STAT 413/613 Homework: Shiny

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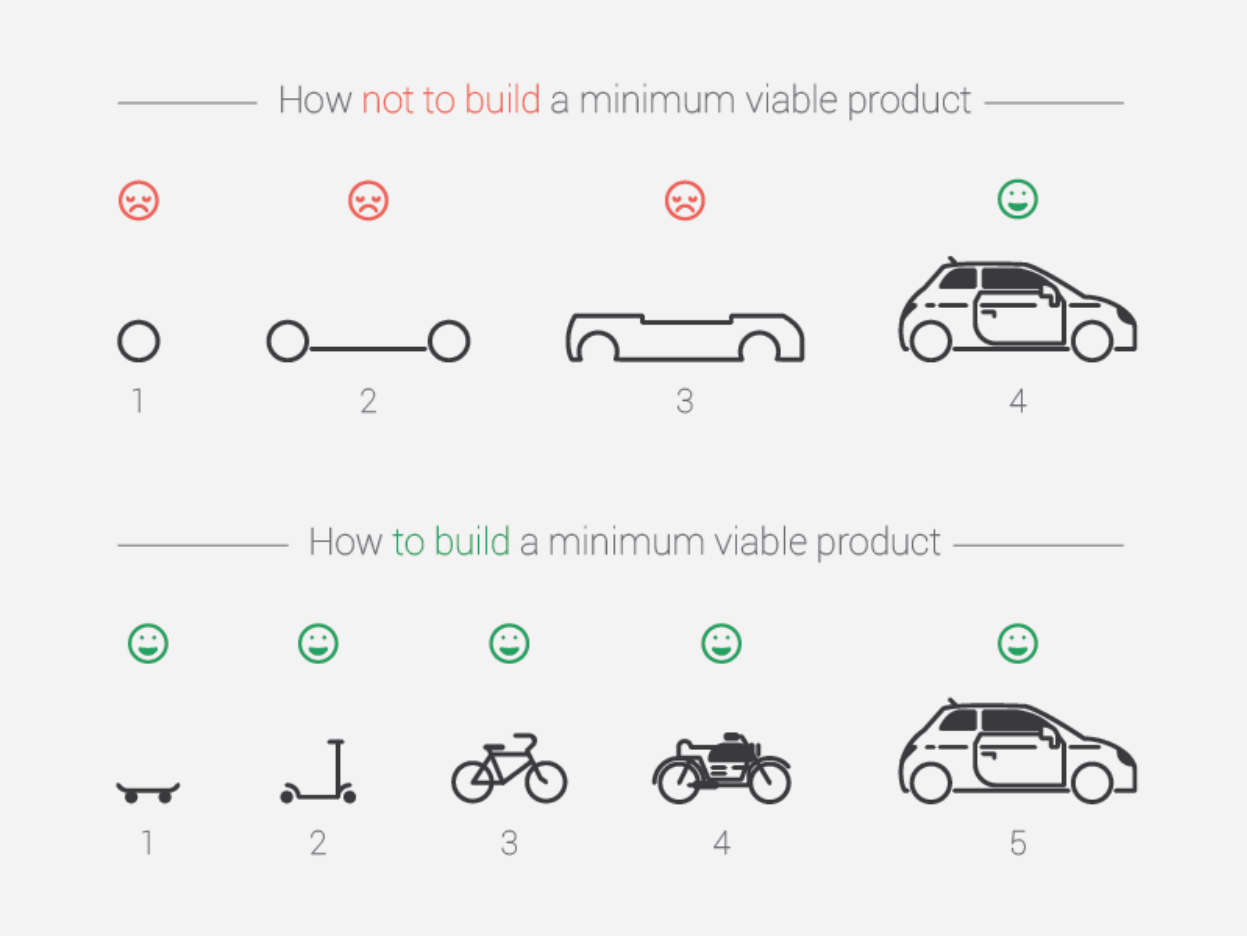
Instructions

- Create three Apps in the appropriate folders in the homework repo in accordance with the instructions below.
- Delete the Untitled.R files in the R directories
- For each App, put your name in a comment at the top of the app.R file.
- Include any citations or references in the comments as well.
- Place all of your solution Shiny code in the appropriate app folders.
- **Make sure to commit often, consider branches, and push each time you answer a question or you want me to look at code.**
- Submit a note on Canvas when your apps are complete and ready for scoring.
- If you want to answer the extra credit question at the end, please add your answers to your submission note on Canvas
- HINT: Use the following to guide your app development {-}
  - Courtesy of https://engineering-shiny.org/



Learning Outcome

- Create Shiny Apps with increasing levels of sophistication.

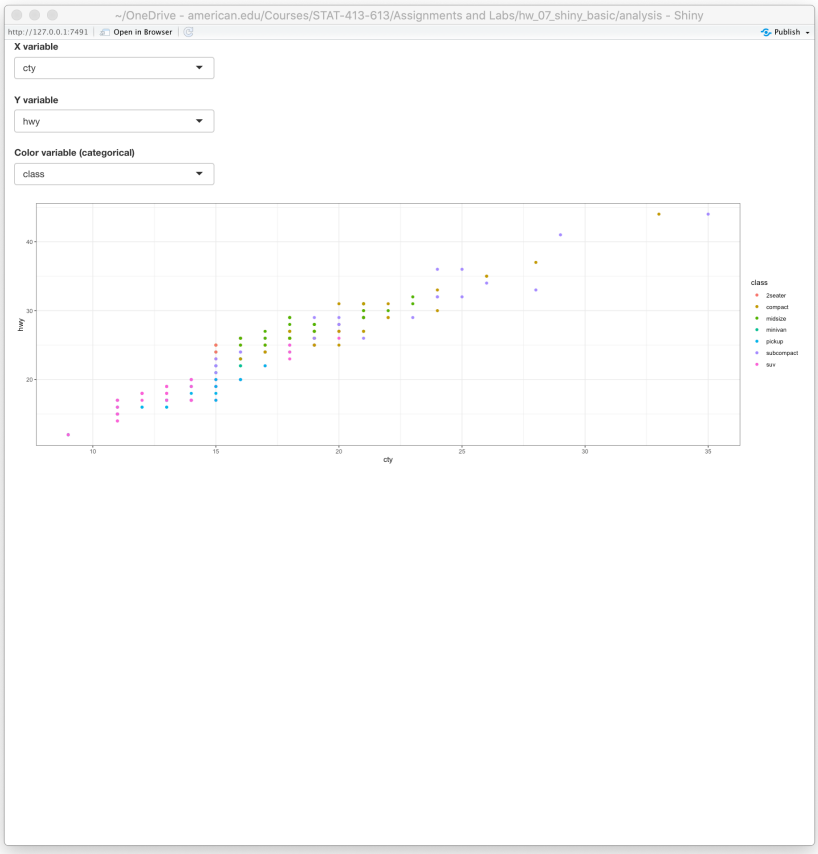
Rubric

Part	Pts	Element
1.mpg App	1.	Working App
1.mpg App	1.	Correct Input capabilities
1.mpg App	1.	Correct Plot Outputs
2.mtcars App	1.	Working App
2.mtcars App	2.	Correct Input capabilities
2.mtcars App	2.	Correct Plot Outputs
3.Housing App	1.	Data is loaded and Transformed before the UI code
3a.Tab 1	2.	Numeric Input and Output
3a.Tab 1	2.	Factor Input and Output
3a.Tab1	2.	Log Input and Output and error message using validate()
3a.Tab1	3.	t.test Input and Output
3b.Tab2	4.	Numeric and Numeric
3b.Tab2	4.	Numeric and Factor
3b.Tab2	4.	Factor and Factor
3b.Tab2	4.	Log Input and Output and error message using validate()

Part	Pts	Element
3b.Tab2	4.	OLS Input and Output
3b.Tab 2 Extra Credit	1.	EC: LM Summary
3b.Tab 2 Extra Credit	.5	EC: Residual Plot
3b.Tab 2 Extra Credit	.5	EC: QQ Plot
3c.Tab3	2.	Data Table
4.Extra Credit Webinar	1.	Answers to Questions
Total	**40**	Plus 3 Extra Credit

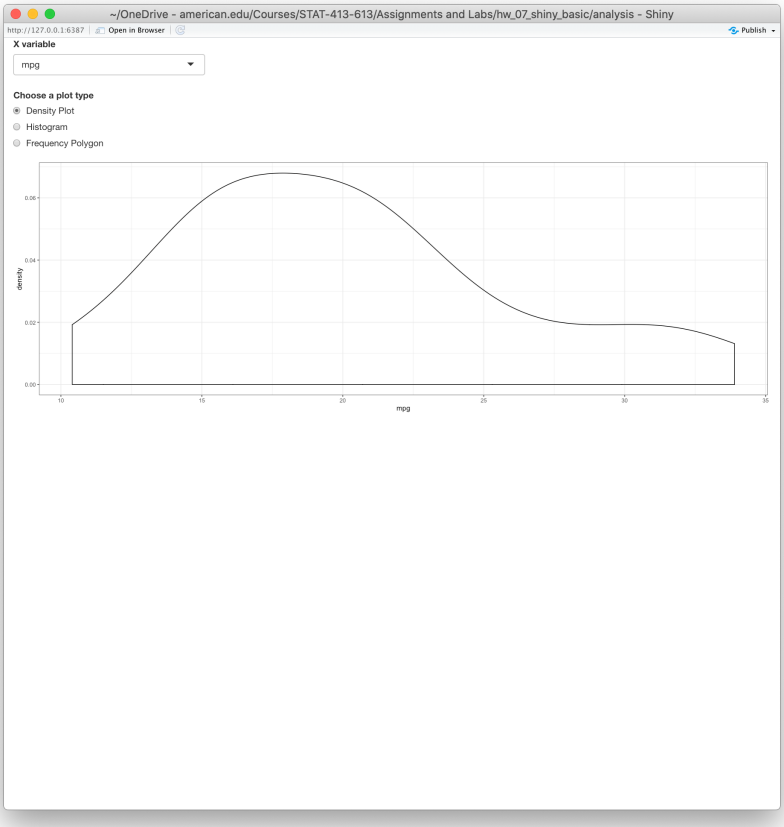
1 Create a Shiny app based on the `mpg` dataset from the ggplot2 package.

- Allow a user to select three variables from the dataset.
- The app should output a scatterplot of two of the variables and color code the points by the third variable.
- Make the default variables the ones in the image below.
- Your app should look similar to this:



2 Create a Shiny app based on the mtcars data set.

- Take as input a variable from the `mtcars` dataset to plot as well as the type of plot (histogram, density, or frequency polygon).
- Hint: Recall plots are objects you can build one layer at a time. Taking advantage of this modular nature of ggplot2 will make your code simpler:
- Your app should look similar to this:



3 Housing Sales App

Researchers were interested in predicting residential home sales prices in a Midwestern city as a function of various characteristics of the home and surrounding property. Data on 522 transactions were obtained for home sales during the year 2002. The 13 variables are:

- Price: Sales price of residence (in dollars)
- Area: Finished area of residence (in square feet)
- Bed: Total number of bedrooms in residence
- Bath: Total number of bathrooms in residence
- AC: 1 = presence of air conditioning, 0 = absence of air conditioning
- Garage: Number of cars that a garage will hold
- Pool: 1 = presence of a pool, 0 = absence of a pool
- Year: Year property was originally constructed
- Quality: Index for quality of construction. High, Medium, or Low.

- Style: Categorical variable indicating architectural style
- Lot: Lot size (in square feet)
- Highway: 1 = highway adjacent, 0 = highway not adjacent.

We've seen these data a few times before.

3.1 Build a Shiny App with the following attributes:

1. Three tabs. The first tab is for univariate analysis. The second tab is for bivariate analysis. The third tab is for a spreadsheet of the numeric variables in the data.

- Transform the data so `AC`, `Pool` and `Highway` are factors and `Price` is in thousands of dollars.

2. The inputs/outputs for the univariate analysis should be:

- The variable of interest.
- Do the analysis on log-transformed data or not?
- The number of bins in the histogram.
- The null value for a one-sample t-test.
- Output the results of the one-sample t-test. The results of the test should be in accordance with the user's choice of a log transformation (or not) for the data .
- Output a histogram if the variable is numeric and a barplot otherwise.
- Use `validate()` to output an error message if the log transform is checked for a factor

3. The inputs/outputs for the bivariate analysis should be:

- The variable of interest for the X axis and the Y axis.
- Whether to log each variable.
- Whether to add an OLS line.
- Output a scatter plot if both variables are numeric, a boxplot if one is numeric and one is categorical, and a jitter plot if both are categorical.
- Use `validate()` to output an error message if the log transform is checked for a factor.

4. The spreadsheet tab should contain a Data Table with only the numeric variables. Use a map*() function to select these.

5. Try to make your Shiny app as visually similar to my app as you can.

- Hint: You can make this a lot easier by taking advantage of the modularity built into ggplot2:

```
pl <- ggplot(mtcars, aes(x = disp, y = mpg))
if (...){
pl <- pl + geom_point()
} else if(...){
pl <- pl + scale_x_log10()
}
pl
```

- Hint: I found it easier to use `geom_boxploth()` from the ggstance library instead of using `coord_flip()`.

3.2 Extra Credit Tab 2

- Only if the OLS line is requested, add another row of output:
  - On the left, a summary from running a linear model on the chosen inputs and outputs to include any log transforms

– In the middle, a plot of the residuals versus fitted

– On the right, a QQ plot of the residuals

4 Extra Credit Webinar

- Listen to Epsiode 1 of the RStudio Shiny Developer Series" webinars and provide answers to the following questions:

1. How has the R Studio shiny development changed their focus over the past several years?
2. How does your approach to writing shiny apps change when you think they will need to be maintained over the long run by your “future self” or others?