STAT 6160: Final Project

LCS 2017 Summer Split Fantasy Player & Team Stats

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Dataset Design

- LCS Players Stats Summer Split 2017
  - Variables: Team, Results, Total Points, Average Points per Game, Games Played, Wins, Losses, First Bloods, Dragon Kills, Baron Kills, Towers Destroyed, and 30-Minute Wins
- LCS Players Stat Summer Split 2017
  - Variables: Name, Role, Team, Results, Total Points, Average Points, Games Played, Kills, Deaths, Assists, Creep Kills, Triple_Quadra_Penta

Problem Description

- Do the role of a player significantly influence the total number of points a player receives, and are there significant differences between the roles?
- Do the number of kills, deaths, assists, creep kills, and their interactions significantly influence the total number of points a player receives, and are there significant differences between the levels for each factor?
- Are there significant differences in how each role contributes to the total points received by each team?
- What variables are most important in achieving a less than 30-minute win?

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Feature Transformation

- Most of the features we considered were continuous variables
- To get around this issue we defined categories for the important continuous variables based on our prior knowledge
- Important categorical features were: Player Name, Opponent, First Bloods, and Team
- Square-root and Logarithm transformation was applied on the response variable

The following two slides outline our thresholds for transforming the continuous variables to categorical variables for both the Team and Player datasets

Team Categories

Feature	Low	Medium	High
Towers Destroyed	0-10	11-20	21+
Dragons Killed	0-3	4-7	8+
Barons Killed	0-1	2-3	4+

Player Categories

Feature	Low	Medium	High
Kills	0-5	6-10	11+
Deaths	0-5	6-10	11+
Assists	0-10	11-20	21+
Creep Kills	0-400	401-800	801+

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Model, Testing, and Diagnostics

- For each analysis we utilized a multi-way layout model with variables capturing the effect of each important factor
- We used Tukey's Honest Significant Differences for hypothesis tests to correct for multiple-comparison testing at $\alpha = 0.05$
- Plots of the fitted-values vs residuals and qqplots were used to asses model fitness

Per Player Role Analysis

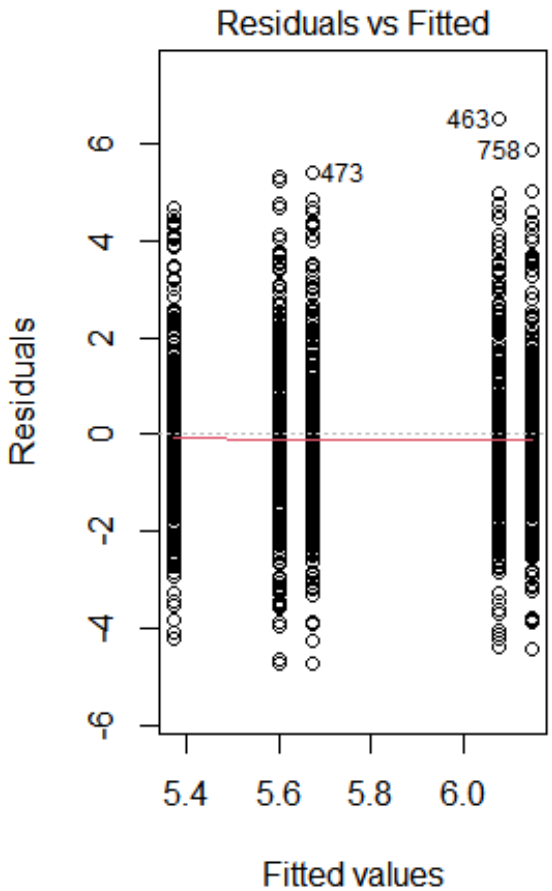
- For this problem, we used the following model:

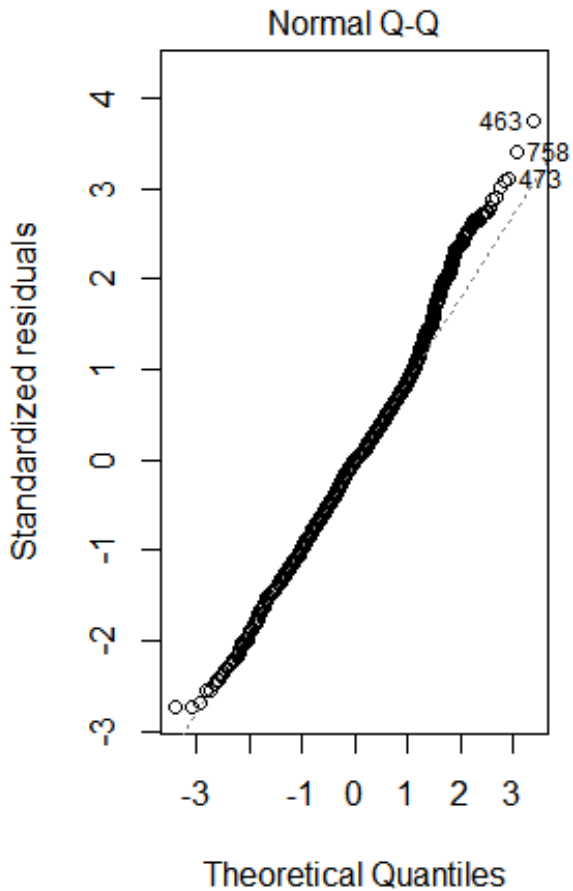
$$y_{ij} = \mu + \tau_i + \epsilon_{ij}$$

- μ is the overall mean and τ_i is the role effect. The sqaure-root of the response variable was used in order to stabilize the variance of the residuals.

Per Player Role Analysis

The diagnostic plots show that the model assumptions are met and our hypothesis tests and conclusions are therefore valid.





Factor Analysis on Kills, Deaths, Assists, and Creep Kills

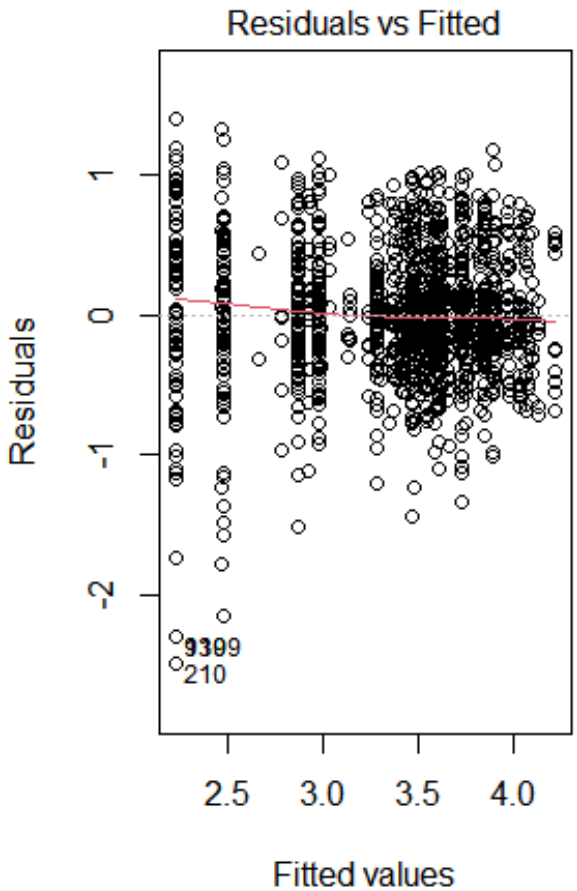
- For this problem, we used the following model:

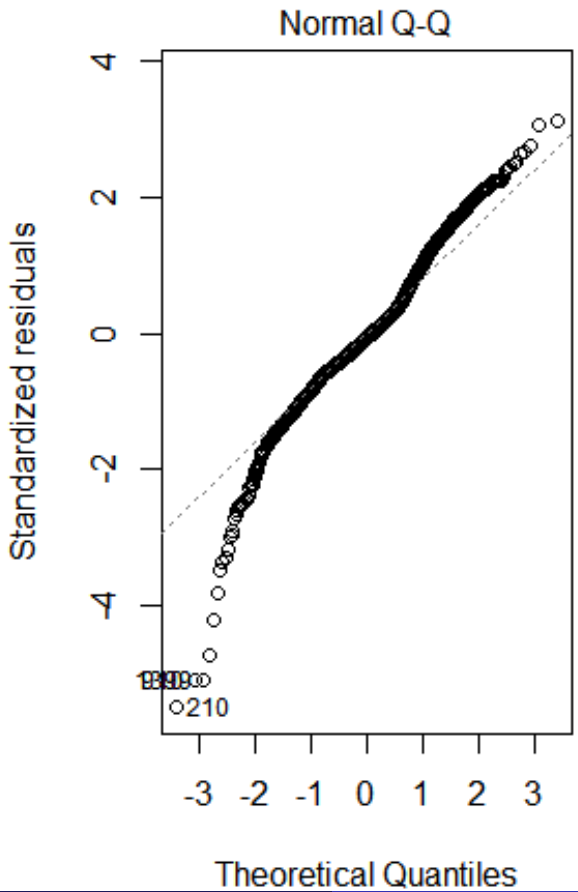
$$\begin{aligned} y_{ijkl} =& \mu + \tau_i + \beta_j + \gamma_k + \delta_l + (\tau\beta)_{ij} + (\tau\gamma)_{il} \\ &+ (\tau\delta)_{il} + (\beta\delta)_{jl} + (\gamma\delta)_{kl} + (\beta\gamma\delta)_{jkl} + \epsilon_{ijkl} \end{aligned}$$

- μ is the overall mean, τ_i is the kills effect, β_j is the deaths effect, γ_k is the assists effect, and δ_l is the creep kills effect. The logarithm of the response variable was used in order to stabilize the variance of the residuals.

Factor Analysis on Kills, Deaths, Assists, and Creep Kills

The diagnostic plots show that the model assumptions are met and our hypothesis tests and conclusions are therefore valid.





Per Team Role Analysis

- For this problem we used the following model:

$$y_{ijklmnpq} = \mu + \tau_i + \beta_j + \gamma_k + \delta_l + \zeta_m + \eta_n + \theta_p + \epsilon_q$$

- μ is the overall mean, τ_i is the role effect, β_j is the kills effect, γ_k is the deaths effect, δ_l is the assists effect, ζ_m is the creep kills effect, η_n is the opponent effect, and θ_p is the player effect. The square-root of the response variable was used in order to stabilize the variance of the residuals.

The following slide shows a summary table of the significant Role differences across all the teams. The diagnostic plots are summarized in the accompanying project report.

Per Team Role Analysis

Contrast	Significant Count	Sig Mean Difference
Jungle - Support	1	0.9724
Top - Support	2	0.7710
Mid - Support	12	0.9408
AD Carry - Support	13	0.9469
Top - Jungler	1	0.7075
Mid - Jungler	7	0.8816
AD Carry - Jungler	5	0.8519
Mid - Top	5	0.9707
AD Carry - Top	4	0.7400
AD Carry - Mid	4	-0.07557

30-Minute Win Analysis

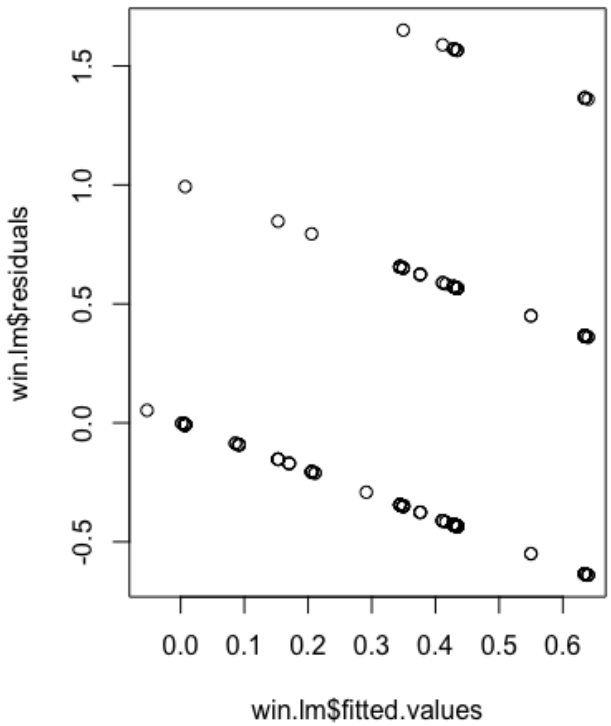
- For this problem we used the following model:

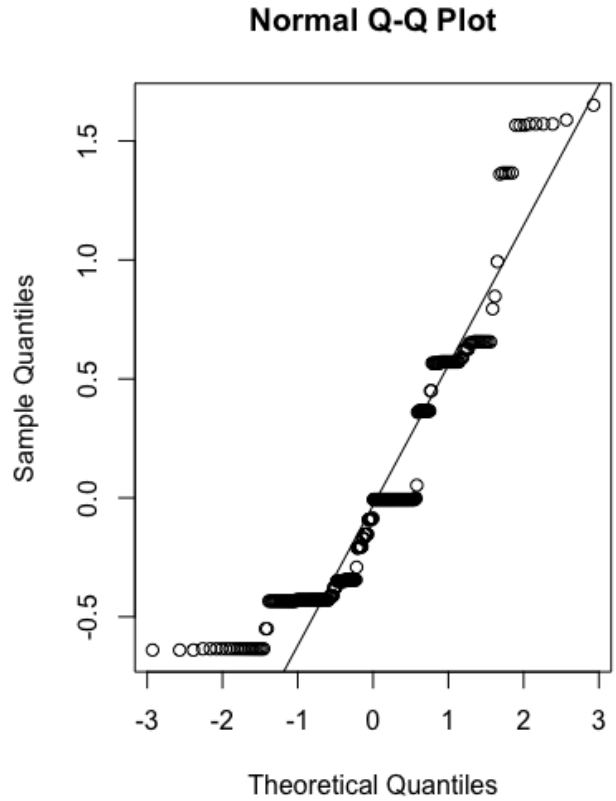
$$y_{ijklm} = \mu + \tau_i + \beta_j + \gamma_k + \delta_l + (\tau\beta)_{ij} + (\tau\gamma)_{ik} + (\tau\delta)_{il} + (\beta\gamma)_{jk} + (\beta\delta)_{jl} + (\gamma\delta)_{kl} + \epsilon_m$$

- μ is the overall mean, τ_i is the First Blood effect, β_j is the Towers Deshttps://www.overleaf.com/project/6276ce980886573479d20deatroye effect, γ_k is the Dragons Killed effect, and δ_l is the Barons Killed effect.
- In this model, our response variable is the binary response variable 30-minute win.

30-Minute Win Analysis

It is apparent these diagnostics plots do not pass our assumptions of constant variance and normal residuals. The conclusions of our hypothesis tests for this problem are therefore questionable.





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Conclusions

- Per Player Role Analysis: The player's role has a significant impact on the total points a player receives. Also, there are significant differences between roles, with the combination of Mid and Support having the greatest difference.
- Factor Analysis on Kills, Deaths, Assists, and Creep Kills: The number of kills, deaths, assists, and creep kills a player has significantly influences the total points a player receives. Some interaction terms were found to be significant as well. Lastly, there are significant differences between the levels of Kills, Deaths, Assists, and Creep Kills.

Conclusions Cont.

- Per Team Role Analysis: For the majority of teams, the player's role significantly influences the total points the team receives. The roles of ADC and Mid differed the most from Support.
- 30-Minute Win Analysis: The amount of dragon kills, Baron kills, and towers destroyed significantly influences the likelihood of achieving a 30 minute (or less) win. All of the interaction terms were found to insignificant. There are significant differences between the levels for their respective factor. Conclusions are questionable because the diagnostics failed.