Randomized End-to-End Testing in Shiny Applications

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Abstract

Shiny applications have gained substantial popularity as a powerful framework for developing interactive web applications using the R programming language. These applications often serve critical functions and require robust testing methodologies to ensure their reliability and functionality. End-to-end testing is a valuable approach to validate the behavior and performance of these applications under various scenarios. In this presentation, we introduce a novel tool, leveraging *shinytest2*, that enables developers to conduct randomized end-to-end testing in *shiny* applications efficiently.

Randomized end-to-end testing involves generating and executing test scenarios with randomly selected inputs and interactions to evaluate the application's behavior and identify potential issues. By incorporating randomness into the testing process, it becomes possible to uncover unforeseen bugs and edge cases that may not be apparent through traditional testing methods.

Furthermore, this approach helps ensure that the application is capable of handling a wide range of user inputs and interactions effectively. The tool we present in this abstract builds upon the capabilities of *shinytest2*, an R package specifically designed for testing *shiny* applications. Our tool extends its functionality by incorporating a randomized testing framework, enabling developers to create and execute comprehensive end-to-end tests with minimal effort. By leveraging the power of *shinytest2*, we provide an intuitive and user-friendly interface that allows developers to define test cases, specify input for testing, and set test constraints, all within the familiar R environment. The key features of our tool include:

- Test Scenario Generation: Our tool automates the process of generating randomized test scenarios, allowing developers to specify inputs for testing, select test constraints, and define test objectives. This approach enables comprehensive coverage of the application's functionality, ensuring that critical paths and edge cases are thoroughly tested.
- Test Execution and Reporting: Leveraging *shinytest2*'s underlying infrastructure, our tool facilitates the execution of randomized test scenarios in a reproducible manner. It captures interactions, takes screenshots, and reports any inconsistencies encountered. Detailed reports, including logs and visual representations of test

outcomes, provide developers with comprehensive insights into the application's behavior and potential issues.

- Integration and Reusability: Our tool seamlessly integrates with existing *shiny* applications, making it straightforward to incorporate randomized end-to-end testing into the development workflow. Additionally, the modular design allows developers to reuse and adapt test cases across different projects, enhancing efficiency and scalability.

By utilizing randomized end-to-end testing in Shiny applications, developers can improve the quality and reliability of their applications. Our tool, built upon *shinytest2*, empowers developers to implement this testing approach seamlessly, providing an efficient and user-friendly solution for comprehensive application validation.