Getting Started with STAT 961

August 7, 2021

1 Setup

R and RStudio setup.

- If you do not have R and/or RStudio installed, download and install these softwares by following the instructions here. If you do have RStudio installed, update it to the latest version by opening RStudio and clicking `Help -> Check for Updates`. If you do have R installed, update it to the latest version by following the instructions here. Open RStudio.
- Install packages for compiling reports by entering the following commands at the console (labeled B in Figure 1):

```
install.packages("knitr")
install.packages("xtable")
install.packages('tinytex')
tinytex::install_tinytex()
```

- If you are on a Windows machine, go to `Tools -> Global Options -> Terminal`. In the drop down box for `New terminals open with`, select "Git Bash".
- Go to `Tools -> Global Options -> Sweave` on Windows or `RStudio -> Preferences -> Sweave` on Mac and select the options pictured in Figure 2.

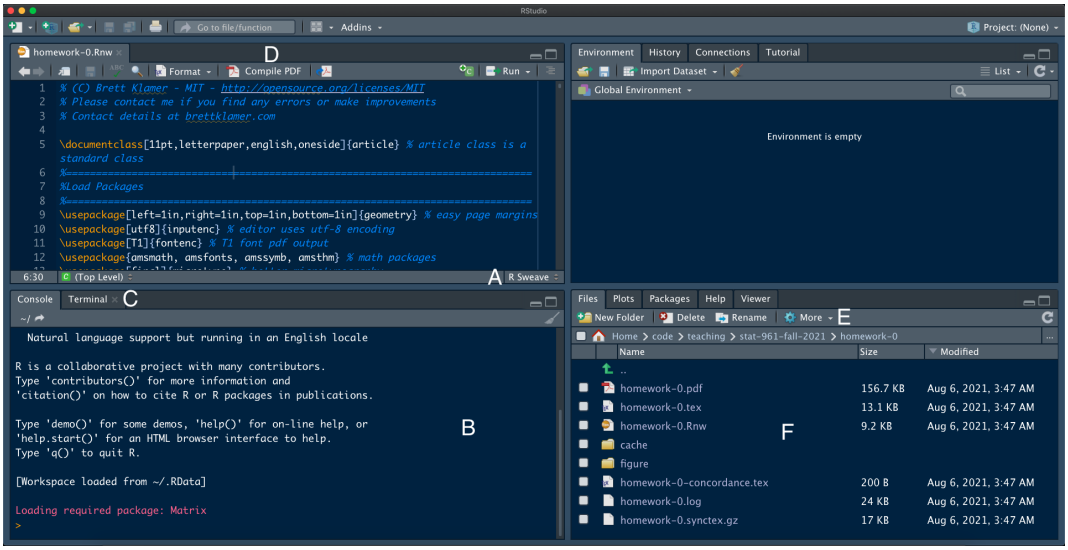

Figure 1: RStudio interface

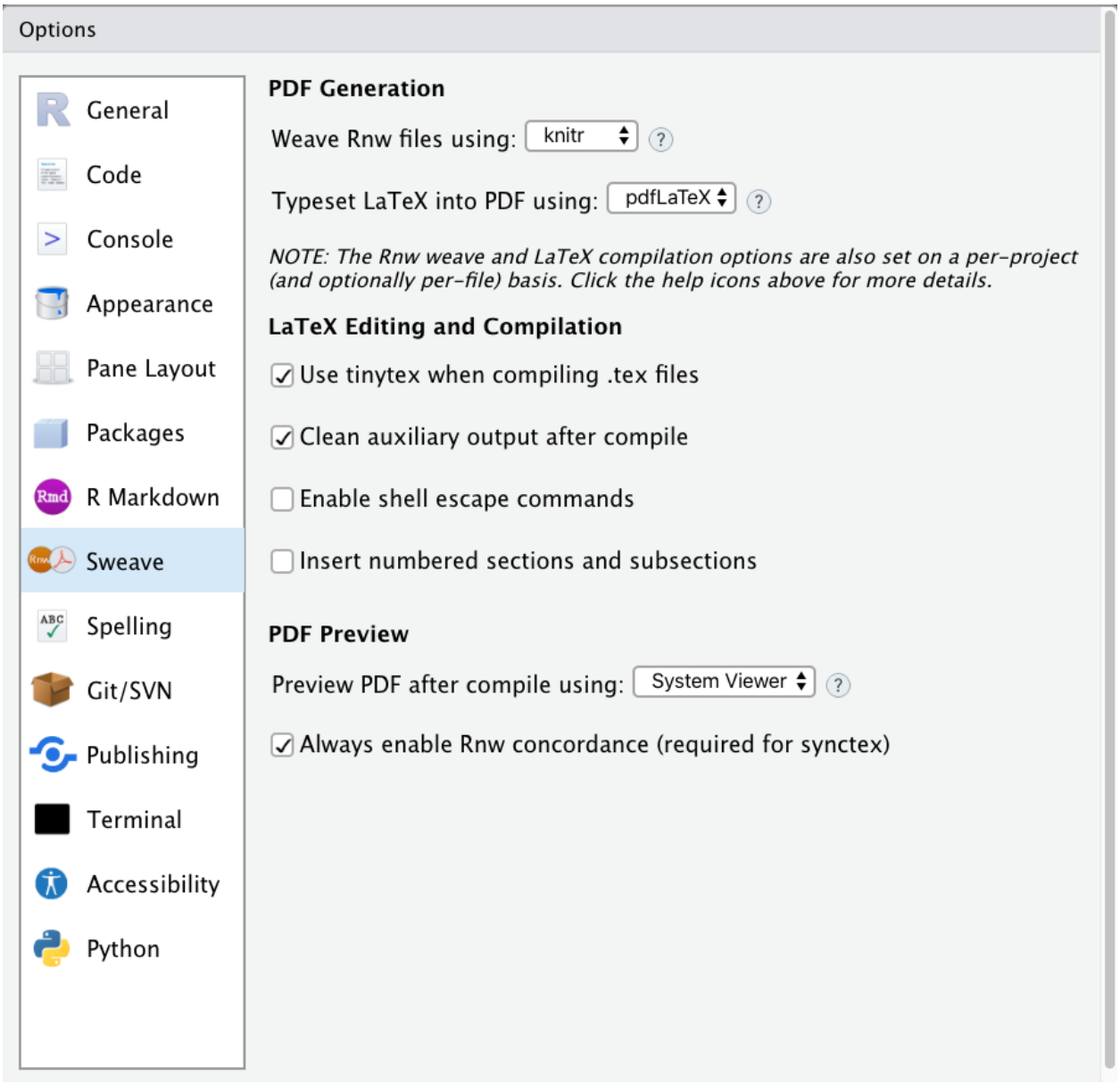

Figure 2: Options for PDF generation.

Git and Github setup.

- Install Git by following the instructions here (if not already done so).
- Set up Git by following the instructions here (if not already done so).
- Create an account on Github (if not already done so).
- Create a repository on Github named `stat-961-fall-2021` by signing into your Github account, clicking "Repositories", clicking the green "New" button, choosing the options pictured in Figure 3, and clicking the green "Create repository" button.
- Create a folder on your computer called `stat-961-fall-2021`.
- Open RStudio and navigate to the `stat-961-fall-2021` directory in the RStudio "Files" pane (Figure 1F). Click `More` -> `Set As Working Directory` (Figure 1E).
- Open the Terminal in RStudio (Figure 1C), click the down arrow, and click `Go to Current Directory`.
- In the terminal, type

  ```
  git clone https://github.com/katsevich-teaching/stat-961-fall-2021.git
  ```

  This will copy the STAT 961 Github repository onto your local computer.
- In the terminal, type

  ```
  git remote set-url --push origin https://github.com/[USERNAME]/stat-961-fall-2021.git
  ```

  Here, "[USERNAME]" should be replaced by your Github username. This command will tell Github that any changes you make will be synchronized to your version of the class repository, as opposed to the main version.
- In the terminal, type

  ```
  git push
  ```

  This will have the effect of copying the contents of the repository to your personal Github account. Go to `https://github.com/[USERNAME]/stat-961-fall-2021` and check that this operation succeeded.

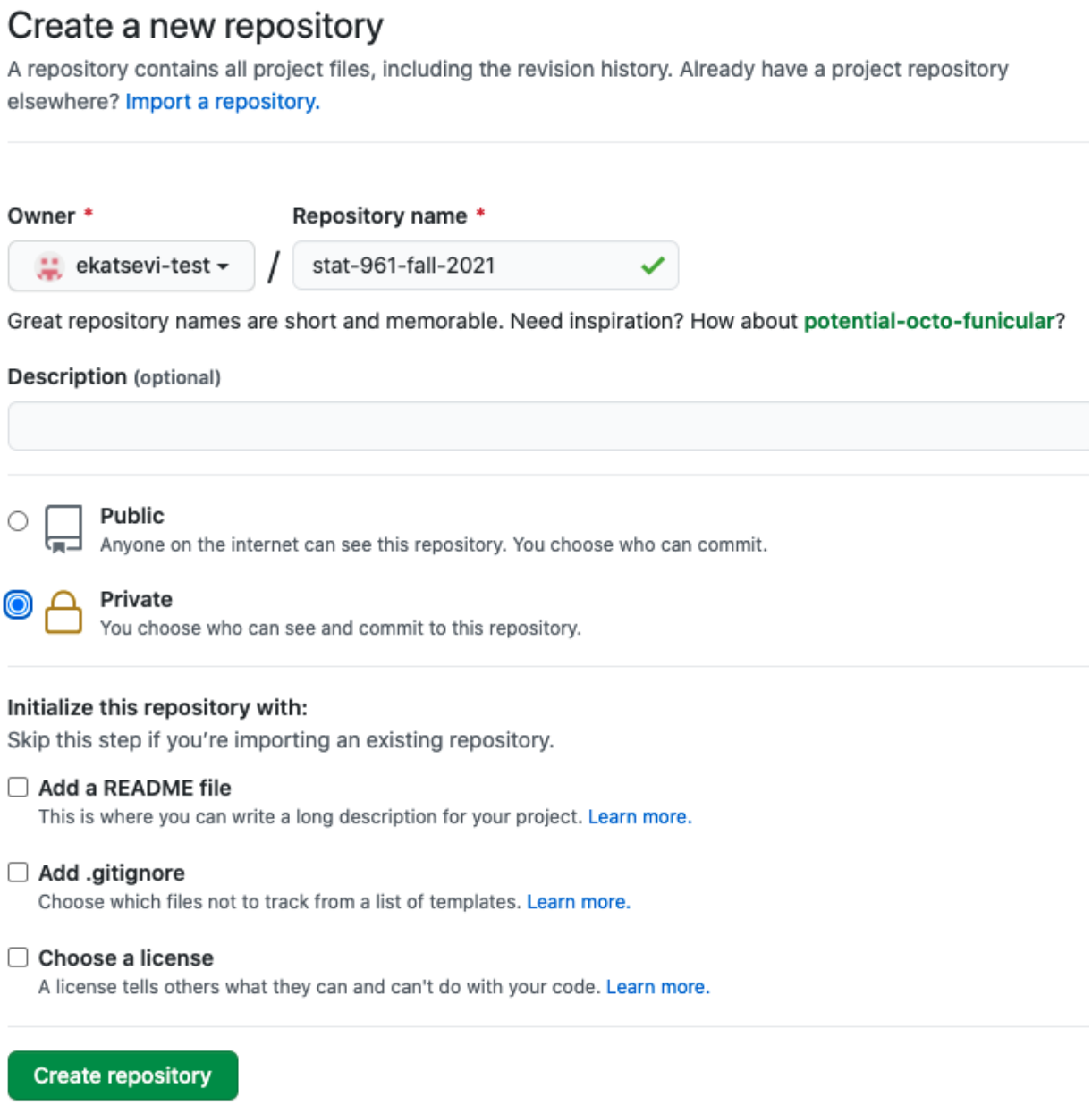

Figure 3: Creating a new Github repository for the class.

2 Homework assignments

Homework assignments will be made available on the Github webpage. As an example, see Homework 0.

Pulling, editing, compiling, and pushing.

1. Locate and open the file `homework-0/homework-0.Rnw` in the files pane (Figure 1F). Select "R Sweave" from the menu in the bottom right-hand corner of the editor pane (Figure 1A).
2. Change "FirstName LastName" to your first and last name in line 24.
3. Click "Compile PDF" near the top of the editor pane, and make sure the PDF compiled.
4. See what changes have been made by typing `git status` in the Terminal
5. Stage the changes for committing by typing the following command in the Terminal:

```
git add --all
```

6. Commit the changes by typing the following command in the Terminal:

```
git commit -m "Changed name on homework 0"
```

7. Push the changes to your Github repository by typing the following command in the Terminal

```
git push
```

8. Submit compiled PDF to Gradescope.

3 LaTeX tutorial

1. Learn about LaTeX basics like formulas, cross-referencing

4 R tutorial

5 Rnw tutorial

Problem 1. How to reference R values within LaTeX using $\backslash Sexpr\{\}$.

Solution 1. Here is some R code...

```
x <- c(1, 2, 3, 4, 5)
y <- c(1, 2, 1.5, 3.5, 2.5)
x.mean <- mean(x); x.sd <- sd(x)
y.mean <- mean(y); y.sd <- sd(y)
```

The mean for x is 3 and the standard deviation is 1.58. The mean for y is 2.1 and the standard deviation is 0.96.

Problem 2. How to add regression tables to LaTeX with *xtable*().

Solution 2. Run the regression using the data above...

```
reg <- lm(y ~ x)
```

Table 1: This is a caption

	Estimate	Std. Error	t value	Pr(>|t|)
(Intercept)	0.7500	0.7837	0.96	0.4092
x	0.4500	0.2363	1.90	0.1530

Call: lm(formula = y x)
Coefficients: (Intercept) x 0.75 0.45

Problem 3. How to add pdf plots to LaTeX using knitr.

Solution 3. Still using the same data...

```
data <- data.frame(cbind(y, x))
library(ggplot2)
ggplot(data = data, aes(x = x, y = y)) +
    geom_point(shape = 1) +
    geom_smooth(method = lm) +
    ggtitle("This is a title")
```

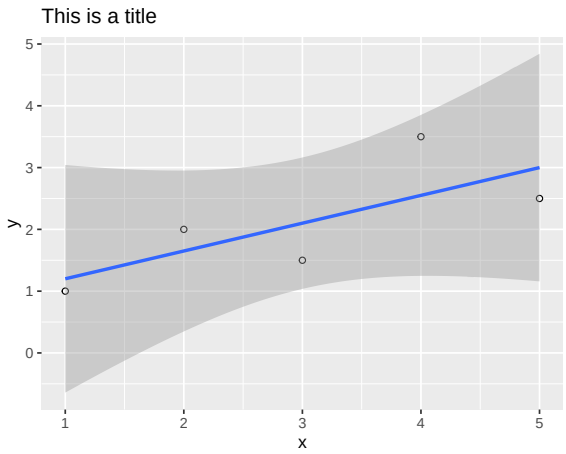

Figure 4: This is a caption