An Technical Look at Shiny

Intro to Advanced Data Science

Jacob Wolfrom, Balah Muhammad

March 20, 2023

Contents

1 Focus

The focus of this project is to cover how reactive evaluation works in Shiny, a package for R. We have chosen this as a topic because it is a crucial component in the developement of Shiny application, and it is not only a somewhat complicated concept, but it is also difficult to piece together its functionality from the standard documentation pages and examples that are prompted from R, unlike many other aspects such as the creation of UI elements and the server function.

2 Sources

2.1 Understanding Reactivity

The citation with the link can be found here [1]

[1]- Article by Shiny Shiny. (2017, June 28). *Reactivity - An overview.* shiny.rstudio.com. `https://shiny.rstudio.com/articles/understanding-reactivity.html`

This source is an article that is the beginning of a section on reactive evaluation by the developers of Shiny that serves as a basic overview of how reactivity works in Shiny. This and the other articles in its section are important because these articles are made by the developers of Shiny themselves. Ultimately these articles seek to give the reader a functional (if not complete) understanding on how Shiny evalutes reactive expressions. To this end they serve as a very good starting point on understanding how reactivity works in Shiny. They are concise enough that reading them is not a serious time investment while being clear enough that there is little confusion about the topic. This was the first source we used in our journey to get a basic understanding of our topic.

This is a very good source as it is made directly by the same group who made Shiny. We recommend this source for anyone that is new to Shiny. We especially liked the fact that it was able to convey the key points of reactivity in a way that was both understandable and quick to read. The main downside is that this is all the developers of Shiny have to say about reactivity on their website itself, and the information is not complete. For example, the website states some information on how changed values are invalidated, but it doesn't mention the process by which that happens. The exact details of this process begin a problem when trying to implement data abstractions that are not compatible with the `identical` function (such as the somewhat popular R6 class) as they will not invalidate properly.

2.2 Mastering Shiny

The citation with the link can be found here [2]

This source is a book by Hadley Wickham, the Chief Scientist at Rstudio and one of the contributors to the Shiny Github page, on how to develop applications using Shiny. The book covers a great deal more than just reactivity, but is has a significant portion devoted to reactivity and is more in depth than the previous source. This source is one of the most commonly recommended sources from our exploration and it really shows. The goal of the book is to teach the reader how to effectively use Shiny. As of right now, we have used this to learn more about reactive evaluation in Shiny, but we also plan on using this source in the development of our final product to help in the process of developing our final product.

This book is credible on account of how well appraised it is and how credible the author is. This source is incredible not only because of the

[2]- Book on Shiny Wickham, H. (2021, April). *Mastering Shiny.* `https://mastering-shiny.org/`

content itself, but also the fact that the online version of it is free and separated into easily navigatable sections. Additionally, the book includes exercises on each of the topics it explains which is a crucial component to committing concepts to memory. We have no real complaints with the source. We recommend this source for essentially anyone looking to learn Shiny.

2.3 Datacamp Course

The citation with the link can be found here [3]

This source is a digital skill track for Shiny from Datacamp. Although neither of us have fully completed the course, it was our first introduction to the Shiny package as it was used as an assignment in a previous course. This track intends to teach a beginner how to use Shiny as well as looking at some use cases and related packages. This extra content is a bit outside the scope of our project, but are useful nontheless.

Datacamp is a well known source and credible source for a variety of data science topics including this one. There is a number of reasons for someone to use this source over the others. Firstly, Datacamp is essentially a tutorial that guides you through its lessons, and that may be easier depending on the student. Secondly, it has a much more hands on approach as most of the learning is done through coding assignments. Lastly, when a student completes the skill track, they recieve a certificate to prove that they have completed the track. This can go on a resume as a way to quickly show an employer that the applicant possesses certain skills. We will note however, that the entire course is about 16 hours long which is not an insignificant time investment. For someone that just wants to learn the basics of Shiny, the first course will suffice as it teaches the basic technical and syntactical elements of Shiny while the other courses delve into other packages or discuss applications. Additionally, the first course is only 4 hours long which is much more manageable. Ultimately, this source is simple and easy to follow, but the pacing can feel really slow at times, making other sources preferable for those who want to learn more than just the absolute basics or do not have access to Datacamp for whatever reason.

2.4 Github Issue Page

The citation with the link can be found here [4]

[3]- Datacamp course DataCamp. (n.d.). Shiny Fundamentals in R [Skill Track]. DataCamp. `https://app.datacamp.com/learn/skill-tracks/shiny-fundamentals-with-r`

[4]- GitHub Issue Tasan, M., Cheng, J., and Chang, W. (2020, October 22). *hashReactiveVal (or checkReactiveVal).* Github. `https://github.com/rstudio/shiny/issues/`

This source is unique among the others listed as it does not aim to teach how to use the Shiny package. In fact, its barely even a source at all. This is a Github issue page where a user is askin if there is a way to overwrite the typical invalidation checking in Shiny. We selected and noted this source for later use because it shows an example of something that is not covered in any of the sources that we discovered.

This source is granted credibility primarily due to the replies and interaction by two of the people who have worked on Shiny, including the developer of its framework, Joe Cheng. We would not recommend this source to any beginner, but it is an interesting dilemma to read for those that have a good understanding of the Shiny framework. Essentially, the problem the user has is that the default method of invalidation checking, the identical function, is to strict for his purpose and is causing issues.

3109