SURJO DEY

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EDUCATION

Rajiv Gandhi Institute of Petroleum Technology, Raebareli, India **2022 - Present**
B.Tech — Computer Science and Engineering

EXPERIENCE

Jashore University of Science and Technology, Jashore, Bangladesh **Jun'25 – Aug'25**
Research Intern — *Supervisor: Dr. A F M Shahab Uddin* *On-site*
Medical Image Augmentation with Segmentation-Guided Diffusion Models [GitHub]

- **Overview:** Working on generative diffusion models guided by segmentation maps to enhance medical image augmentation.
- **Data:** Using Duke-Breast-Cancer-MRI dataset for segmentation-augmented synthesis.
- **Impact:** Improving robustness and variability in training data for diagnostic models.

PUBLICATIONS

Medical Image Generation for Data Augmentation Using Segmentation-Guided Diffusion Models with Limited Training Data Scenarios *Under Submission to a Q1 Journal*
This paper presents a segmentation-guided diffusion model for medical image augmentation that generates realistic synthetic images with anatomical accuracy using limited training data. The approach leverages segmentation masks to improve data efficiency and outperforms existing generative models.

Automated Detection and Analysis of Minor Deformations in Flat Walls Due to Railway Vibrations Using LiDAR and Machine Learning **Jun'24**
Developed a methodology using TLS LiDAR and ML to detect deformations caused by railway vibrations, improving urban safety. [Paper]

Comprehensive Analysis of Structural Defects in Various Structures Using TLS Data and Machine Learning **Nov'24**
Utilized TLS data and ML algorithms to analyze structural defects in various structures, enhancing defect detection and assessment methods. [Paper]

ONGOING RESEARCH PROJECT

Theoretical and Computational Analysis of Convergence and Explainability in Diffusion-Based Generative Models for Vision AI: A Markov Process Perspective for High-Fidelity Visual Reconstruction.

TECHNICAL SKILLS

Languages: Python, MATLAB, C
Frameworks: Pandas, NumPy, Scikit-learn, PyTorch, Matplotlib
Tools: LaTeX, Excel, Word, PowerPoint, Google Earth Engine
Platforms: Virtual Environment, MATLAB, Google Colab, Jupyter Notebook, Visual Studio Code
Operating Systems: Linux (Ubuntu), Windows

ACHIEVEMENTS AND SERVICES

- Reviewer for **IEEE 2nd International Conference on Computing, Applications and Systems (COMPAS 2025).** [Conference Link]
- Presented a paper at the **2024 IEEE International Conference on Future Machine Learning and Data Science (FMLDS)** at Sydney, Australia
- Presented a paper at the **15th International IEEE Conference on Computing, Communication, and Networking Technologies (ICCCNT)** at Mandi, India