Final Project

Psyc 122: Statistics for the Behavioral Sciences

Answer the following questions on the basis of the WordleBot data set which is available via the class website. You must explain your answer for each question, using statistical analyses when appropriate. You also must report the results of those analyses using proper notation.

Please type out your responses and submit as a google doc using 12-point, Times New Roman font; paragraphs should be single-spaced. There is a link to submitting the final project assignment on the course web page. Graphs can be cut and paste into the google doc. Please come talk to me before the start of finals period if you anticipate any problems submitting a google doc.

You may work on the project in groups of up to 3 (three) people. You only need to turn in one copy of the assignment per group but be sure to include the names of ALL group members on the final google doc.

**Data Set Overview**

Wordle is a word guessing game. Each day, your job is to guess a five-letter word. With each guess, you receive feedback about the number of letters you have correct and whether those letters are in the right location. There is also an online program that assesses your game performance in terms of two factors:

* Skill – did your guesses effectively reduced the number of possible words remaining.
* Luck – did your guesses eliminate more of fewer remaining words than expected.

This summer and fall I played Wordle for 100 days and recorded my overall performance; that is, how many guesses it took me to identify the word of the day (which could range between 1 and 6). I also recorded my Skill and Luck ratings (which could range between 0 and 100. The website also indicates the average Score, Skill and Luck ratings for New York Times readers who played Wordle that day. Below is a summary of the dataset.

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| --- | --- |
| Day | Just a number marking the 100 days that I played in order. |
| TDSkill | My Skill rating for that day. |
| TDLuck | My Luck rating for that day. |
| TDScore | The number of turns I needed to solve the Wordle. |
| NYTSkill | The average Skill rating for NY Times readers for that day. |
| NYTLuck | The average Luck rating for NY Times readers for that day. |
| NYTScore | The average number of turns that NY Times readers needed to solve the Wordle. |
| SkillDiff | The difference between TDSkill and NYTSkill for that day. |
| LuckDiff | The difference between TDLuck and NYTLuck for that day. |
| ScoreDiff | The difference between TDScore and NYTScore for that day |

1. Use SPSS to find the mean, median, mode, variance, and standard deviation for the following variables: TDSkill; TDLuck; TDScore. Copy the table that SPSS produces into your google doc. (10 pts)
   1. Make a separate graph for the mean each of three variables mentioned above. Make sure your graph includes appropriate titles and labels. (6 pts)
   2. Describe each graph as positively skewed, negatively skewed or symmetrical and explain the rationale for your choice. (4 pts)
2. Conduct a t-test or ANOVA to determine whether TD is better than the average NYT Wordle player? That is, does he solve the Wordle in fewer guesses than the average NYT Wordle player? Report and interpret the results using proper notation including a measure of effect size. (4 pts)
   1. TD haters might say that the results of this analysis only reflect the fact that TD collected such a large sample of data. How might TD defend himself against this claim? (3 pts)
   2. Conduct a t-test or ANOVA to determine if TD is more skilled than the average NYT Wordle player? Conduct a t-test or ANOVA to determine if TD is luckier than the average NYT Wordle Player? Report and interpret the results of these analyses using proper notation. (8 pts)
   3. On the basis of these analyses, would you conclude that it is better to be lucky or better to be skilled? Explain your answer. (2 pts)
   4. The difference between TD’s score and the average NYT Wordle player’s score is similar in magnitude to the difference between TD’s Luck and the average NYT Wordle player’s luck, but only one of these two differences is significant? What explains the fact that only one of these differences is significant? (3 pts)
3. What is the correlation between TD’s Wordle performance and Luck and Skill, respectively? Report the results using proper notation. (4 pts)
   1. How much of the variability in performance can be attributed to Luck and Skill, respectively? (4 pts)
   2. Run simple regression models for Luck and Skill separately. Report and interpret the results of the regression analysis (including the regression equation) for Skill and Luck separately using proper notation. (8 pts)
   3. On the basis of this analysis, would you conclude that it is better to be lucky or better to be skilled? (2 pts)
4. Perform a multiple regression analysis to determine whether Luck and/or Skill are significant contributors to TD’s Wordle performance.
   1. Report and interpret the results of the regression analysis (including the regression equation, the overall significance of the model, the significance of individual predictors, and R2) using proper notation. (10 pts)
   2. On the basis of this analysis, would you rather be Lucky or Skilled? (2 pts)
   3. Are you concerned about the collinearity of your two predictor variables? Explain your answer citing any relevant statistical analyses that you might have run to support your response. (3 pts)
   4. **Bonus question**: There is a stark discrepancy between the results of the simple and multiple regression analyses. What is it? How might you explain why this discrepancy emerged? This second part of that question is **DIABOLICAL**!! Probably just skip it, but I’ll give you a hint. Remember that for pretty much every analysis we have done, our test statistic is a ratio in which the numerator is some measure of the effect of our independent variable(s) and the denominator is some measure of chance variation. So, for your decision regarding the null to change, you either have to see a change in the numerator (effect of the independent variables) or the denominator (chance variation). (2 pts)
5. Let’s return one last time to the question of whether Luck or Skill is more valuable when it comes to World performance. Looking at all of the data including the graphs (hint), what is your assessment of the contribution of Luck and Skill to Wordle play? Your answers to questions 2c, 3c, and 4c are probably a little different. Do you think one set of analyses might over- or underestimate the contribution of skill? Explain your answer. This is kind of a hard question so I’m going to be very lenient. Just do your best. (3 pts)
6. Run one additional analysis of the dataset. It can be anything. Report the results and interpretation using proper notation. (4 pts)