Project 1 158

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Introduction

The dataset for this project contains 10,000 League of Legends ranked matches from the North American region with 775 variables offered through the Riot Games API, provided on Kaggle (Games 2021a)(James 2020). Each match is pulled from players who rank Gold in the League system, a ranking system that matches players of a similar skill level to play with and against each other. Amongst North American players, the Gold skill level was the second most common tier, achieved by 27.7 percent of players, or approximately 49.86 million players when considered against Riot Games' player base of 180 million ("Distribution of League of Legends (Lol) Summoners in North America as of October 2021, by Tier" 2021)(Games 2021b). This dataset will be referred to as `lol10`.

For this project, the following variables are of interest: lane, champion, map side, first summoner spell, kills, deaths, gold earned, and total damage dealt. A figure including all the relevant variables and their description is attached at the end.

Hypothesis

We consider the following research question: Does the amount of gold earned have an effect on the total damage dealt for the average Gold-ranked player on the blue team? We want to describe the relationship between the gold earned and the total damage dealt on the blue team in the `lol10` dataset using a line. We will use the gold earned across all summoners on the blue team as the predictor variable, x, to predict the total damage dealt across all summoners on the blue team, y. In Figure @ref(fig:xyplot), we observe the linearity of the regression model, albiet with some curvature. In Figure @ref(fig:residyhatplot), we observe the nonconstancy of the error terms.
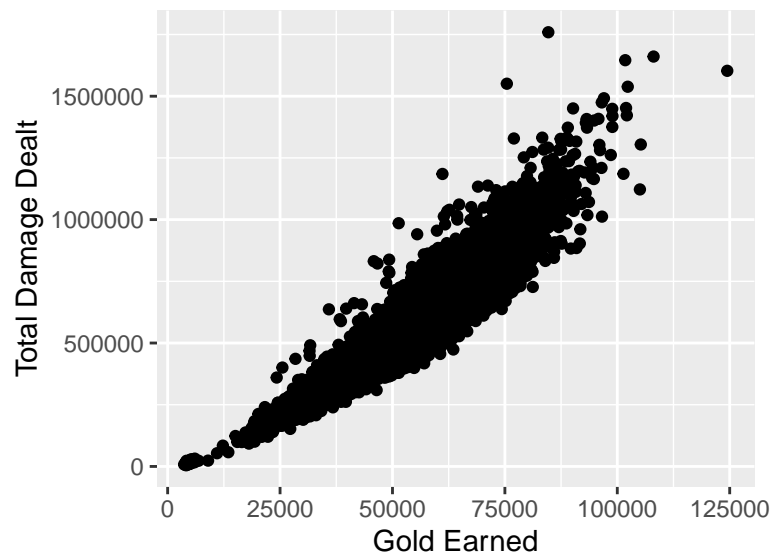
1

Figure 1: A scatterplot showing gold earned against total damage dealt on the blue team for 10,000 Gold-ranked matches
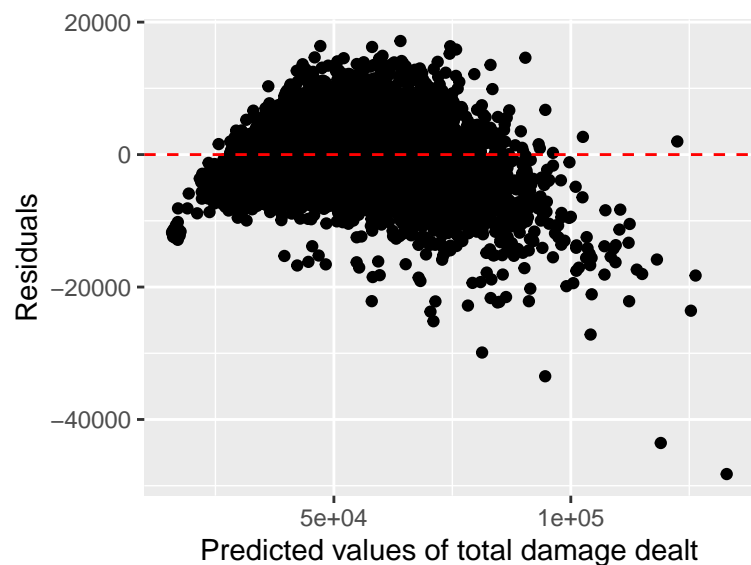

Figure 2: Residual plot for the model predicting total damage dealt from gold earned on the blue team for 10,000 Gold-ranked matches.

Next, we consider H_0. In this instance, we have: $H_0 : \beta_1 = 0$ and $H_a : \beta_1 \neq 0$. The 95% confidence interval for β_1 is $(0.066, 0.067)$; this means that we are 95% confident that β_1 is in this range. Since the confidence interval for β_1 does not contain 0, it can be concluded that there is evidence of a linear relationship between the gold earned and the total damage dealt for the blue team.

Transformed Data

Log Transformations

While we did observe some linearity in our intitial plots, our plots still contained some curviture and we still observed nonconstancy of the error terms. We then sought to transform our data so that it would be more linear and have consistant normality or errors. We approached this by taking the log of both our response and explanatory variables.
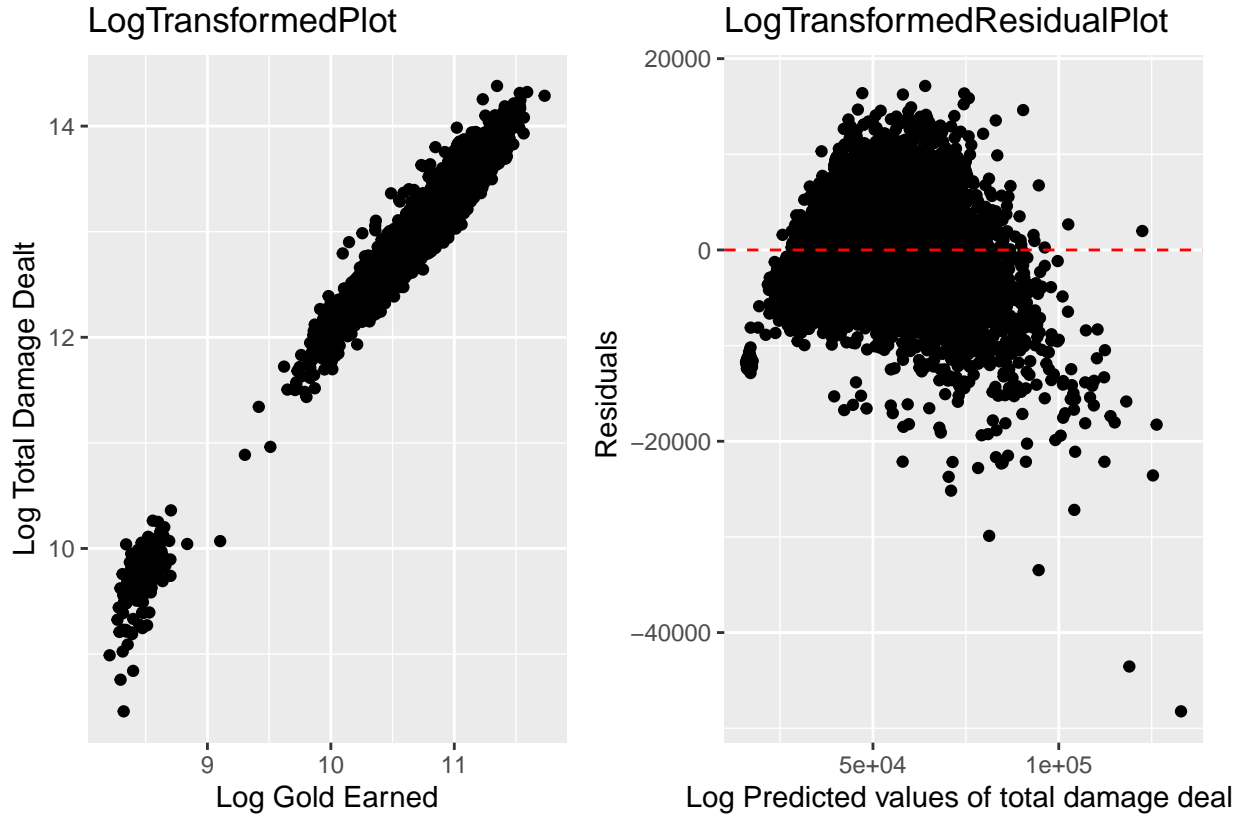

Figure 3: Transformed Residual and Scatter plots for the model predicting total damage dealt from gold earned on the blue team for 10,000 Gold-ranked matches.

Table 1: Variables and their descriptions

Variable	Description
b_summoner1_role	The role of summoner 1 on the blue side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
b_summoner2_role	The role of summoner 2 on the blue side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
b_summoner3_role	The role of summoner 3 on the blue side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.

Variable	Description
b_summoner4_role	The role of summoner 4 on the blue side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
b_summoner5_role	The role of summoner 5 on the blue side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
b_summoner1_championId	A number corresponding to the champion of summoner 1 on the blue side of the map.
b_summoner2_championId	A number corresponding to the champion of summoner 2 on the blue side of the map.
b_summoner3_championId	A number corresponding to the champion of summoner 3 on the blue side of the map.
b_summoner4_championId	A number corresponding to the champion of summoner 4 on the blue side of the map.
b_summoner5_championId	A number corresponding to the champion of summoner 5 on the blue side of the map.
b_summoner1_championId	A number corresponding to the first spell of summoner 1 on the blue side of the map.
b_summoner2_championId	A number corresponding to the first spell of summoner 2 on the blue side of the map.
b_summoner3_championId	A number corresponding to the first spell of summoner 3 on the blue side of the map.
b_summoner4_championId	A number corresponding to the first spell of summoner 4 on the blue side of the map.
b_summoner5_championId	A number corresponding to the first spell of summoner 5 on the blue side of the map.
b_summoner1_kills	The number of kills obtained by summoner 1 on the blue side of the map.
b_summoner2_kills	The number of kills obtained by summoner 2 on the blue side of the map.
b_summoner3_kills	The number of kills obtained by summoner 3 on the blue side of the map.
b_summoner4_kills	The number of kills obtained by summoner 4 on the blue side of the map.
b_summoner5_kills	The number of kills obtained by summoner 5 on the blue side of the map.
b_summoner1_deaths	The number of deaths obtained by summoner 1 on the blue side of the map.
b_summoner2_deaths	The number of deaths obtained by summoner 2 on the blue side of the map.
b_summoner3_deaths	The number of deaths obtained by summoner 3 on the blue side of the map.
b_summoner4_deaths	The number of deaths obtained by summoner 4 on the blue side of the map.
b_summoner5_deaths	The number of deaths obtained by summoner 5 on the blue side of the map.
b_summoner1_gold_earned	The gold obtained by summoner 1 on the blue side of the map.
b_summoner2_gold_earned	The gold obtained by summoner 2 on the blue side of the map.
b_summoner3_gold_earned	The gold obtained by summoner 3 on the blue side of the map.

Variable	Description
b_summoner4_gold_earned	The gold obtained by summoner 4 on the blue side of the map.
b_summoner5_gold_earned	The gold obtained by summoner 5 on the blue side of the map.
b_summoner1_total_damage_dealt	The total damage dealt by summoner 1 on the blue side of the map.
b_summoner2_total_damage_dealt	The total damage dealt by summoner 2 on the blue side of the map.
b_summoner3_total_damage_dealt	The total damage dealt by summoner 3 on the blue side of the map.
b_summoner4_total_damage_dealt	The total damage dealt by summoner 4 on the blue side of the map.
b_summoner5_total_damage_dealt	The total damage dealt by summoner 5 on the blue side of the map.
r_summoner1_role	The role of summoner 1 on the red side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
r_summoner2_role	The role of summoner 2 on the red side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
r_summoner3_role	The role of summoner 3 on the red side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE
r_summoner4_role	The role of summoner 4 on the red side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
r_summoner5_role	The role of summoner 5 on the red side of the map, taking on the values of TOP_LANE, MID_LANE, BOT_LANE, or JUNGLE.
r_summoner1_championId	A number corresponding to the champion of summoner 1 on the red side of the map.
r_summoner2_championId	A number corresponding to the champion of summoner 2 on the red side of the map.
r_summoner3_championId	A number corresponding to the champion of summoner 3 on the red side of the map.
r_summoner4_championId	A number corresponding to the champion of summoner 4 on the red side of the map.
r_summoner5_championId	A number corresponding to the champion of summoner 5 on the red side of the map.
r_summoner1_championId	A number corresponding to the first spell of summoner 1 on the red side of the map.
r_summoner2_championId	A number corresponding to the first spell of summoner 2 on the red side of the map.
r_summoner3_championId	A number corresponding to the first spell of summoner 3 on the red side of the map.
r_summoner4_championId	A number corresponding to the first spell of summoner 4 on the red side of the map.
r_summoner5_championId	A number corresponding to the first spell of summoner 5 on the red side of the map.
r_summoner1_kills	The number of kills obtained by summoner 1 on the red side of the map.

Variable	Description
r_summoner2_kills	The number of kills obtained by summoner 2 on the red side of the map.
r_summoner3_kills	The number of kills obtained by summoner 3 on the red side of the map.
r_summoner4_kills	The number of kills obtained by summoner 4 on the red side of the map.
r_summoner5_kills	The number of kills obtained by summoner 5 on the red side of the map.
r_summoner1_deaths	The number of deaths obtained by summoner 1 on the red side of the map.
r_summoner2_deaths	The number of deaths obtained by summoner 2 on the red side of the map.
r_summoner3_deaths	The number of deaths obtained by summoner 3 on the red side of the map.
r_summoner4_deaths	The number of deaths obtained by summoner 4 on the red side of the map.
r_summoner5_deaths	The number of deaths obtained by summoner 5 on the red side of the map.
r_summoner1_gold_earned	The gold obtained by summoner 1 on the red side of the map.
r_summoner2_gold_earned	The gold obtained by summoner 2 on the red side of the map.
r_summoner3_gold_earned	The gold obtained by summoner 3 on the red side of the map.
r_summoner4_gold_earned	The gold obtained by summoner 4 on the red side of the map.
r_summoner5_gold_earned	The gold obtained by summoner 5 on the red side of the map.
r_summoner1_total_damage_dealt	The total damage dealt by summoner 1 on the red side of the map.
r_summoner2_total_damage_dealt	The total damage dealt by summoner 2 on the red side of the map.
r_summoner3_total_damage_dealt	The total damage dealt by summoner 3 on the red side of the map.
r_summoner4_total_damage_dealt	The total damage dealt by summoner 4 on the red side of the map.
r_summoner5_total_damage_dealt	The total damage dealt by summoner 5 on the red side of the map.

"Distribution of League of Legends (Lol) Summoners in North America as of October 2021, by Tier." 2021. *Statista.* https://www.statista.com/statistics/807298/league-of-legends-player-tier/.

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