Project 1: Getting From Walker to Greer

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Introduction

This project, known as "Campus Transport" calls for a model to find the "best" route from Walker 205 to I.G. Greer Auditorium. No further problem statement is given.

Defining "Best"

There are many different ways to define "best" depending on the goal. In going from Walker to Greer, for instance, best could mean "shortest time of travel" or it could mean "cheapest method of travel" or "the way that takes the least work" (in the physics definition of work) or "the most comfortable way to travel" or "the safest way to travel" (whether that means for a person traveling or whether that means the product being transported arrives in optimal condition).

Determining the "best" way to get from Walker 205 to IG Greer Auditorium requires more information than we have been given. Are we restricted to legal ways of travel (skateboarding not being allowed on campus, for example)? Must it be realistic or can we, for instance, use the Star Trek transporter? Are we the one(s) traveling or are we transporting goods or both goods and ourselves? Is it a group traveling (I find groups tend to be slower than individuals)? What time of day are we traveling? What is the weather like? What time of year is it? Is it, for instance, a game day at App? How does the user requesting this analysis/model define "best"? Since the user requesting this model has not given more information, I am going to discuss a few of the possible "best" scenarios based on different goals.

Personally, "best" for getting myself from Walker to Greer would be the easiest and most comfortable method, which, for me, would be having my own vehicle of choice and having a safe, efficient and pleasant driver who would pick me up, deal with traffic hassles and route decisions (with any input I might care to give) and drop me off. But . . . I am not independently wealthy, so that scenario is wishful thinking.

Personally, I would be extremely unlikely to ever transport myself using any sort of manually propelled vehicle (bike, skateboard or the like) due to health issues. While I would gladly ride a horse if I could, it really isn't efficient or cheap enough to warrant a "best case"

scenario. Likewise, I rule out air travel (helicopter or plane) as being excessively expensive, more trouble than it's worth for such a short distance, impractical and not green.

If I had to transport cargo (more than a purse and a backpack), I would drive a car. Since I generally park in the stadium lot, I would walk from Walker to my car and then drive to wherever I needed to pick up the cargo, and proceed to Greer. However, since I don't have information indicating there is going to be cargo, and since there are infinitely many places to pick up cargo, I'm not even going to address this scenario further.

Figures

Margin Figures

Images and graphics play an integral role in Tufte's work. To place figures or tables in the margin you can use the `fig.margin` knitr chunk option. For example:

```
library(ggplot2)
qplot(Sepal.Length, Petal.Length, data = iris,
    color = Species)
```

Note the use of the `fig.cap` chunk option to provide a figure caption. You can adjust the proportions of figures using the `fig.width` and `fig.height` chunk options. These are specified in inches, and will be automatically scaled down to fit within the handout margin.

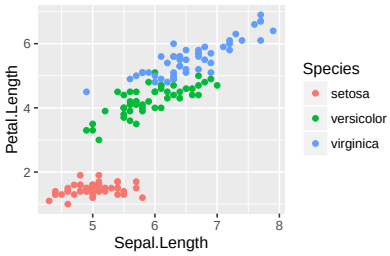

Figure 1: Sepal length vs. petal length, colored by species

Equations

You can also include LaTeX equations in the margin by explicitly invoking the `marginfigure` environment.

Note the use of the `\caption` command to add additional text below the equation.

$$\frac{d}{dx}\left(\int_0^x f(u)\,du\right) = f(x).$$

Figure 2: An equation

Full Width Figures

You can arrange for figures to span across the entire page by using the `fig.fullwidth` chunk option.

```
qplot(wt, mpg, data = mtcars, colour = factor(cyl))
```

Note the use of the `fig.width` and `fig.height` chunk options to establish the proportions of the figure. Full width figures look much better if their height is minimized.

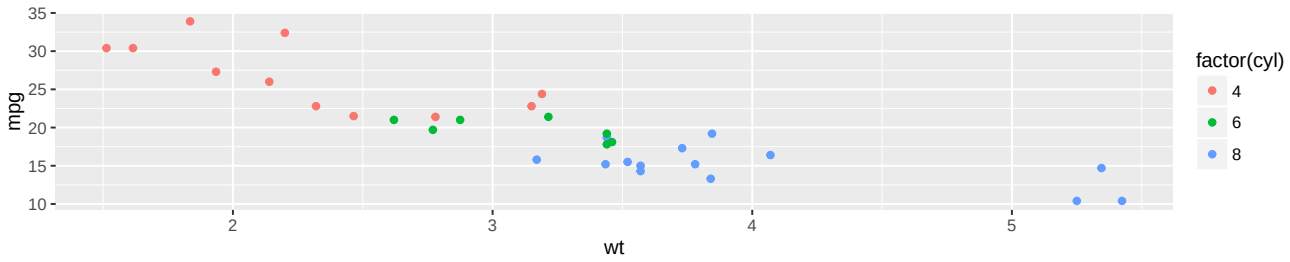

Figure 3: Full width figure

Main Column Figures

Besides margin and full width figures, you can of course also include figures constrained to the main column.

```
qplot(factor(cyl), mpg, data = mtcars, geom = "boxplot")
```

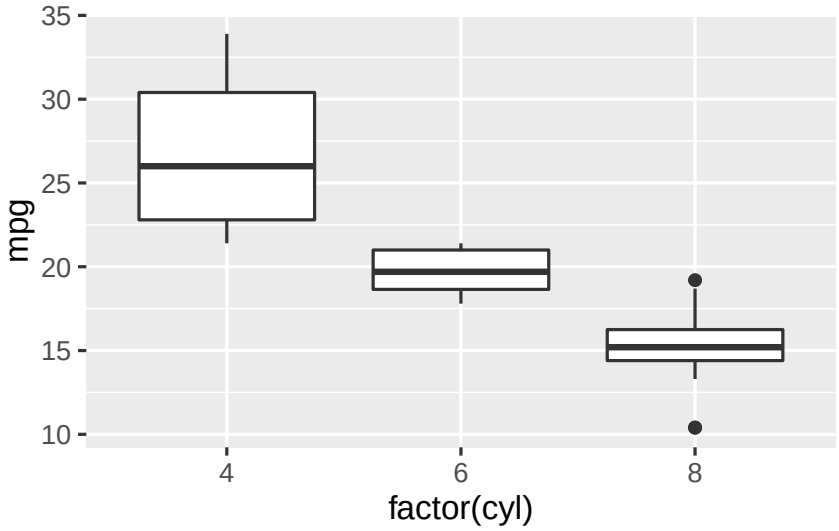

Figure 4: Another figure

Sidenotes

One of the most prominent and distinctive features of this style is the extensive use of sidenotes. There is a wide margin to provide ample room for sidenotes and small figures. Any use of a footnote will automatically be converted to a sidenote. [1]

If you'd like to place ancillary information in the margin without the sidenote mark (the superscript number), you can use the `\marginnote` command.

Note also that the two footnote references (`tufte_latex` and `books_be`, both defined below) were also included in the margin

[1] This is a sidenote that was entered using a footnote.

This is a margin note. Notice that there isn't a number preceding the note.

on the first page of this document.

Tables

You can use the **xtable** package to format LaTeX tables that integrate well with the rest of the Tufte handout style. Note that it's important to set the `xtable.comment` and `xtable.booktabs` options as shown below to ensure the table is formatted correctly for inclusion in the document.

```
library(xtable)
options(xtable.comment = FALSE)
options(xtable.booktabs = TRUE)
xtable(head(mtcars[, 1:6]), caption = "First rows of mtcars")
```

	mpg	cyl	disp	hp	drat	wt
Mazda RX4	21.00	6.00	160.00	110.00	3.90	2.62
Mazda RX4 Wag	21.00	6.00	160.00	110.00	3.90	2.88
Datsun 710	22.80	4.00	108.00	93.00	3.85	2.32
Hornet 4 Drive	21.40	6.00	258.00	110.00	3.08	3.21
Hornet Sportabout	18.70	8.00	360.00	175.00	3.15	3.44
Valiant	18.10	6.00	225.00	105.00	2.76	3.46

Table 1: First rows of mtcars