Rahul Roy

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Education

Indian Institute of Science **Bengaluru, India**
*Master of Technology (M. Tech) in **Artificial Intelligence**; CGPA: 7.1/10* *Aug 2022 - Jun 2024*

Maulana Abul Kalam Azad University of Technology **Kolkata, India**
*Bachelor of Technology (B. Tech), **Electrical Engineering (EE)**; CGPA: 8.37/10* *Aug 2015 - July 2019*

Relevant Coursework

- Advanced Deep Representation Learning
- Pattern Recognition and Neural Networks
- Advanced Image Processing
- Linear Algebra and Applications
- Computational Methods of Optimization
- Stochastic Methods And Applications
- Data Analytics
- Data Structures and Algorithms

Research Project

Accelerating the Sampling Process in Diffusion and Score-Based Model

Prof. Chandra Sekhar Seelamantula (Spectrum Lab) ***Jun 2023 – Aug 2023***

- Proposed novel sampling strategy for diffusion and score-based models, leading to a 2-5x increase in speed compared to Annealed Langevin dynamics.
- Demonstrated superior FID scores compared to NCSN and NCSN++ by incorporating ideas from momentum-based optimization.

Spider Diffusion: Efficient High-Quality Image Generation

Prof. Chandra Sekhar Seelamantula (Spectrum Lab) ***Ongoing***

- Focused on integrating SpiderGAN's "friendly neighborhood dataset" concept into the diffusion model, forming Spider Diffusion.
- This innovative approach aims to maintain image quality while drastically reducing the required training, marking a significant advancement in generative model techniques.

Projects

Image Generation using β-VAE | *Variational Auto-Encoders, Generative Modelling, PyTorch* **September 2023**

- Trained a β-VAE with varying beta values, assessing its impact on the trade-off between image reconstruction quality and latent space disentanglement.
- Conducted posterior inference and latent space interpolation experiments for 10 image pairs, showcasing the model's ability to generate diverse images and explore the latent space structure.

Image Segmentation | *CNN, Image Segmentation, PyTorch* **February 2023**

- Transformed a pre-trained MobileNetv2 backbone, initially designed for ImageNet classification, into an FCN by replacing the final fully connected (FC) layers with convolutional layers, enabling it to handle variable-sized inputs and perform dense pixel-wise predictions.
- Conducted a comparative analysis of pixel-wise accuracy and mean IOU accuracy against the FCN ResNet50 model.
- Implemented the N-Cut algorithm to perform image segmentation, resulting in the partitioning of images into two distinct segments.

Deep Learning Models for NLP: | *PyTorch, RNN, LSTM, Transformers, Seq2Seq* **July 2023**

- Trained LSTM and Transformer models to classify sentiments from tweets, assessed their comparative performance, and quantified results using classification performance metrics.
- Compared the performance of an RNN encoder-decoder model with attention to a Transformer model for English-to-German translation tasks and observed an improvisation in BLEU score from 28.45 to 29.3.

Technical Skills

Languages: Python, C, C++, LaTeX
Technologies: Pytorch, Numpy, Pandas, Scipy, Matplotlib, Pytorch, Seaborn, Sklearn, OpenCV
Software/Frameworks: Google Colab, VS Code, Anaconda, Linux, GitHub

Achievements

GATE 2022 (Electrical Engineering): All India Rank-52 with a 99.93 percentile score.

GATE 2022 (Instrumentation): All India Rank-162 with a 98.90 percentile score.

Swami Vivekananda Scholarship (B.Tech): Awarded for outstanding academic performance.