MOBILE APPS FOR TEACHING AND LEARNING STATISTICS

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INTRODUCTION

The GAISE guidelines made it clear that we should use *real data* where possible, take an *active learning* approach, and *analyze data using technology*. The technology should enable instructors to demonstrate concepts and methods of data analysis in class and labs, and perhaps in remote or asynchronous settings. Additionally, the technology should make it easy for students to replicate the analyses and use it on their own datasets. To this end, we are introducing a new suit of mobile apps under the umbrella name Art of Stat, available for both iOS and Android. These apps cover the entire spectrum of methods and concepts in a one- or two-semester introductory statistics course and can be used to illustrate statistical concepts as well as analyze real data. Several example datasets are provided with the apps, but users can create their own, or import a CSV file. Results can be shared via screenshots or screen recordings. Figure 1 shows icons for the six mobile apps currently available in the app store. While some content is free, all functionality of a particular app can be unlocked for a nominal fee of $1.99 to cover development costs.

Figure 1: The six Art of Stat Apps available in the app store for teaching and learning statistics.

Because statistical mobile apps are a new technology, no literature currently exists on their effectiveness. However, as Lu (2022) made clear, “Tools that prioritize the teaching of statistical thinking and computational reasoning while avoiding the obstacle of programming will give students more benefits in introductory courses.” In addition, the mobile apps are based on the popular R Shiny web apps published at http://www.ArtofStat.com. The article by Lu (2022) also includes discussion on the effectivness of such R Shiny applets, and we believe some of the mentioned benefits will carry over to the mobile apps.

ART OF STAT: REGRESSION

We will use the Regression app to illustrate the general functionality, as the interface is similar across apps. The Regression app opens with a landing screen that presents several regression models using icons illustrating each model: Simple linear, exponential, or logistic regression models, and multiple linear regression. The user must now understand the two most important questions: What type of response variable do I have (quantitative or binary), and how many predictors do I want to include? Other apps enforcing similar choices, for instance the Inference app.

If the multiple linear regression icon is selected, the user is presented with three tabs: The “Enter Data” tab provides a variety of ways of entering data, and allows selection of the response and independent variable(s). On the “Fitted Model and Plots” tab, a scatterplot matrix is displayed, and the fitted model is displayed. A table of parameter estimates is shown, and t-statistics and P-values can be added with a switch. All these are design features of all apps: When possible, an appropriate plot is shown, and more output is revealed with switches and drop-downs, prompting the user to think what they are about to do. This is in contrast to the overwhelming (to an intro student) output of standard commercial and free statistical software. The final “Fitted Values and Residuals” tab lets the user obtain predicted values (including for categorical predictors) and analyze residual plots.

REFERENCES

Lu, Y. (2022) Web-Based Applets for Facilitating Simulations and Generating Randomized Datasets

