

Xujie Si

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Research Interests

My research interests span programming languages, program synthesis and verification, constraint solving, and machine learning. My recent research focuses on applying deep learning and reinforcement learning to synthesize proofs (with only weak supervision from a theorem prover) and programs (with respect to either a logical specification or input/output examples). Meanwhile, my research also investigates symbolic reasoning techniques to improve deep learning and reinforcement learning in terms of robustness and sample efficiency.

Education

- 2016-Present **Ph.D. candidate, Computer and Information Science.**
University of Pennsylvania, Philadelphia, PA
Advisor: Prof. Mayur Naik
- 2014 **M.S., Electrical Engineering and Computer Science.**
Vanderbilt University, Nashville, TN
Advisor: Prof. Yuan Xue
- 2011 **B.E., Software Engineering, Nankai University, Tianjin, China.**

Publications

- [1] Xujie Si, Hanjun Dai, Mukund Raghothaman, Mayur Naik and Le Song. Learning Loop Invariants for Program Verification. In *Proceedings of the Thirty-second Conference on Neural Information Processing Systems, NIPS 2018 (spotlight)*.
- [2] Xujie Si, Woosuk Lee, Richard Zhang, Aws Albarghouthi, Paris Koutris and Mayur Naik. Syntax-Guided Synthesis of Datalog Programs. In *Proceedings of the ACM Joint European Software Engineering Conference and Symposium on the Foundations of Software Engineering, FSE 2018*.
- [3] Mukund Raghothaman, Sulekha Kulkarni, Richard Zhang, Xujie Si, Kihong Heo, Woosuk Lee and Mayur Naik. Difflog: Beyond Deductive Methods in Program Analysis. In *Proceedings of the Workshop on Machine Learning for Programming, ML4P 2018*.
- [4] Mayur Naik, Xujie Si, Xin Zhang and Radu Grigore. Maximum Satisfiability in Software Analysis: Applications and Techniques. In *Proceedings of 19th International Conference on Verification, Model Checking, and Abstract Interpretation, VMCAI Invited Tutorial 2018*.
- [5] Xin Zhang, Radu Grigore, Xujie Si and Mayur Naik. Effective Interactive Resolution of Static Analysis Alarms. In *Proceedings of the ACM SIGPLAN conference on Systems, Programming, Languages and Applications: Software for Humanity, SPLASH/OOPSLA 2017*.
- [6] Xin Zhang, Xujie Si and Mayur Naik. Combining the Logical and the Probabilistic in Program Analysis. In *Proceedings of the Workshop on Machine Learning and Programming Languages, MAPL 2017*.
- [7] Xujie Si, Xin Zhang, Radu Grigore and Mayur Naik. Maximum Satisfiability in Software Analysis: Applications and Techniques. In *Proceedings of the 29th International Conference on Computer Aided Verification, CAV 2017*.
- [8] Xujie Si, Xin Zhang, Vasco Manquinho, Mikolas Janota, Alexey Ignatiev and Mayur Naik. On Incremental Core-Guided MaxSAT Solving. In *Proceedings of the 22nd International Conference on Principles and Practice of Constraint Programming, CP 2016*.

- [9] Insu Yun, Changwoo Min, Xujie Si, Yeongjin Jang, Taesoo Kim and Mayur Naik. APISan: Sanitizing API Usages through Semantic Cross-checking. In *Proceedings of the 25th USENIX Security Symposium*, 2016.
- [10] Xiaowei Li, Xujie Si and Yuan Xue, Automated Black-box Detection of Access Control Vulnerabilities in Web Applications, In *Proceedings of 2014 ACM Conference on Data and Application Security and Privacy*, San Antonio, TX, USA, March 3-5, 2014
- [11] Xiaocheng Huang, Xujie Si, Xiaojie Yuan and Chao Wang, A Dynamic Load-balancing Scheme for XPath Queries Parallelization in Shared Memory Multi-core Systems, *Journal of Computers*, Volume 9, 1436-1445, 2014
- [12] Xujie Si, Airu Yin, Xiaocheng Huang, Xiaojie Yuan, Xiaoguang Liu, Gang Wang, Parallel Optimization of Queries in XML Dataset using GPU, In *Proceedings of 2011 Fourth International Symposium on Parallel Architectures, Algorithms and Programming*, Tianjin, China, Dec 9-11, 2011
- [13] Xudong Lee, Shuiqing Wang, Jianfeng Tan, Jinzuo Ye, Xujie Si, Mingze Lee, “Automatic Wireless Embedded Projector Player System” , In *Proceedings of 2010 International Conference on Multimedia Technology*, Ningbo, China, Oct 29-31, 2010.

Work Experience

- 2015 **Software Engineer Intern**, *Google*, Mountain View, CA.
May-Aug. Worked on analyses of dynamic search Ads and serving algorithms.
- 2014 **Software Engineer Intern**, *Google*, Seattle, WA.
May-Aug. Designed and built a pipeline on analyzing display Ads traffic with Flume C++.

Teaching Experience

- 2017 Fall **Teaching Assistant**, *CIS 700 Software Testing and Analysis*, University of Pennsylvania.
- 2016 Spring **Teaching Assistant**, *CS 6340 Software Testing and Analysis*, Georgia Institute of Technology.
- 2015 Fall **Teaching Assistant**, *CS 7001 Introduction to Graduate Studies*, Georgia Institute of Technology.
- 2012 Spring **Teaching Assistant**, *CS 285 Computer Networks*, Vanderbilt University.
- 2011 Fall **Teaching Assistant**, *CS 212 Discrete Structures*, Vanderbilt University.

Selected Awards

- ESEC/FSE Travel Fund Award from the US National Science Foundation, 2018
- World Finalist of the ACM/ICPC, Ekaterinburg, 2014
- Champion of the 38th ACM/ICPC Mid-Central USA Regional, Nashville, 2013
- National Scholarship (1/135), Nankai University, 2010
- Tianjin Government Scholarship (4/135), Nankai University, 2009

Services

- PLDI'18 **Student Volunteer Co-Chair**, *Philadelphia*, PA, June 18-22, 2018.
- POPL'16 **Student Volunteer**, *St. Petersburg*, FL, Jan. 20-23, 2016.

Skills

- Programming C/C++, Python, Java, OCaml, Scala, Haskell, Coq
- Tools IDEs (Eclipse, XCode, Visual Studio), Editors (Emacs, Vi), Compiler Infrastructures (CIL, Clang, LLVM), Frameworks (TensorFlow, Pytorch), Solvers (Gurobi, CPLEX, CVC4, Z3)
- Languages Chinese (native), English (fluent)