Biswajyoti Nath

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Summary

Undergraduate researcher specializing in scientific machine learning, symbolic regression, and evolutionary computation. Passionate about how representation, constraints, and search strategies shape intelligent systems. Experienced in building reproducible research pipelines and robust computational frameworks to optimize learning systems for interpretability and validity.

Education

Barak Valley Engineering College (ASTU) *Aug 2024 – present*
B.Tech in Computer Science & Engineering

Jawahar Navodaya Vidyalaya *Sept 2022 – May 2024*
Diploma in High School

Independent Research Projects

Constrained EML Grammars in Symbolic Regression

- Completed an independent empirical study investigating how constrained operator grammars affect symbolic regression.
- Developed the experimental pipeline, performed the experiments, and analyzed structural properties such as expression complexity and validity-aware evaluation.

Constraint Interaction Effects in Grammar-Guided Symbolic Regression

- Ongoing research project proposing a quantitative constraint-interaction framework to analyze search-space geometry.
- Currently investigating how operator constraints alter the evolutionary search space and shift inductive biases.

Randomness in Quantum Cryptography

- Authored an independent literature-based research report analyzing randomness in quantum cryptographic structures.
- Emailed Prof. Nicolas Gisin and Prof. Gilles Brassard to clarify conceptual questions and received helpful explanations and recommended reading.

Publications

EML Framework: Symbolic Regression Representation Study Jan 2025
Biswajyoti Nath
10.5281/zenodo.19991771

Randomness in Quantum Cryptography Jan 2024
Biswajyoti Nath
10.5281/zenodo.15867370

Projects

Pather Saathi – Smart Fleet Booking Platform

- Architected a production-oriented, serverless full-stack booking platform using Next.js 15, PostgreSQL, and Tailwind CSS.
- Engineered secure RBAC via PostgreSQL Row-Level Security (RLS) and implemented server-side authorization.
- Designed a normalized database capable of handling concurrent fleet ticketing with Upstash Redis distributed rate limiting.

Startup LLM Content Pipeline

- Engineered a multi-agent pipeline using Python and large language models to automate the extraction of structured insights from raw web sources into high-fidelity content.

Skills

Research Areas: Symbolic Regression, Evolutionary Computation, Scientific Machine Learning, Interpretable ML

Programming: Python, TypeScript, SQL, C/C++

Machine Learning: Scikit-Learn, NumPy, SymPy, Qiskit, Optimization Algorithms

Frameworks & Tools: Next.js 15, Tailwind CSS, Supabase, PostgreSQL, Upstash Redis, Git, Linux

Awards

Ishan Uday Scholarship: Government of India (Full financial support for undergraduate studies awarded for academic merit)

Anundoram Borooah Award: Government of Assam, awarded for meritorious performance in the HSLC (Class 10) examination.

Certifications

IBM Quantum Enigmas (Levels I-II): IBM Quantum

Python Essentials 1 & 2: Cisco Networking Academy