Abhishek Tiwari

GitHub | Linkedin | abhishekt282001@gmail.com

Summary

Researcher focused on neurosymbolic AI, with expertise in neural-symbolic integration, differentiable reasoning, and program synthesis. Combines deep learning with symbolic AI techniques for interpretable and robust reasoning systems. Proficient in Python (PyTorch, JAX), formal methods, and knowledge representation. Seeking to advance neurosymbolic research through modular reasoning architectures and verifiable AI systems.

Work Experience

Business Intelligence Analyst, Allpay Ltd, Hereford, UK February 2024 – September 2025

- Developed ML-driven pipelines and optimization projects for fintech/payments, generating data-driven insights.
- Designed and maintained interactive dashboards and visualizations to support operational and strategic functions.
- Applied advanced analytics and predictive modeling to improve product performance and operational efficiency.

Research Assistant, University of Liverpool, UK Oct 2023 – Sep 2024

- Conducted AI and computational modeling research in stochastic processes, reinforcement learning, and graph-based methods.
- Implemented Python-based simulations and ML models for quantitative analyses and system optimization.
- Contributed to manuscript preparation, preprints, and academic publications in AI and interpretable modeling.

Projects

Neurologicx Terminal (Neurosymbolic AI) GitHub Link

Developing a modular, terminal-style neurosymbolic reasoning system with Python backend and Streamlit deployment. Combines NLP parsing, symbolic program synthesis, and interpretable reasoning pipelines.

Quantum-Inspired Portfolio Optimization Platform GitHub Link

Built a research-grade framework applying quantum algorithms (QAOA, VQE, Quantum Annealing) to portfolio optimization. Benchmarked against classical models (Markowitz, Black-Litterman, HRP) with extensions to multi-objective, cardinality, and transaction cost optimization. Includes scalability and noise-resilience studies.

Cross-Venue Hawkes Process Model GitHub Link

Designed a multivariate Hawkes process model with cross-venue graph structure for high-frequency order flow prediction. Implements real-time particle filter calibration and GNN-based excitation modeling, with profitability demonstrations on multi-exchange tick and order book data. *(Work in Progress)*

Multi-Regime Climate-Financial Risk Transmission Engine GitHub Link

Developed an econometric engine modeling climate-financial risk transmission using Hamilton's Markov regime-switching model with climate extensions. Includes 9+ years of empirical data, interactive dashboards, and reproducible code for real-time stress testing and risk analysis.

Education

2022 – 2023 **University of Liverpool**, United Kingdom
Post Graduate Diploma in Finance & Investment Management GPA: 3.65/4.00
Dissertation: *The Impact of Mergers and Acquisitions on Firm Financial Performance: A Quantitative Analysis Using Mathematical Modeling and Python*

2018 – 2021 **G.C. University**, India
Bachelor of Business Administration (BBA) GPA: 3.80/4.00
Dissertation: *Mathematical and Computational Approaches to Financial Performance Analysis: An Empirical Study Using Python*

Publications

1. Abhishek Pankaj Tiwari. *A Modular Neurosymbolic Framework for General-Purpose Reasoning: Bridging Symbolic and Deep Learning for Interpretable AI*. TechRxiv, July 2025. DOI link. (Preprint, under peer-review).
    - **Methodological novelty:** Introduces a modular neurosymbolic reasoning pipeline integrating symbolic program synthesis with deep learning for interpretable general-purpose reasoning.
2. Abhishek Pankaj Tiwari. *Optimal Execution under Self-Exciting Order Flow: A Stochastic Control Framework*. Manuscript in preparation. (under peer-review).
    - **Methodological novelty:** Develops a stochastic control framework that integrates Hawkes process–based self-exciting order flow with optimal execution models, capturing endogenous market impact and feedback effects in high-frequency trading environments.

Skills

Programming	Python (PyTorch, JAX, SymPy, Logic Programming), C++ (metaprogramming), Julia (symbolic computation), CUDA (neural-symbolic acceleration), Git
Neurosymbolic AI	Neural-symbolic integration, logical neural networks, differentiable reasoning, program synthesis, symbolic regression, constraint learning, relational learning
Knowledge Representation	First-order logic, probabilistic graphical models, knowledge graphs, semantic networks, rule-based systems, ontology engineering, temporal logic
Machine Learning	Graph neural networks, transformer architectures, reinforcement learning (symbolic policies), interpretable AI, causal reasoning, few-shot learning with symbolic priors
Formal Methods	Automated theorem proving, SAT/SMT solvers, formal verification of neural systems, program verification, symbolic execution, model checking
Reasoning Systems	Probabilistic reasoning, inductive logic programming, abductive inference, commonsense reasoning, multi-hop reasoning, neuro-symbolic program induction