

Sayan Chaudhuri

Data Scientist (Mercedes-Benz) | M.Tech. (IISc)

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Professional Summary

Data Scientist with expertise in Python, deep learning, and reinforcement learning, specializing in scientific machine learning and computer vision research. Experienced in NLP, generative AI, LLMs, and building RAG chatbots. Proficient in end-to-end project leadership, cloud deployment (Microsoft Azure), and developing web apps for enhanced efficiency. Filed a global offensive patent and currently pursuing multiple research projects. Passionate about advancing cutting-edge AI solutions in research-focused roles.

Work Experience

PGET Data Scientist | Mercedes-Benz Research and Development India

August 2023-Present

- Optimized battery cooling by designing a Physics-Informed Neural Network to predict cooling plate interface temperature with 0.85% MAPE.
- Developed an AI-powered inferencing tool on Azure, reducing hardware-validation test report inference time by 60X, saving thousands monthly.
- Built a cloud-hosted web solution integrating 3rd-party APIs, streamlining EVSyE testing and reducing annual costs by millions of Euros.
- Supported cross-functional collaboration by developing statistical models and visualizations for test case prediction, achieving 97.3% accuracy.
- Guided 2 external consultants on strategic alignment, promoting leadership, collaboration, and continuous learning in AI/ML projects.

Projects

Metacognitive Mask R-CNN and Robustness Analysis using Spatial Dropout and APR

M.Tech. Thesis, IISc

- Proposed a metacognitive training strategy with binary loss and SpatialDropout2D to enhance model robustness.
- Applied Amplitude Phase Recombination for data augmentation, boosting NWPU VHR-10 performance under different environmental conditions.
- Increased Mask R-CNN object detection and segmentation accuracy by an average of 7.6% under Darken, Snowy, and Blur Augmentations.
- This work is currently under review for publication at International Joint Conference on Neural Network 2025.

Optimizing Portfolio Performance with Deep Learning and Traditional Models

Course Project, IISc

- Applied the Markowitz Model to optimize asset distribution for NIFTY 50 stocks.
- Created LSTM models to forecast and optimize asset weights, enhancing returns during market volatility.
- Analyzed performance and discovered that deep learning models provided higher returns, albeit with increased risk.

Detection of Cyst, Tumor and Stone in Kidney using CT Images

Course Project, IISc

- Created a deep learning pipeline using a CNN for feature extraction and an ANN for classifying kidney CT scans, achieving a recall of 98.7%.
- Compared model performance with EfficientNet-B3, leveraging the Kim-Monte Carlo algorithm for training and analysis.

Motion Planning using Stochastic Multimodal Trajectory Optimization (SMTO)

Course Project, IISc

- Formulated path planning solutions for mobile robots and manipulators using SMTO and trajectory optimization.
- Enhanced trajectory distribution with Gaussian Mixture Models (GMM) and Variational Bayes EM, improving log-likelihood and diversity.

Lunar Lander Continuous Control with Proximal Policy Optimization (PPO)

Personal Project

- Designed and implemented a deep reinforcement learning agent using PPO with an actor-critic framework.
- Investigated landing performance in OpenAI Gym's continuous action space. Conducted performance analysis using metrics and visualizations.

Technical Skills

Programming Languages: Python, SQL

Machine learning and Deep Learning Libraries: PyTorch, TensorFlow, Numpy, Pandas, SciPy, Scikit-Learn, XGBoost, OpenAI Gym, Pybullet

Web Development: FastAPI, Flask, Streamlit

Cloud Platforms and DevOps: Microsoft Azure (Azure ML Studio, Azure Active Directory, Azure DevOps), Docker, Git

Education

Indian Institute of Science, Bangalore

M. Tech.

Major in Aerospace Engineering, (CGPA - 8.4/10)

Computing for AI and ML | Numerical Optimization | Robotic Perception | Statistics | Data Analytics | ML for Signal Processing

Birsa Institute of Technology, Sindri

B. Tech.

Major in Electrical Engineering, (CGPA - 8.04/10)

Advanced Mathematics | Soft Computing Techniques | Analog and Digital Electronics | Data Structure and Algorithms | Soft Optimization Techniques

Certifications

- Microsoft Certified: Azure Fundamentals
- Deep Learning Specialization by *DeepLearning.AI*(Coursera)
- Machine Learning with Python-From Linear Models to Deep Learning by *MITx: 6.86x*(edX)
- Modern Reinforcement Learning: Actor-Critic Agents and Deep Q Agents by *Udemy*
- Deep Neural Networks with PyTorch IBM Skills Network by *IBM*(Coursera)

Research Work

Patent:

- Global Offensive Patent on Battery-Cooling Plate interface temperature prediction using Physics Informed Neural Networks.

Nov 2024

Publications:

- (To be published) Domain generalization for environmental uncertainties using Metacognitive Mask R-CNN
- (To be published) Symbolic Multi-Architecture Regression Technique embedded within PINNs for compressible fluid flows.