SDM4 in R: Scatterplots, Association, and Correlation (Chapter 6)

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Introduction and background

This document is intended to help describe how to undertake analyses introduced as examples in the Fourth Edition of *Stats: Data and Models* (2014) by De Veaux, Velleman, and Bock. More information about the book can be found at http://wps.aw.com/aw_deveaux_stats_series. This file as well as the associated R Markdown reproducible analysis source file used to create it can be found at http://nhorton.people.amherst.edu/sdm4.

This work leverages initiatives undertaken by Project MOSAIC (http://www.mosaic-web.org), an NSF-funded effort to improve the teaching of statistics, calculus, science and computing in the undergraduate curriculum. In particular, we utilize the mosaic package, which was written to simplify the use of R for introductory statistics courses. A short summary of the R needed to teach introductory statistics can be found in the mosaic package vignettes (http://cran.r-project.org/web/packages/mosaic). A paper describing the mosaic approach was published in the *R Journal*: https://journal.r-project.org/archive/2017/RJ-2017-024.

Chapter 6: Scatterplots, Association, and Correlation

Section 6.1: Scatterplots

Figure 6.1 (page 152) displays the scatterplot of the average tracking error over time.

```
library(mosaic)
library(readr)
options(digits = 3)
Hurricanes <-
    read_csv("http://nhorton.people.amherst.edu/sdm4/data/Tracking_hurricanes_2012.csv")
gf_point(Error72h ~ Year, ylab = "Prediction error (nautical miles)", data = Hurricanes)</pre>
```



Section 6.2: Correlation

Figure 6.2 (page 155) displays the scatterplot of weight vs. height for a sample of students from statistics classes.

```
HtWt <- read_csv("http://nhorton.people.amherst.edu/sdm4/data/Heights_and_Weights.csv")
gf_point(Weight ~ Height, ylab = "Weight (lbs)", xlab = "Height (in)", data = HtWt)</pre>
```



```
cor(Weight ~ Height, data = HtWt)
```

[1] 0.644

Kendall's Tau and Spearman's Rho

```
cor(Weight ~ Height, method = "kendall", data = HtWt)
```

[1] 0.545

cor(Weight ~ Height, method = "spearman", data = HtWt)

[1] 0.697

Section 6.3: Warning: Correlation does not always equal Causation

Section 6.4: Straightening scatterplots

Since the dataset is so small for Figure 6.10 (page 165) we can enter it by hand.



A new transformed variable can be added using the **mutate** function.

