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divyeshunadkat
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Divyesh Unadkat

Education

Ph.D. **Computer Science and Engineering**, *Indian Institute of Technology Bombay (IITB)*, Mumbai. **2015–2022**
CPI: 9.48/10

B.E. **Computer Engineering**, *Dharmsinh Desai University (DDU)*, Nadiad. **2006–2010**
Aggregate: 80.12 %

Ph.D. Thesis

Title: *Techniques for Precise and Scalable Verification of Array Programs*

Supervisors: Prof. Supratik Chakraborty , Prof. Ashutosh Kumar Gupta

Institution: IIT Bombay, India

Area: Formal Methods and Software Verification

Experience

Scientist/Senior Software Engineer, *TCS Research*, Pune. **Jun'21–Present**

Researcher/Software Engineer, *TCS Research*, Pune. **Jun'10–May'21**

Software Engineering Intern, *TCS Research*, Pune. **Dec'09–Apr'10**

Technical Skills

Programming: C++, C, Java, Python, LaTeX

Compilers: LLVM, Clang, GNU Tool Chain (GCC, GDB, Make)

Research Tools: Z3, CBMC, Daikon, CPAChecker, InvGen

Development Tools: Emacs, Vim, Eclipse

Version Control: Git, CVS

Tools/Artifacts

Diffy Generalized Inductive Reasoning for Arrays. Published in CAV 2021 [3]. *figshare* repository.

Vajra Full-Program Induction. Published in TACAS 2020 [4, 5], STTT 2022 [2]. *figshare* repository.

Tiler Verifying Array Programs by Tiling. Published in SAS 2017 [6]. code repository.

DIV Dynamic Inference Verifier. Internal Tool, TCS Research. Published in HVC 2013 [8].

ScaleM Scaling Model Checking with Abstractions Inferred using Dynamic Analysis. Internal Tool, TCS Research. Published in ICST 2013 [7].

AutoGen Automatic Test-case Generation using Model Checking. Internal Tool, TCS Research.

Awards

Team Award (Recurring): Best Verification Tool

Institution: International Software Verification Competition (SV-COMP)

Description: Designed verification techniques based on induction for programs in the Arrays sub-category and implemented them in the tools DIFFY [3], VAJRA [4, 2] and TILER [6]. As a team member, I re-purposed these tools and integrated them within the VERIABS tool. VERIABS [5] stood first in the ReachSafety category at SV-COMP in 2020, 2021 and 2022. My work got a mention on IITB page. Refer [5] and [1] for details.

Individual Award: Most Admired Sprint Thesis Talk

Institution: Indian Institute of Technology Bombay, Mumbai

Description: Runner-up, Senior Researcher Sprint Talks, RISC 2017, IIT Bombay.

Individual Award: Best Speaker in Sprint Thesis Talk

Institution: Indian Institute of Technology Bombay, Mumbai

Description: Winner, Early Researcher Sprint Talks, RISC 2016, IIT Bombay.

Individual Award: Eklavya Gold Medal

Institution: Dharmsinh Desai University, Nadiad

Description: Highest aggregate in first four semesters of computer engineering at DDU.

Publications

[1] Divyesh Unadkat. Techniques for Precise and Scalable Verification of Array Programs. *Doctoral Dissertation, IIT Bombay*, August 2022.

[2] Supartik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Full-Program Induction: Verifying Array Programs sans Loop Invariants. In *International Journal on Software Tools for Technology Transfer (STTT)*, (to appear) 2022.

[3] Supartik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Diffy: Inductive Reasoning of Array Programs using Difference Invariants. In *Proc. of the 33rd International Conference on Computer-Aided Verification (CAV)*, pages 911–935, 2021.

[4] Supartik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Verifying Array Manipulating Programs with Full-Program Induction. In *Proc. of the 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, pages 22–39, 2020.

[5] Mohammad Afzal et. al. VeriAbs : Verification by Abstraction and Test Generation (Competition Contribution). In *Proc. of the 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS)*, pages 383–387, 2020.

[6] Supratik Chakraborty, Ashutosh Gupta, and Divyesh Unadkat. Verifying Array Manipulating Programs by Tiling. In *Proc. of the 24th International Static Analysis Symposium (SAS)*, pages 428–449, 2017.

[7] Anand Yeolekar et. al. Scaling Model Checking for Test Generation using Dynamic Inference. In *Proc. of the 6th International Conference on Software Testing, Verification and Validation (ICST)*, pages 184–191, 2013.

[8] Anand Yeolekar and Divyesh Unadkat. Assertion Checking using Dynamic Inference. In *Proc. of the 9th Haifa Verification Conference (HVC)*, pages 199–213, 2013.

Conference Presentations

Diffy: Verifying Array Programs using Difference Invariants: 33rd International Conference on Computer Aided Verification (CAV), Los Angeles, USA (*Online*), July 2021

Verifying Array Manipulating Programs with Full-Program Induction: 26th International Conference on Tools and Algorithms for the Construction and Analysis of Systems (TACAS), Luxembourg (*Online*), March 2021

Verifying Array Manipulating Programs by Tiling: 24th International Static Analysis Symposium, SAS, New York, USA, August 2017

Assertion Checking using Dynamic Inference: 9th Haifa Verification Conference, Haifa, Israel, November 2013

Invited Talks

Dance of the Dragons: Induction, Difference Computation and SMT Solving: Formal Methods Update Meeting, IIT Delhi, July 2022

Difference Invariants for Inductive Verification: 6th Indian SAT+SMT School (*Online*), December 2021

Exploiting Induction and Difference Computation to Verify Array Programs: Formal Methods Update Meeting (*Online*), July 2021

The Full-Program Induction Technique: 5th Indian SAT+SMT School, IIT Hyderabad (*Online*), December 2020

Verifying Array Manipulating Programs with Full-Program Induction: Software Engineering Research India (SERI), IIIT Hyderabad (*Online*), July 2020

Lightening Talk: Verifying Array Manipulating Programs by Tiling: 2nd Indian SAT+SMT School, Infosys Campus, Mysuru, December 2017

Competition Talks

Verifying Array Manipulating Programs by Full-Program Induction: Research and Innovation Symposium in Computing, RISC 2019, IIT Bombay

Verifying Array Manipulating Programs by Tiling: Sprint Thesis Talk, Research and Innovation Symposium in Computing, RISC 2017, IIT Bombay

Towards Precise Software Verification: Sprint Thesis Talk, Research and Innovation Symposium in Computing, RISC 2016, IIT Bombay

Poster Presentations

Verifying Array Programs with Full-Program Induction: 4th Indian SAT+SMT School, IIT Bombay, December 2019

Executive Summary on Tiling to Verify Array Programs : TCS Anvetion Workshop, IIT Madras Research Park, Chennai, 2018

Verifying Array Manipulating Programs by Tiling: Research and Innovation Symposium in Computing, RISC 2017, IIT Bombay

Interests

Sports: Table Tennis, Volleyball, Football

Recreation: Yoga, Novels, Music, Movies

Links

Webpage: https://divyeshunadkat.github.io/

dblp: https://dblp.uni-trier.de/pers/hd/u/Unadkat:Divyesh

Scholar: https://scholar.google.co.in/citations?user=8d48NqMAAAAJ

GitHub: https://github.com/divyeshunadkat/

LinkedIn: https://www.linkedin.com/in/divyeshunadkat/

Contact

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References

Available upon request.