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

Inductive Syntax-Guided Synthesis — Oct 2022 – Present
Prof. Madhusudan Parthasarathy, Professor, Dept. of Computer Science, UIUC — *Champaign, IL, USA*
- Devising optimal techniques to solve syntax-guided synthesis (SyGuS) like problems inductively.
- 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.

Readability Analysis of Scientific Writing (Bachelors Thesis) — Aug 2019 - May 2020
Dr. Ashish Anand, Associate Professor, Dept. of Computer Science, IIT Guwahati — *Guwahati, India*
- Developed the tool VReadA, which generates a visual heatmap analysis of the readability of a text sample.
- It analyzes the *linguistic complexity, predictability, perplexity, and coherence* among sections of the sample.
- It uses novel coherence calculation methods and state-of-the-art Language Models to achieve accuracy.

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

Program Equivalence Checker | *Python, Javascript, Z3 Solver* — Feb 2023 – Present
- Developing a tool to check the semantic equivalence of two programs (under some relaxations).
- Programs are translated to constraints using Symbolic Execution which are then compared by the Z3 Solver.

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.

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.