Aaditya Naik

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Research Interests: Scalable Neurosymbolic Programming, Differentiable Reasoning, Program Synthesis, AI for SE

Education

University of Pennsylvania
Ph. D., Computer and Information Science *Sept. 2020 – Present*

NMIMS Mukesh Patel School of Tech. Mgmt. and Engg. (MPSTME)
B. Tech., Computer Engineering *July 2016 – May 2020*

Work Experience

Oracle Cloud Infrastructure
Agents Team: GenAI PhD Intern *May 2025 – Aug. 2025*

- Conducted comprehensive studies on abilities of LLMs to solve constraint optimization problems.
- Built an agentic system to translate optimization problems into Integer Linear Programs (ILP) solved using off-the-shelf solvers like Gurobi, Z3, and SCIP.
- Improved code refinement techniques for ILP programs by designing a more fine-grained feedback mechanism.
- Designed evaluation metrics to measure constraint satisfiability rates of LLMs instead of exact match.

Microsoft Research
RiSE Team: Summer Research Intern *June 2021 – Sept. 2021*

- Formalized the problem for interactive test-driven code generation, potential solutions and workflows, and evaluated it at scale.
- Conducted comprehensive studies of its impact on the Codex model.
- Resulted in published work in TSE '24.

Publications

* Co-first author

Dolphin: A Programmable Framework for Scalable Neurosymbolic Learning
Aaditya Naik, Jason Liu, Claire Wang, Amish Sethi, Saikat Dutta, Mayur Naik, Eric Wong
Proceedings of ICML '25

TorchQL: A Programming Framework for Integrity Constraints in Machine Learning
Aaditya Naik, Adam Stein, Yinjun Wu, Mayur Naik, Eric Wong
Proceedings of OOPSLA '24

Towards Compositionality in Concept Learning.
Adam Stein, **Aaditya Naik**, Yinjun Wu, Mayur Naik, Eric Wong
Proceedings of ICML '24

LLM-Based Test-Driven Interactive Code Generation: User Study and Empirical Evaluation.
Sarah Fakhoury, **Aaditya Naik**, Georgios Sakkas, Saikat Chakraborty, Shuvendu K. Lahiri
IEEE Transactions on Software Engineering '24 (Volume 50, Issue 9)

Relational Query Synthesis ⋈ Decision Tree Learning
Aaditya Naik, Aalok Thakkar, Adam Stein, Mayur Naik, Rajeev Alur
Proceedings of VLDB '24

Do Machine Learning Models Learn Statistical Rules Inferred from Data?
Aaditya Naik, Yinjun Wu, Mayur Naik, Eric Wong
Proceedings of ICML '23

Learning to Walk over Relational Graphs of Source Code.
Pardis Pashakhanloo, **Aaditya Naik**, Hanjun Dai, Petros Maniatis, Mayur Naik
Proceedings of DL4C Workshop @ ICLR '22

CodeTrek: Flexible Modeling of Code using an Extensible Relational Representation.
Pardis Pashakhanloo, **Aaditya Naik**, Yuepeng Wang, Hanjun Dai, Petros Maniatis, Mayur Naik
Proceedings of ICLR '22

Sporq: An Interactive Environment for Exploring Code Using Query-by-Example.
Aaditya Naik, Jonathan Mendelson, Nathaniel Sands, Yuepeng Wang, Mayur Naik, Mukund Ragothaman
Proceedings of UIST '21

Example-Guided Synthesis of Relational Queries.
Aalok Thakkar, **Aaditya Naik**, Nate Sands, Mukund Raghothaman, Mayur Naik, Rajeev Alur
Proceedings of PLDI '21

GenSynth: Synthesizing Datalog Programs without Language Bias.
Jonathan Mendelson*, **Aaditya Naik***, Mukund Ragothaman, Mayur Naik
Proceedings of AAAI '21

Code2Inv: A Deep Learning Framework for Program Verification.
Xujie Si*, **Aaditya Naik***, Hanjun Dai, Mayur Naik, Le Song
Proceedings of CAV '20

Awards

Google PhD Fellowship *2023 - Present*

Teaching Experience

University of Pennsylvania
Teaching Assistant *May 2020 – Aug 2023*

- TA for *CIS 547: Software Analysis* for Summer and Fall 2020 which covers concepts including static and dynamic analyses, symbolic executors and automated debugging.

ACM Student Chapter, MPSTME
Instructor *Sep. 2019*

- Taught core C concepts to college freshman students over a 4 day workshop.

Skills

Programming Languages : Python, C/C++, Bash, Java

Tools : Git, LaTeX, Docker

Miscellaneous : LLVM/Clang, PyTorch, Keras/TensorFlow, Z3

References

Mayur Naik (PhD Advisor)
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