Naavya Shetty

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RESEARCH INTERESTS

Decision-making under uncertainty; adaptive and resource-aware AI systems; policy-driven model behavior; interpretability and evaluation of AI systems; human-AI alignment

EDUCATION

University of Illinois Urbana-Champaign — Champaign, IL

Bachelor of Science in Computer Science and Philosophy, Minor in Psychology — August 2023 - December 2025

Distinguished Undergraduate Researcher Certificate recipient (competitive, research-based award)

***Relevant Coursework** – Data Structures, Algorithms & Models of Computation, Applied Machine Learning, Advanced Symbolic Logic*

PROJECTS

Adaptive Inference Router – Adaptive Computation Under Constraints | *Python - scikit-learn*
- Built an inference router that dynamically selects between approximate and high-accuracy models based on input difficulty and runtime constraints, enabling selective use of expensive computation while preserving reliability on challenging cases
- Developed a policy-driven evaluation framework with decision tracing, failure analysis, and counterfactual comparisons to study how inference choices affect system behavior across latency, cost, and error profiles

Risk-Aware Task Scheduling Engine – Planning and Prioritization Under Uncertainty | *Python*
- Designed a deterministic task scheduling engine that explicitly models estimation uncertainty, replacing deadline-first heuristics with risk-weighted prioritization over historical overruns, slack time, dependency structure, and capacity constraints to reduce cascading delays in constrained schedules
- Built an offline policy comparison and observability framework using deterministic replay, decision tracing, and counterfactual analysis to evaluate how alternative scheduling policies impact lateness, workload concentration, deadline misses, and schedule stability under uncertainty

Model Behavior Stability & Consistency Analyzer – Reliability Measurement in ML models | *Python*
- Built a model-agnostic evaluation framework to measure behavioral stability under controlled input perturbations, formalizing invariance expectations and instability regimes independently of accuracy or real-world distribution shift.
- Implemented deterministic inference replay as experimental control to isolate perturbation-induced behavior changes from execution noise, producing fully traceable, reproducible stability metrics and per-input diagnostics.

PUBLICATIONS

'Metacognition-Driven Preprocessing for Optimized Artificial Intelligence Performance'
(Decision-theoretic control for resource allocation)
COGNITIVE 2025 – International Conference on Advanced Cognitive Technologies and Applications | Link — April 2025
- Proposed a preprocessing control layer that **evaluates computational feasibility prior to execution**, formalizing when inputs should be filtered, redirected, or deferred based on resource constraints and expected utility
- Framed preprocessing as a system-level decision problem and evaluated its impact on redundancy reduction and computational efficiency, **emphasizing control and allocation decisions rather than post-hoc model optimization**

EXPERIENCE

Research & Development Intern | *Mondelēz International FutureLab* — May 2025 - Present
- Designed experiments inspired by decision-making theory, developing a non-Likert data model to improve the objectivity and reproducibility of human evaluation systems, and implementing machine learning-compatible pipelines to analyse behavioral data by translating psychological constructs into structured algorithmic parameters
- Collaborated on the development of predictive decision frameworks aligning human sensory input with algorithmic outputs for product optimization

Course Assistant | *CS 124 – Introduction to CS (Java)* — January 2024 - December 2024
- Provided individualized tutoring to 40+ students weekly, clarifying Java programming concepts, assisting with debugging, and guiding students in their preparation for assignments and quizzes
- Contributed feedback for better course content delivery and instructional strategies, and wrote practice code questions targeting problematic areas, showing an overall improvement in student performance on quizzes by 30%

TECHNICAL SKILLS

Languages: Python, Java, C/C++, MERN stack
AI Evaluation & Modeling: PyTorch (inference and evaluation), scikit-learn, offline benchmarking, counterfactual and failure-mode analysis
Systems & Decision Design: policy-driven systems, deterministic simulation, decision tracing, risk-aware prioritization
Data & Analysis: NumPy, pandas, matplotlib