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Web application teaching tools for statistics using R and Shiny.

Summary: Technology plays a critical role in supporting statistics education, and student comprehension is improved when simulations accompanied by dynamic visualizations are employed. Many web-based teaching tool applets programmed in Java/Javascript are publicly available (e.g., `www.rossmanchance.com`, `www.socr.ucla.edu`). These provide a user-friendly interface which is accessible and appealing to students in introductory statistics courses. However, not all statistics educators are fluent in Java/Javascript and may not be able to tailor these apps or develop their own. Shiny, a web application framework for R created by RStudio, facilitates applet development for educators who are familiar with R. We illustrate the utility, convenience, and versatility of Shiny through our collection of 17 freely available apps covering a range of topics and levels (found at `www.statistics.calpoly.edu/shiny`). Our Shiny source code is publicly available so that anyone may tailor our apps as desired. We provide feedback on how our apps have been used in statistics classes including some challenges that were encountered. We also discuss feasibility on building, launching, and deploying Shiny apps. A brief tutorial on installing and using Shiny is provided in the appendix. Some teaching materials based on our Shiny apps are also included in the appendix.

Classification: U70 K10

Keywords: introductory statistics; educational media; information technology; computer as educational medium; statistical software; apps; applet teaching tools; web-based applications; web-based teaching tools; internet; technology implementation; student activities; computer simulation; violation of the constant variance condition; ANOVA; F-test; Wilcoxon-Mann-Whitney test; t-test; nonparametric tests; parametric tests; probability distribution viewer; gambler's ruin; longest run of heads or tails; sampling distributions; random variable generation app; computer programming; building Shiny apps
https://escholarship.org/uc/item/00d4q8cp