

Jaganmohan Chandrasekaran

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EDUCATION

Doctor of Philosophy, Computer Science - August, 2015 - August, 2021

University of Texas at Arlington, Arlington, TX

- Dissertation: “*Testing Artificial Intelligence-Based Software Systems*”
- Advisor: [Dr. Jeff Lei](#)

Master of Science, Computer Science - August, 2013 - August, 2015

University of Texas at Arlington, Arlington, TX

- Thesis: “*Evaluating the effectiveness of BEN in localizing different types of software fault*”
- Advisor: [Dr. Jeff Lei](#)

Bachelor of Technology, Information Technology - September, 2004 - May, 2008

Anna University, Chennai, India

Relevant Courses: Software Testing, Software Design Patterns, Advanced Topics in Software Engineering, Machine Learning, Computer Architecture II, Computer Networks, Discrete Structures, Theory of Computation, Software Engineering I, Design and Analysis of Algorithms, Distributed Systems, Data Analysis and Modeling Techniques, Design and Construction of Compilers, Advanced Topics in Networking, Advanced Topics in Database Systems (Cloud Computing).

RESEARCH INTERESTS

Software Engineering, Testing and Debugging of Machine Learning (ML) models, Reliable AI, Explainable AI (XAI), Software Engineering for AI-enabled systems.

EMPLOYMENT

STEM Graduate Research Assistant, Computer Science and Engineering,

University of Texas at Arlington, Arlington, TX

(September 2020 - May 2021)

- Convert research ideas into prototypes.
- Design and execute research experiments.
- Interprets, synthesizes and analyses data (experimental results).
- Writes and edits research findings for publication and presentation.
- Mentoring undergraduate students on Honors project.

STEM Graduate Teaching Assistant, Computer Science and Engineering,

University of Texas at Arlington, Arlington, TX

(September 2015 - August 2020)

- Assisted students outside class during office hours, provided feedback and evaluation, and occasionally provided in-class lectures.

List of courses:

- CSE 4361 - Software Design Patterns
- CSE 3310 - Object Oriented Software Engineering
- CSE 4321/ CSE 5321 - Software Testing
- CSE 6329.001 - Special Topics in Advanced Software Engineering (Test Automation)

Graduate Teaching Assistant, Computer Science and Engineering,

University of Texas at Arlington, Arlington, TX

(August 2014 - May 2015)

- Assisted students outside class during office hours, provided feedback to students by grading homeworks, quizzes, and class projects

List of courses:

- CSE 5325 - Software Engineering-II
- CSE 5328 - Software Team Project

Analyst Programmer, Syntel Consulting Inc,

Mumbai, India / Northbrook, IL, USA

(Nov 2009 - Aug 2012)

- Requirements gathering from different project stakeholders
- Development and testing of insurance policy administration system that includes creating High-level design document, unit test plan, and performing functional testing.

RESEARCH
EXPERIENCE

Software Engineering Research Group ,
University of Texas at Arlington, Arlington, TX

(Nov 2013 - Present)

- Explainable AI (XAI) Tool
 - A model-agnostic, post-hoc explainable AI tool to generate counterfactual explanations for image classifiers.
 - Proposed a combinatorial approach to identify segments and generate local, counterfactual explanations for DNN models.
 - Evaluated our approach using the VGG16 model; seed images from the ImageNet dataset.
 - Result suggests, in most cases, the approach can successfully generate counterfactual explanations by masking a mere one or two segments of the input image.
- Testing Deep Learning Systems
 - Proposed a combinatorial testing based approach to systematically generate synthetic images (test cases) to test Deep Neural Network(DNN) models used in autonomous vehicle systems.
 - Evaluated our approach on three open-source models from the Udacity self-driving car challenge.
 - Proposed approach can successfully identify a number of inconsistent model behavior across DNN's.
 - T-way test inputs generated by the proposed approach can significantly increase Neuron Coverage, a test adequacy measure used in testing DNN models.
- Effectiveness of dataset reduction in testing machine learning algorithms.
 - Empirically analyze the effect of using sampled datasets in testing Machine learning applications (supervised learning algorithms).
 - Results suggests that in most cases, reduced datasets can be a good substitute for the original dataset in testing machine learning algorithms, thereby reducing the testing cost.
- A Method Level Test Generation Framework for Debugging Big Data Applications
 - Developed a debugging framework for effectively generating method-level tests to facilitate debugging of big data applications.
 - Results suggests framework could significantly reduce the efforts required for debugging big data applications.
- Applying Combinatorial testing to Data mining algorithms
 - Combinatorial testing applied to top five most influential data mining algorithms.
 - Designed Input Parameter Modeling (IPM) and generated t-way tests using ACTS, a combinatorial test generation tool.
 - Results indicate the test coverage is invariant to size of datasets.
 - Test coverage of combinatorial test set increases progressively slower with respect to increase of test strength.
- Evaluating the effectiveness of BEN in localizing different types of software fault
 - Effectiveness is measured in terms of the percentage of program statements (executable) the user has to inspect to locate the fault.
 - Categorized the seeded faults from the Siemens test suite to three fault properties: Accessibility, Input value sensitivity, Control flow sensitivity.
 - BEN was found to be very effective in localizing low accessibility faults, input value-insensitive (or control flow-insensitive) faults compared to input value-sensitive (or control flow- sensitive) faults.
- BEN: A Combinatorial Testing-Based Fault Localization Tool
 - Developed a GUI for an existing command line fault localization tool BEN that analyze the source code based on test set results and rank faulty statements.

MENTORING

- Christian Teeple (Honors project) Fall 2020
- Tiffany Isabel Frias (Honors project) Spring 2021
- Edrik Aguilera (Research Experience for Undergraduates) Fall 2020 - Spring 2021

HONORS &
AWARDS

- *Summer Dissertation Fellowship*, University of Texas at Arlington Summer 2021
- *STEM Doctoral Fellowship*, University of Texas at Arlington 2015 - 2021
- Nominated as a finalist for Outstanding Graduate Teaching Assistant Award for Computer Science and Engineering Department Spring 2018

SKILLS

Programming Languages: Java, Python

Testing Frameworks: JaCoCo (Code coverage framework), PIT (Mutation testing framework)

Machine Learning Frameworks and Packages: WEKA, R, Tensorflow, OpenCV, Keras, SHAP, LIME

PUBLICATIONS

Conference Proceedings

1. **Jaganmohan Chandrasekaran**, Ankita Ramjibhai Patel, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “*Evaluation of T-Way Testing of DNNs in Autonomous Driving Systems*”. IEEE International Conference On Artificial Intelligence Testing (AITest), IEEE, (In Press).
2. **Jaganmohan Chandrasekaran**, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “*A Combinatorial Approach to Explaining Image Classifiers*”. In 2021 IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW), IEEE, 2021.
3. **Jaganmohan Chandrasekaran**, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “*A Combinatorial Approach to Testing Deep Neural Network-based Autonomous Driving Systems*”. In 2021 IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW), IEEE, 2021.
4. **Jaganmohan Chandrasekaran**, Haudong Feng, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “*Effectiveness of dataset reduction in testing machine learning algorithms*”. In 2020 IEEE International Conference On Artificial Intelligence Testing (AITest), IEEE.
5. Haudong Feng, **Jaganmohan Chandrasekaran**, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “*A Method-Level Test Generation Framework for Debugging Big Data Applications*”. In 2018 IEEE International Conference on Big Data (Big Data), IEEE.
6. **Jaganmohan Chandrasekaran**, Haudong Feng, Yu Lei, D. Richard Kuhn and, Raghu N.Kacker . “*Applying Combinatorial Testing to Data Mining Algorithms*”. In 2017 IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW). IEEE, 2017.
7. **Jaganmohan Chandrasekaran**, Laleh Sh Ghandehari, Yu Lei, Raghu Kacker, and D. Richard Kuhn. “*Evaluating the effectiveness of BEN in localizing different types of software fault*”. In 2016 IEEE Ninth International Conference on Software Testing, Verification and Validation Workshops (ICSTW), IEEE, 2016.
8. Laleh Sh Ghandehari, **Jaganmohan Chandrasekaran**, Yu Lei, Raghu Kacker, and D. Richard Kuhn. “*BEN: A combinatorial testing-based fault localization tool.*”. In 2015 IEEE Ninth International Conference on Software Testing, Verification and Validation Workshops (ICSTW), IEEE, 2015.

Dissertation/Thesis

1. Jaganmohan Chandrasekaran. “*Testing Artificial Intelligence-based software systems*”. Dissertation & Theses University of Texas - Arlington (In Press).
2. Jaganmohan Chandrasekaran. “*Evaluating the effectiveness of BEN in localizing different types of software fault*”. Dissertation & Theses University of Texas - Arlington; ProQuest Dissertation & Theses Global.

PRESENTATIONS

Oral

- “*Evaluation of T-Way Testing of DNNs in Autonomous Driving Systems*”. IEEE International Conference on Artificial Intelligence Testing(AITest), 2021 (Virtual)
- “*A Combinatorial Approach to Explaining Image Classifiers*”. IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW), 2021 (Virtual)
- “*A Combinatorial Approach to Testing Deep Neural Network-based Autonomous Driving Systems*”. IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW), 2021 (Virtual)
- “*Effectiveness of dataset reduction in testing machine learning algorithms*”. IEEE International Conference on Artificial Intelligence Testing(AITest), 2020 (Virtual)
- “*Evaluating the Effectiveness of BEN in Localizing Different Types of Software Fault*”. IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW), Chicago, USA, 2016

REFERENCES

Provided on request