

Jaganmohan Chandrasekaran

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EDUCATION

Doctor of Philosophy, Computer Science - August, 2015 - August, 2021 (Expected)

University of Texas at Arlington, Arlington, TX

- Dissertation: *“Testing AI-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

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

RESEARCH INTERESTS

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

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 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.

WORK/TEACHING EXPERIENCE	<p>STEM Graduate Research Assistant, Computer Science and Engineering, <i>University of Texas at Arlington, Arlington, TX</i> (September 2020 - Current)</p> <p>STEM Graduate Teaching Assistant, Computer Science and Engineering, <i>University of Texas at Arlington, Arlington, TX</i> (September 2015 - August 2020)</p> <ul style="list-style-type: none"> • Teaching assistant for Object Oriented Software Design (Under-graduate level course), Software Testing and Advanced Software Testing (Graduate level course). • Provided feedback to students by grading homeworks, quizzes, and class projects. <p>Graduate Teaching Assistant, Computer Science and Engineering, <i>University of Texas at Arlington, Arlington, TX</i> (August 2014 - May 2015)</p> <ul style="list-style-type: none"> • Teaching assistant for Software Engineering-II and Software Team Project(Graduate level course) • Provided feedback to students by grading homeworks, quizzes, and class projects. <p>Analyst Programmer, Syntel Consulting Inc, <i>Mumbai, India / Northbrook, IL, USA</i> (Nov 2009 - Aug 2012)</p> <ul style="list-style-type: none"> • 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.
RELEVANT COURSES	<p>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).</p>
HONORS & AWARDS	<ul style="list-style-type: none"> • <i>STEM Doctoral Fellowship</i>, University of Texas at Arlington 2015 - Current • Nominated as a finalist for Outstanding Graduate Teaching Assistant Award for Computer Science and Engineering Department Spring 2018
PUBLICATIONS	<p><u>Conference Proceedings</u></p> <ol style="list-style-type: none"> 1. Jaganmohan Chandrasekaran, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “<i>A Combinatorial Approach to Explaining Image Classifiers</i>”. (Accepted to IWCT 2021). 2. Jaganmohan Chandrasekaran, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “<i>A Combinatorial Approach to Testing Deep Neural Network-based Autonomous Driving Systems</i>”. (Accepted to IWCT 2021). 3. Jaganmohan Chandrasekaran, Haudong Feng, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “<i>Effectiveness of volumetric dataset reduction in testing machine learning algorithms</i>”. In 2020 IEEE International Conference On Artificial Intelligence Testing (AITest) (pp. 133-140). IEEE. 4. Haudong Feng, Jaganmohan Chandrasekaran, Yu Lei, Raghu N.Kacker and, D. Richard Kuhn. “<i>A Method-Level Test Generation Framework for Debugging Big Data Applications</i> ”. In 2018 IEEE International Conference on Big Data (Big Data). IEEE, 2018. 5. Jaganmohan Chandrasekaran, Haudong Feng, Yu Lei, D. Richard Kuhn and, Raghu N.Kacker . “<i>Applying Combinatorial Testing to Data Mining Algorithms</i>”. In 2017 IEEE International Conference on Software Testing, Verification and Validation Workshops (ICSTW). IEEE, 2017.

6. **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), pp. 26-34. IEEE, 2016.
7. 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), pp. 1-4. IEEE, 2015.

Dissertation/Thesis

1. **Jaganmohan Chandrasekaran**. “*Evaluating the effectiveness of BEN in localizing different types of software fault*”. Dissertation & Theses University of Texas - Arlington; ProQuest Dissertation & Theses Global.

REFERENCES

Provided on request