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SOFTWARE ENGINEERING
de RSE | CONFERENCE
KARLSRUHE 2025

Contribution ID: **134**   Type: **Talk (15min + 5min)**

Test-Driven Software Experimentation with LASSO

Tuesday 25 February 2025 16:00 (20 minutes)

The field of empirical software engineering faces a significant gap in standardized tools for conducting rapid and efficient Test-Driven Software Experiments (TDSEs). These experiments involve executing software subjects and observing their runtime behavior (i.e., dynamic program analysis). To address this gap, I present LASSO, a general-purpose software code analysis platform that provides a minimal set of domain-specific languages and data structures to conduct TDSEs [1]. Inspired by the architectural designs of modern big data systems, LASSO is a scalable (distributed) workflow system for software engineering research based on the data-driven programming paradigm.

LASSO empowers users with an executable scripting language, allowing them to design and execute complex workflows efficiently. Unlike traditional ad-hoc approaches, LASSO offers a unified platform for creating automated and reproducible TDSEs at scale, while fostering Open Science principles (note that LASSO also offers additional, specific services like code recommendation).

Talk Overview:

My talk will showcase the practical benefits of using LASSO in evaluating software reliability for a particular software engineering scenario. I will present an example use case demonstrating how LASSO's domain-specific scripting language, LSL, seamlessly translates study designs into executable scripts that capture essential analysis steps and parameters. This reproducible example highlights the platform's capabilities in empowering users to quickly develop complex workflows.

Through this talk, I aim to demonstrate how LASSO can be leveraged as a research software platform for various applications, including evaluating code generation tasks [2]. I will discuss the key features and data structures within the LASSO platform, highlighting opportunities for customization and extension to meet specific needs. Additionally, I will point out core challenges faced in the platform's development.

By providing researchers with a unified platform for TDSEs, LASSO has the potential to significantly enhance the field of empirical software engineering. Its impact will not be limited to researchers, but also benefit practitioners (e.g., facilitating tool evaluations) and educators (e.g., test-driven assessments in programming courses). The LASSO platform is freely available at https://softwareobservatorium.github.io/ , and a demo video is available on YouTube: https://youtu.be/tzY9oNTWXzw . Looking ahead, because of the open source nature of LASSO, we anticipate a growing community which leads to a thriving ecosystem around TDSEs, characterized by shared repositories of experiments among users.

Young RSE Prize:

As the LASSO platform was developed as part of my dissertation, which I successfully defended with "summa cum laude"honors in February 2023, I believe that this talk on LASSO as a research software platform aligns perfectly with the "Young RSE Prize".

Literature:

[1] Marcus Kessel, Colin Atkinson, Promoting open science in test-driven software experiments, Journal of Systems and Software, Volume 212, 2024, 111971, ISSN 0164-1212, https://doi.org/10.1016/j.jss.2024.111971.

[2] M. Kessel and C. Atkinson, "N-Version Assessment and Enhancement of Generative AI," in IEEE Software, doi: 10.1109/MS.2024.3469388, Preprint: https://arxiv.org/abs/2409.14071

[3] Marcus Kessel,LASSO –an observatorium for the dynamic selection, analysis and comparison of software, Dissertation, 2023, https://madoc.bib.uni-mannheim.de/64107/

I want to participate in the youngRSE prize

yes

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Session Classification: Domain Specific Languages

Track Classification: Research Software: domain-specific languages