 2018**
· Music Emotion Recognition Tasks on MIREX,Sound Tracks and Media-Eval datasets through supervised machine learning models. Achieved an improvement of 6-10% in accuracy over the state-of-the-art methods.
· Devised a computer vision system based on optical flow tracking through video processing to classify crowd motion pattern.

R.C. Bose Centre for Cryptology, ISI | Kolkata | Undergraduate Summer Research Intern **May 2015 - July 2015**
· Formulated a distributed approach for batch wise GCD computation of RSA moduli to determine the biases in Randomness of Public Keys generated using RSA encryption scheme.
· Collected 42 million HTTPs public certificates from internet and found almost 0.4% sites vulnerable due to shared primes in RSA. Developed a fully parallel processing method for batch wise GCD Computation.

PUBLICATIONS

* Sarkar, R., Choudhury, S., Dutta, S., **Roy, A.**, & Saha, S. K. (2020). Recognition of emotion in music based on deep convolutional neural network. ⬀ Multimedia Tools and Applications, 79(1), 765–783.
* **Roy, A.**, Biswas, N., Saha, S. K., & Chanda, B. (2019). Classification of moving crowd based on motion pattern. ⬀ In 2019 IEEE region 10 symposium (tensymp) (pp. 102–107). IEEE.
* Kumar, V., **Roy, A.**, Sengupta, S., & Gupta, S. S. (2017). Parallelized common factor attack on RSA. ⬀ In International conference on information systems security (pp. 303–312). Springer.
* Sarkar, R., Dutta, S., **Roy, A.**, & Saha, S. K. (2017). Emotion based categorization of music using low level features and agglomerative clustering. ⬀ In National conference on computer vision, pattern recognition, image processing, and graphics (pp. 506–516). Springer.