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Analizing baseball data with R solutions

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Launch angle across batters for the first and second halves of the 2017 season. Launch angle shows strong correlation among batters. FIGURE 12.10 The correlation coefficient of 0.751 is quite high. This is of the same order of magnitude as the correlation of strikeouts between the first and second halves for batters. This provides reasonably strong evidence that average launch angle is in fact a skill, and is likely a property of each batter. This is not surprising since we already know that ground ball and fly ball rates are characteristic of batters, and launch angle is just a more granular, continuous measurement of that same phenomenon. Since the correlation coefficient only measures the strength of the linear relationship, we should always examine the relationship graphically. Figure 12.10 confirms that the relationship is linear. ggplot(sc, split_wide, aes(x = split, TRUE, y = split, FALSE)) + geom_abline(slope = 1, intercept = 0, linetype = 2, color = "darkgray") + geom_point() + geom_smooth() + scale_x_continuous("Launch angle (first half)", limits = c(-2, 24)) + scale_y_continuous("Launch angle (second half)", limits = c(-2, 24)) + coord_fixed(290)

Batted Ball Data from Statcast 12.6 Further Reading Launch angles and exit velocities have received a great deal of attention in the popular press. See Arthur [2016] for a primer. A comprehensive analysis of the increased home run phenomenon is provided in Albert et al. [2018]. Albert [2016] models hit probabilities using launch angle and exit velocity. 12.7 Exercises 1. (Spray Charts) (a) From the baseballr package, download all of the pitch-by-pitch data for Chris Davis for the month of May 2017. Chris Davis' MLB id number is 448801. (b) Use the spray_chart() function to construct a spray chart for Davis' balls in play, coloring the point by the event. (c) Comparing this spray chart with Figure 12.1, comment on the differences in spray angles of Carlos Correa and Chris Davis. 2. (Spray Direction and Shifting) (a) For all of the right-handed hitters in the 2017 Statcast dataset, collect the percentage of ground balls that are pulled where the variable $hc_x < 125.42$. Also for these hitters, collect the percentage of ground balls where the defense employed an infield shift. (b) Is there a relationship between the percentage of ground balls that are pulled and the percentage of shifts? (c) Compare your conclusion with the conclusions made for left-handed hitters in Section 12.2. 3. (Launch Angles and Exit Velocities of Home Runs) (a) Collect all of the launch angles and exit velocities of home runs from the 2017 Statcast data. (b) Construct histograms of the launch angles and the exit velocities of the home runs. What are common values of these two variables for home runs? (c) Construct a scatterplot of the launch angles and exit velocities for home runs. Explain why you see a negative association in this graph. 4. (Exit Velocities) (a) List the batters with the ten highest average exit velocities on batted balls in 2017. Exercises 291 (b) Plot the distribution of exit velocity across batters in 2017 (as in Figure 12.3. Does exit velocity vary significantly across batters? Explain your reasoning. (c) List the pitchers with the ten highest average exit velocities on batted balls in 2017. (d) Plot the distribution of exit velocity across pitchers in 2017 (as in Figure 12.3. Does exit velocity vary significantly across pitchers? Explain your reasoning. (e) Compute the correlation for exit velocity for batters between the first half and second half of the 2017 season. (f) On the basis of your calculations, do you believe exit velocity is a batter skill? Explain. APPENDIX A Retrosheet Files Reference A.1 Downloading Play-by-Play Files A.1.1 Introduction The play-by-play data files are currently available at the Retrosheet Web page www.retrosheet.org/game.htm. By clicking on a single year, say 1950, one obtains a compressed (zip) file containing a collection of files: one set of files containing information on the plays for the home games for all teams, and another set of files giving the rosters of the players for each team. This appendix describes the use of a single function `parse_retrosheet_pbp()` to create a single CSV file of all plays for games played in a particular season, and also to create a CSV file of the rosters of all players. A.1.2 Setup In the current R working directory, create a new folder `retrosheet` and in this new folder, create two folders `zipped` and `unzipped`. There are special software tools called `Chadwick` for working with the Retrosheet files that should be downloaded from sourceforge.net/projects/chadwick/files/. When the compressed file is expanded, the file `cwevent.exe` should be placed in the unzipped folder. Linux and Mac users can compile their own versions of these tools by downloading the source code from chadwickbureau/chadwick. A.1.3 Using a special function for a particular season Open R and make sure that you are in the working directory containing the folder `retrosheet` Read in the file `parse_retrosheet_pbp.R` using the `source()` function. 293 294 Retrosheet Files Reference source("parse_retrosheet_pbp.R") The function `parse_retrosheet_pbp()` has a single argument `season`. To obtain the play-by-play files for the 1950 season, the relevant Retrosheet files are obtained by typing `parse_retrosheet_pbp(1950)` If you look in the `retrosheet/unzipped` folder, you will see two new files: `all1950.csv` contains the play-by-play records for the 1950 season, and `roster1950.csv` contains roster information for all players of that season. A.1.4 Reading the files into R To read the data files into R, one should first make sure that the files `all1950.csv` and `roster1950.csv` are in the current working directory. In addition, the file `fields.csv` containing the names of all of the fields in the play-by-play record file should be placed in this directory. This file was created by the authors from the information in the page chadwick.sourceforge.net/doc/cwevent.html. The following R script will read in the three files by three applications of the `read_csv()` function. In addition, the `col_names` argument is used to assign names to the play-by-play data frame using the `Header` variable from the `fields` data frame. `fields`

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