Customizable, Open Source Shiny Apps for Randomization-Based and Traditional Intro Stat Courses

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Overview

The goal of this project is to build an open source suite of Shiny apps for introductory statistics courses where …

- the apps can be easily hosted on any Shiny server
- several apps for randomization tests are designed for the series of OpenIntro texts[1]
- all apps contain extensive comments for easy customization

The R code for the apps can be found at

gitlab.msu.edu/STT200ShinyApps/intro-statistics-applets

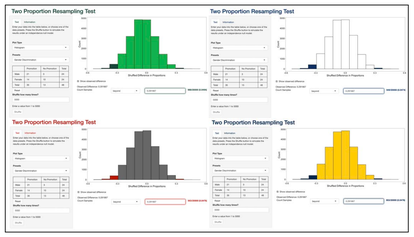
with published versions of the apps found at

msu.edu/~fairbour/Applets.html

Customization

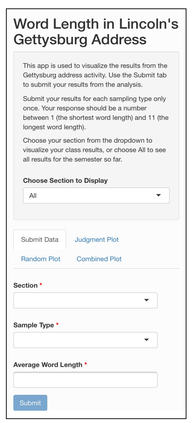
Being able to customize the Shiny apps is one major advantage over other existing statistics apps. Extensive comments in the code allow instructors with minimal R experience to modify the apps to suit their style and needs, with instructions for how to change ...

- the appearance (colors, font, etc.)
- preset datasets
- core functionality



Collect Class Data

- Introductory Statistics courses revolve around displaying, analyzing, and understanding data.
- Many activities designed to explore these ideas use somewhat standard datasets, which have no direct connections to the students.
- It is possible to collect data from students, but this tends to be quite time consuming, and the sample size is limited.
- The Gettysburg Submission App combines data collection and data analysis into a single app.
- Data can be combined with other course sections and previous years to create a larger sample.
- User-friendly mobile webpage (see image on right).



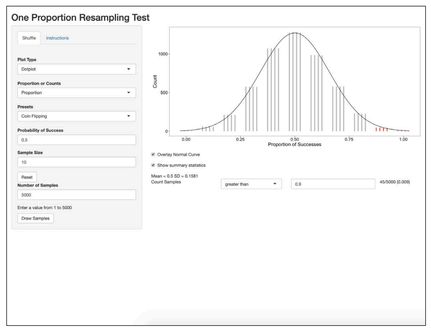
Summary of Current Apps

Two Proportion Resampling Test

The Two Proportion Resampling Test app conducts Fisher's Exact Test by randomization. Preset datasets are included, with the option to customize the observed data.

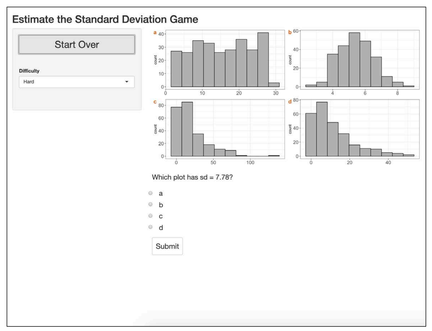
One Proportion Resampling Test

The One Proportion Resampling Test app conducts a one proportion hypothesis test by randomization. Preset examples are included, with the option to specify your own values of *n* and *p*.



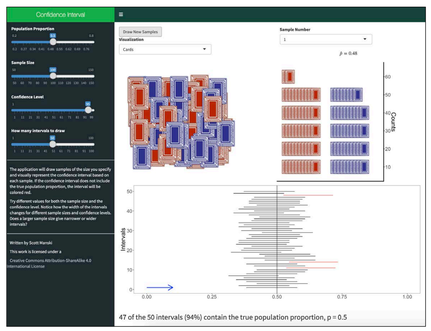
Standard Deviation Game

The Standard Deviation Game let's you put your skills to the test! Four histograms are shown, and you need to select the histogram that matches the standard deviation provided. Two difficulties are available.



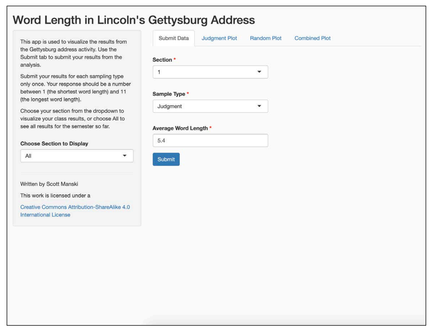
Confidence Interval App

The Confidence Interval app allows users to visualize the repeated confidence intervals for a proportion. The true proportion, confidence level, sample size, and the number of samples can all be chosen by the user.



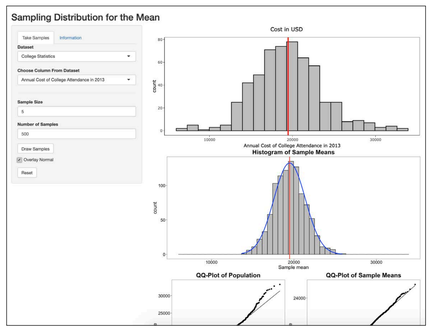
Gettysburg Submission App

The Gettysburg Submission app is designed to collect and visualize class data from the Gettysburg Activity. The activity has students attempt to estimate the average word length in the Gettysburg address with random and biased sampling methods.



Sampling Distribution for the Mean

The Sampling Distribution for the Mean app is designed to visualize the sampling distribution for the mean from a chosen population. Two datasets are included along with an option to upload your own data.



Getting Started

Before We Start

- Download or update to the current version of R and RStudio
- A version control system is recommended, such as Git

Modifying Your App

1. Start by downloading an app folder of your choice from the gitlab page
2. Install all required packages for the app
3. Run the unmodified app locally to verify that the code is working properly
4. Customize the app to your specific needs

Publish Your App

The easiest way to publish your app is through shinyapps.io[2]

1. Install and load the 'rsconnect' package in R
2. Set up your shinyapps.io account
3. From the shinyapps.io dashboard, click 'Account' and 'Tokens'. Then press '+ add token'
4. Press 'show' next to one of your tokens and copy the code. Now run the code in R

```
rsconnect::setAccountInfo(name="<ACCOUNT>", token="<TOKEN>",
                          secret="<SECRET>")
```

5. Deploy your first app by running

```
deployApp("<APP FOLDER LOCATION>")
```

Using shinyapps.io is the simplest way to publish your app, and there are a variety of free and paid plans.

Other methods for publishing your app include[3]

- RStudio Connect
- Shiny Server Pro
- Shiny Server Open Source

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References

1. OpenIntro, https://www.openintro.org/index.php
2. shinyapps.io by RStudio, https://www.shinyapps.io/
3. RStudio, https://www.rstudio.com/products/shiny/shiny-server/