Shaurya Gomber

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EDUCATION

University of Illinois at Urbana-Champaign Illinois, USA
Masters of Science, Computer Science; GPA: 4/4 *Aug 2022 - May 2024*
Key Courses: Formal Software Development Methods, Program Verification (A+), Trustworthy AI Systems (A+)
Teaching Assistantships: CS421 Programming Languages & Compilers (Spring 2023), CS225 Data Structures (Fall 2022)

Indian Institute of Technology, Guwahati Assam, India
B. Tech, Computer Science and Engineering; GPA: 9.66/10 *July 2016 - June 2020*

RESEARCH EXPERIENCE

Learning Efficient Abstract Transformers Mar 2023 - Present
Prof. Gagandeep Singh, Dept. of Computer Science, UIUC *Champaign, IL, USA*
- Abstract Transformers (used in static analysis) can be computationally expensive (like join in polyhedra domain).
- Working on methods to train Deep Neural Networks with logical constraints to approximate such transformers.
- The trained DNNs can be used in place of the expensive transformers to speed up the static analysis process.

Inductive Syntax-Guided Synthesis Oct 2022 – Present
Prof. Madhusudan Parthasarathy, Dept. of Computer Science, UIUC *Champaign, IL, USA*
- Devising optimal techniques to solve syntax-guided synthesis (SyGuS) problems inductively using solvers like Z3.
- Exploring ways in which the search space of possible programs can be effectively pruned by analyzing the input-output examples that do not satisfy a guessed/computed candidate program.

INDUSTRY EXPERIENCE

Software Engineer II June 2020 – June 2022
D.E. Shaw & Co. *Hyderabad, India*
- Worked on the firm's proprietary distributed trading system. Implemented features to streamline traders' workflows, made business-logic changes and optimized the software to handle large amounts of trading data.
- Participated in code reviews and design discussions for some major system components and mentored new joinees.
- Tech Stack: Java & C++ (backend), React (frontend). Misc: Git, Python, Bash, Grafana, Numpy, Matplotlib.

Software Engineering Intern May 2019 – July 2019
D.E. Shaw & Co. *Hyderabad, India*
- Implemented a *type-safe low-latency API* in Java to read and write trading data on the on-premise database.
- Used it to get 60x run-time improvement in production-critical scripts (Got a Pre-Placement Offer for the work).

SELECTED PROJECTS

Monotonic Neural Networks | *Python, Keras, Tensorflow, Numpy* | *Code* Oct 2022 – Nov 2022
- Monotonic Neural Networks are ones whose outputs vary monotonically with respect to the input features.
- Implemented a gradients-based loss method that enforces monotonicity while training neural networks.

Efficient SAT Solver | *Python* | *Code* Mar 2020 – May 2020
- Implemented the *CDCL (Conflict Driven Clause Learning)* SAT algorithm, with state-of-the-art optimizations like 2-watched literals, Decision Heuristics (VSIDS, DLIS) and Restart Heuristics (Geometric, Luby).
- Devised new heuristics based on intelligent data structures (Priority Queues) and innovative restart strategies.

Traffics Light Model Checker | *NuSMV Model Checker* | *Code* Oct 2019 – Nov 2019
- Used the NuSMV Model Checker to simulate the traffic lights model at a road junction.
- Verified its correctness by applying temporal-logic safety constraints like two lights can not be on simultaneously.

Compiler Construction | *C++, Flex, Bison, SPIM simulator* | *Code* Jan 2019 – Apr 2019
- Developed a *compiler for a C-like language* from scratch by implementing all stages of compilation.
- The stages include: lexical analysis, parsing, intermediate code generation, and target MIPS code generation.
- It supported: Function calls, expressions (relational, arithmetic and logical), if-else, switch, for and while loops.

ACHIEVEMENTS

- **Institute Merit Scholarship IITG 2019:** $2800 for scoring the highest grades in the academic year 2018-19
- **Microsoft Code.Fun.Do 2019:** Among *top 10* national finalists (300+ teams, Topic: Blockchain Voting System)
- **ACM ICPC 2018:** Represented IIT Guwahati in India regionals held at Amritapuri, Kerela.
- **IIT JEE Advanced 2016:** Secured All India Rank *902 (top 0.06 %) out of 1.5 million* candidates.