Lichuan Deng

Department of Computer Science, Iowa State University

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Personal Profile

A PhD student at Iowa State University, undertaking the Foundations and Applications of Program Analysis course. Supervised by Dr. Gianfranco Ciardo and Dr. Andrew S Miner, zealous about formal methods and model checking and with two years of experience specializing in RexBDDs, Petri nets. Primarily, looking for Software Engineering Developer or related Researcher internship roles.

Education

Iowa State University *IA, US*

PhD in Computer Science *Aug 2020 - Current*

Southwestern University of Finance and Economics *Chengdu, China*

Bachelor of Science in Mathematics and Applied Mathematics

Bachelor of Economics in Finance *Sep 2016 - Jun 2020*

Experience

Iowa State University *IA, US*

Research Assistant *Aug 2021 - Current*

- Supervised by Dr. Gianfranco Ciardo and Dr. Andrew S Miner, developing and implementing the project that extends and improves the efficiency and applicability of binary decision diagrams (BDDs), RexBDD.
- Built the RexBDD forests encoding all 4 and 5 variables Boolean functions, produced the results comparing to different varieties of BDDs, and implemented the experimental proof of canonicity.
- Developed a BLIF parser to construct RexBDD representations encoding combinatory circuits through logical operations.
- Preparing to design and implement RexBDD-based state relation functionality for the model checker's future enhancements.
- **Technical Skills:** C/C++, CMake, Make, Linux, dot, gnuplot, Git.
- **Soft Skills:** Logical Thinking, Time Management, Communication, Presentation skills.

Collins Aerospace *IA, US*

Systems Engineer Intern *May 2023 - Aug 2023*

- Collaborated with Dr. Gianfranco Ciardo, Dr. Andrew S Miner, and Dr. Junaid Babar to successfully develop and implement key algorithms for RexBDD logical operations. Additionally, implemented the garbage collection mechanism and a suite of essential helper functions to construct RexBDD based on truth tables.
- Following up on leveraging the RexBDD library to implement the back-end CTL and LTL algorithms for the future model checker projects.
- **Technical Skills:** C, Make, Linux, Git.
- **Soft Skills:** Logical Thinking, Communication, Presentation skills.

Iowa State University *IA, US*

Teaching Assistant *Aug 2021 - Dec 2022*

- Organize teaching contents, and grade homework and exams for 64 students in COM S 474/574 (Fall 2022) - Introduction to Machine Learning
- Helped answer students' questions and graded homework and exams for 70 students in COM S 474/574 (Spring 2022) - Introduction to Machine Learning
- Collaborated with a three-TA team to organize a course Lab and provide instructions for 50 students in COM S 113 (Fall 2021) – Introduction to Spreadsheets and Databases.
- **Technical Skills:** Excel, Python, NumPy, Pytorch.
- **Soft Skills:** Teamwork, Time Management, Communication, Presentation skills.

University Project

Efficient game solutions encodings with BDD *IA, US*

Iowa State University *Sep 2022 - Aug 2023*

- Work with a three-person team to implement and explore methods for compactly encoding game solutions using binary decision diagram (BDD) variants from the literature, namely classic BDDs, multi-terminal BDDs, and edge-valued (with addition) BDDs. We introduce a new variant, edge-valued (with addition and modulo) BDDs, as well as the use of swap flags with multi-terminal BDDs and edge-valued BDDs. Then, we consider three concretization heuristics proposed to reduce the BDD size and adapt them for use with edge-valued BDDs and swap bits.
- **Technical Skills:** C/C++, Make, Linux.
- **Soft Skills:** Time Management, Teamwork, Presentation skills, Report writing.