Machine Learning Analysis of Early Game

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Goals

- Understand importance of first 10 minutes of gameplay using machine learning models
  - Best model - Logistic Regression with Grid Search CV
- Analyze feature imoprtances as determined by best model
- Make recommendations to League of Legends development and player experience team

Data

- Obtained first 10 minutes of gameplay data from 9,879 matches
- Matches were played by Diamond Ranked players (highly skilled)
- Contains 19 features per team (38 in total) as well as gameID and ‘blueWins’
- Classification models targeted ‘blueWins’ – 0 for a loss and 1 for a victory

Predicting Victory With All Features

Wards Placed	Wards Destroyed	Kills	Assists	Towers Destroyed
Total Gold	Average Level	Total Experience	Total Minions Killed	Total Jungle Minions Killed

Best model: Logistic Regression with Grid Search

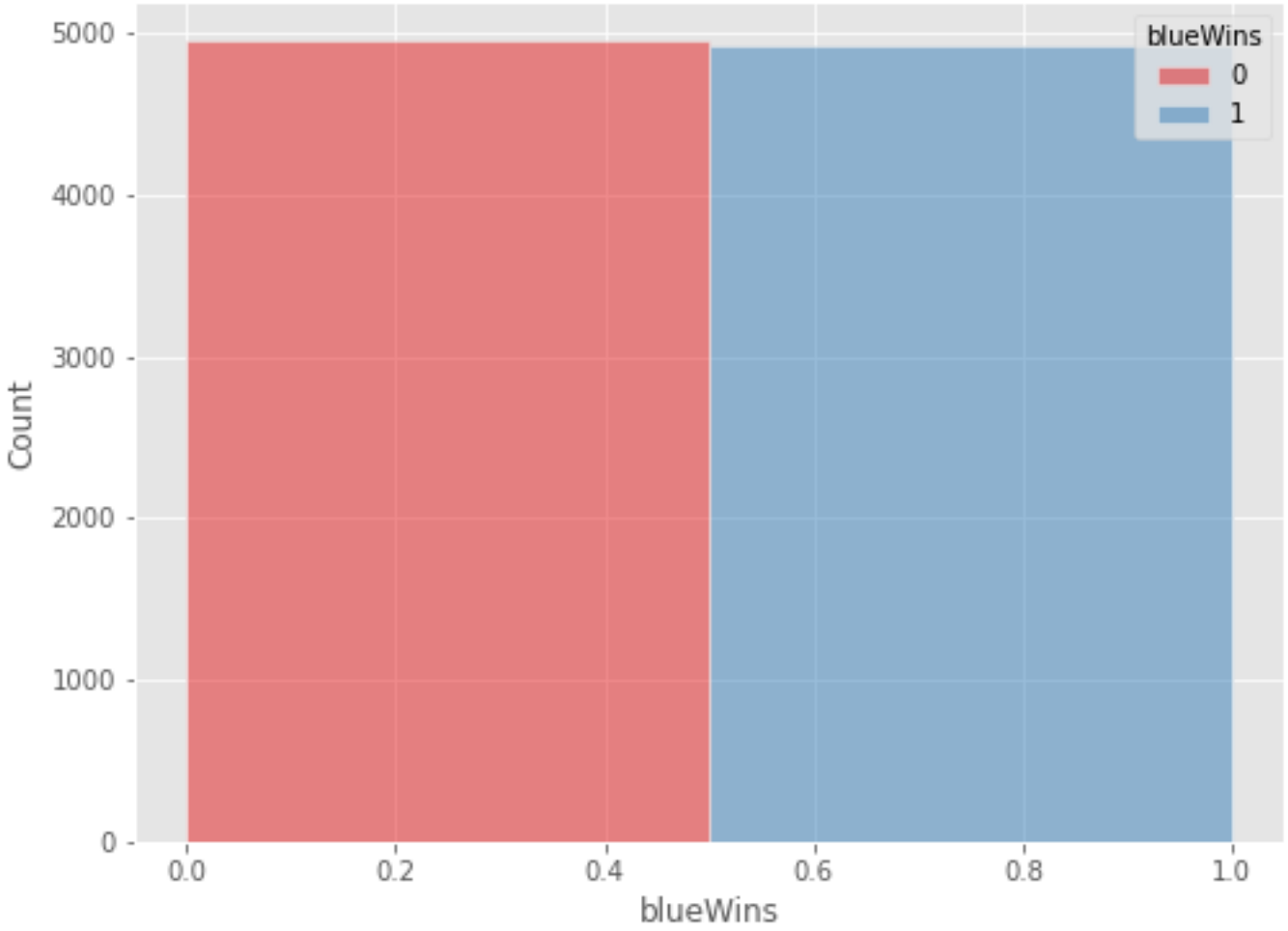
- Accuracy: 72.1%

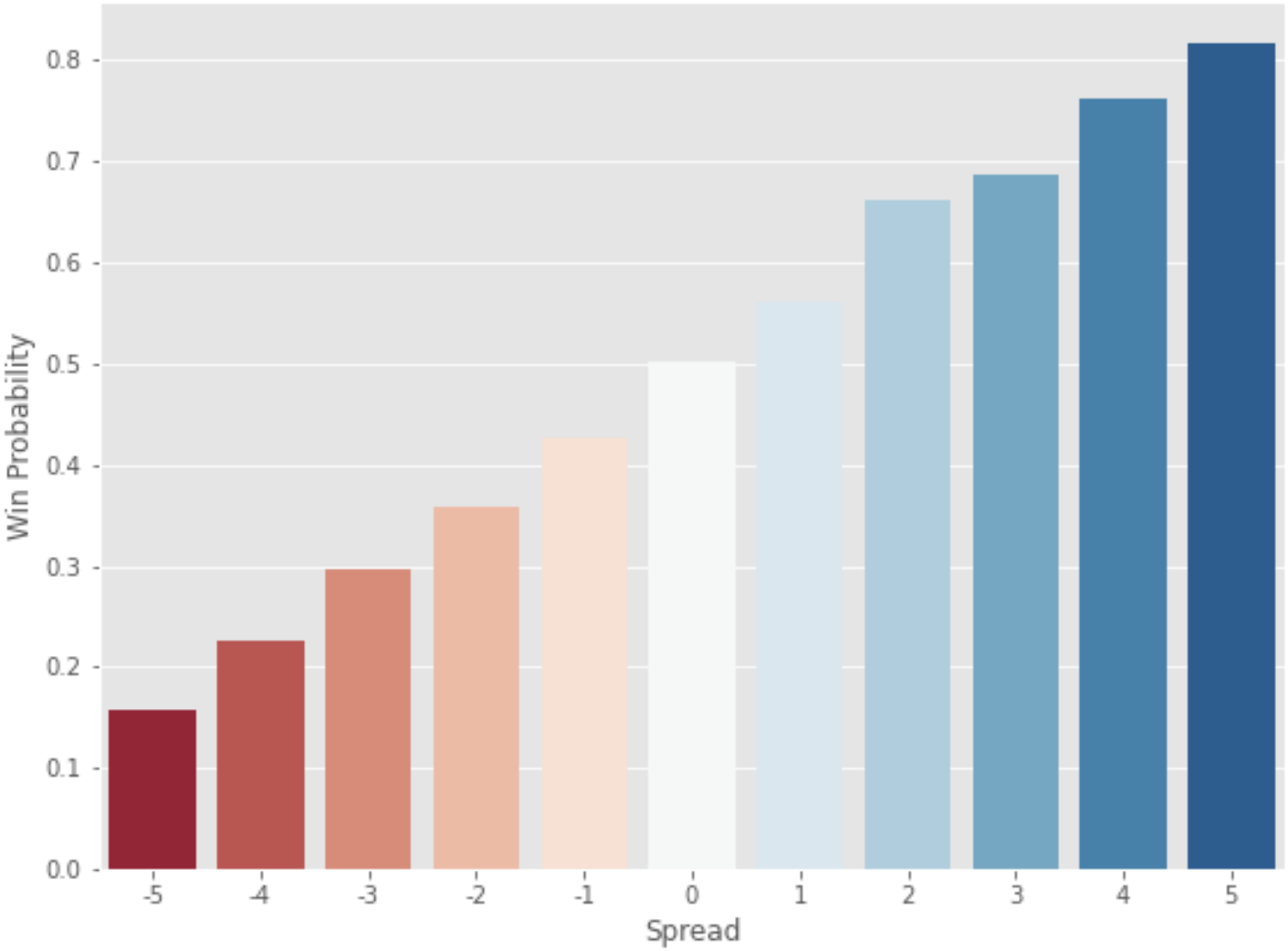
Does Blue or Red have an Advantage?

Total wins:

- Blue: 4,949
- Red: 4,930

No clear imbalance between teams





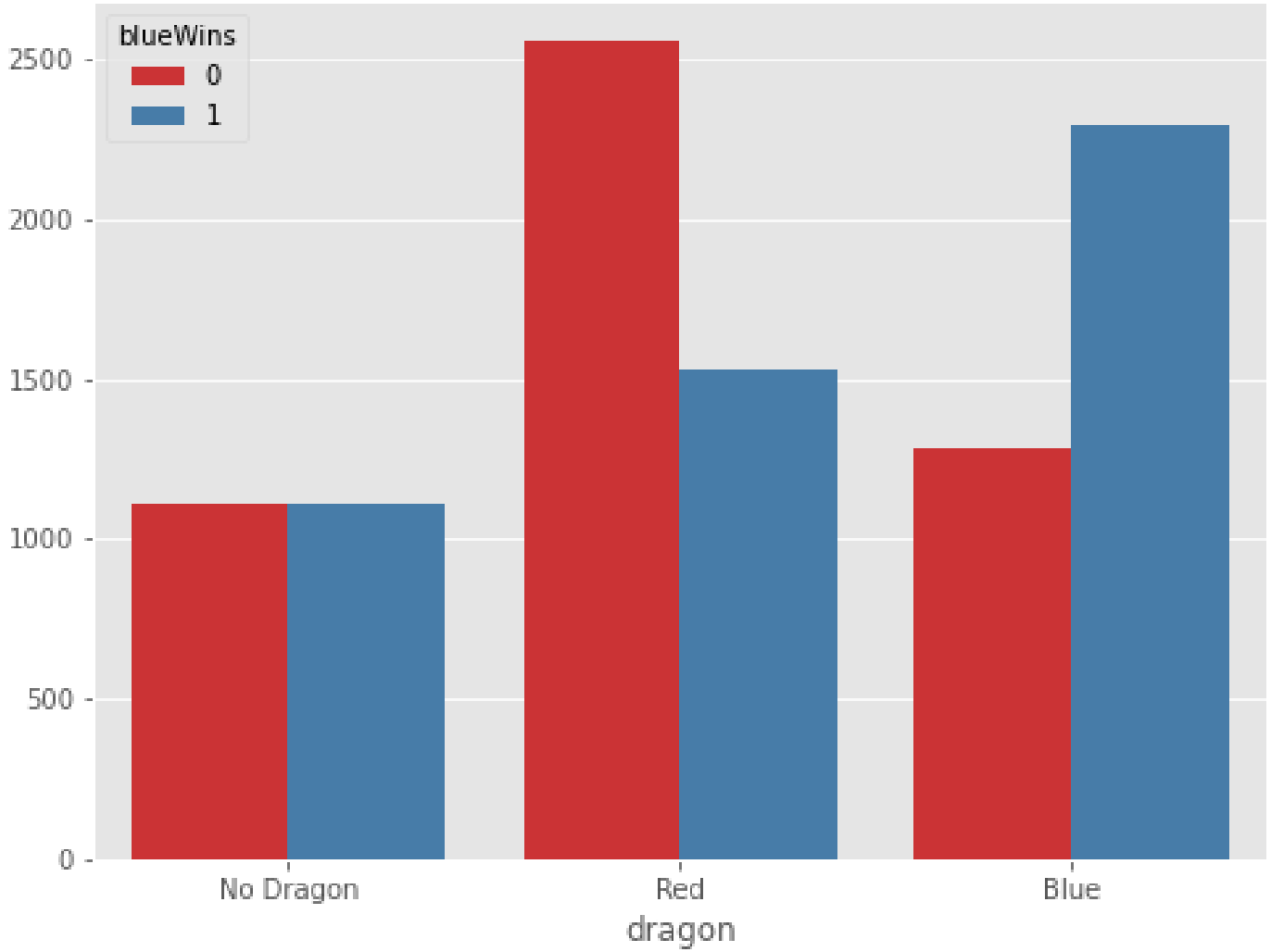
How do kills impact win probability?

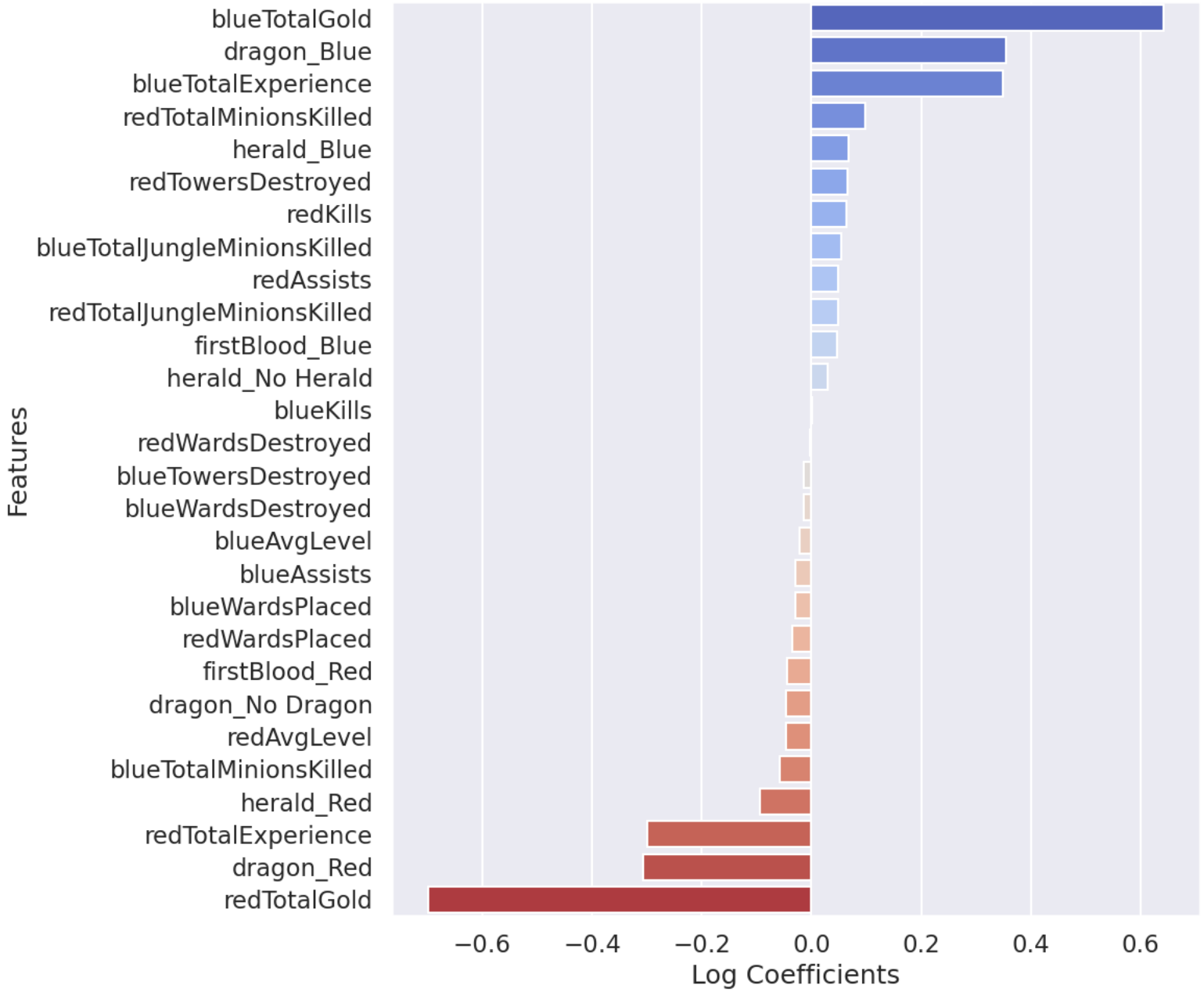
As blue's kill spread at the 10 minute mark grows, so does their probability of winning

How does defeating the dragon impact victory?

When blue defeats the dragon:

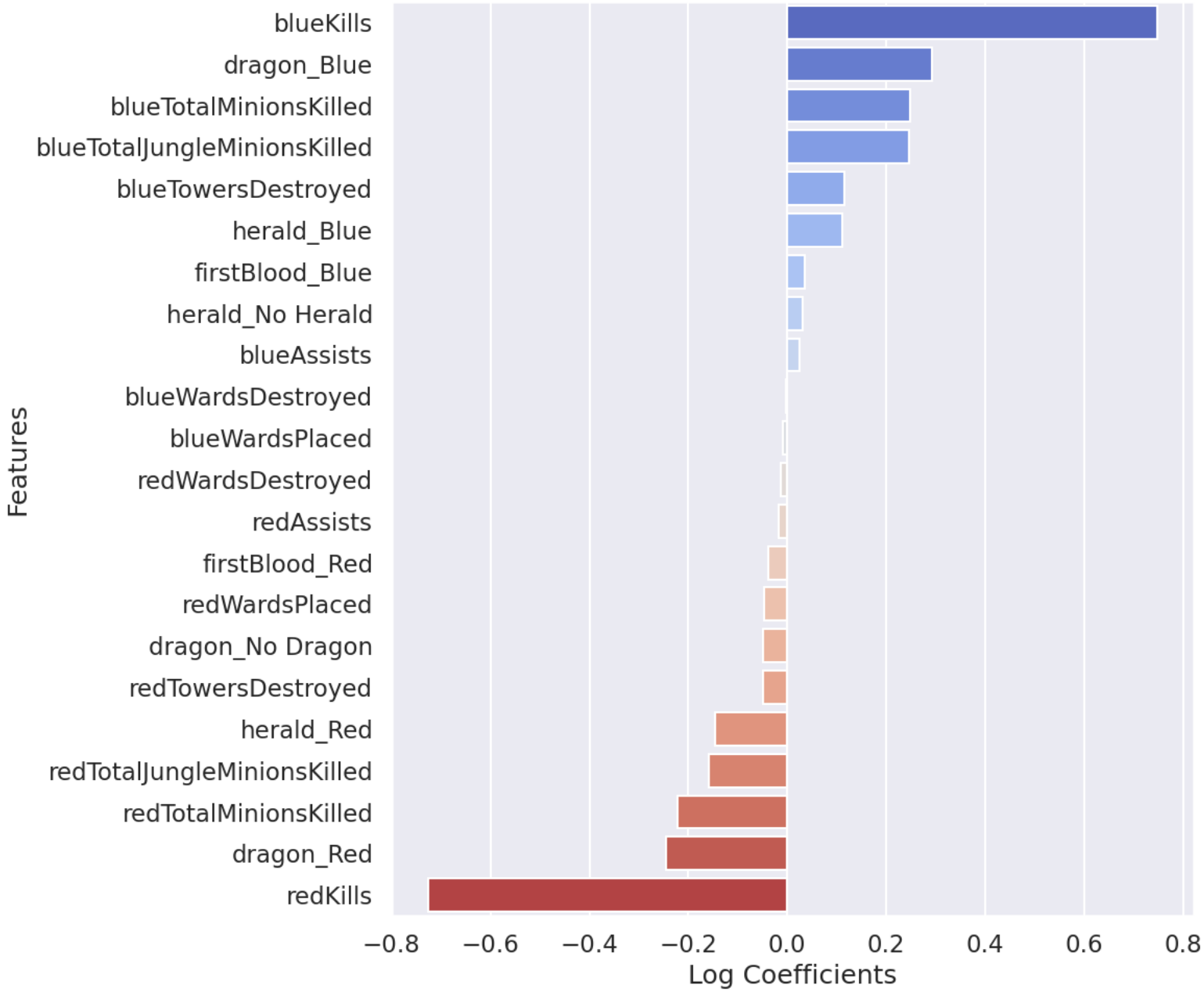
- Blue wins = 64%
- Red wins = 36%





Feature Importance: **All Features**

- Total Gold for both teams has the greatest impact on prediction
- Dragon and Total Experience are second
- Kills and jungle minions seem undervalued
- **Model Accuracy: 72.1%**



Feature Importance: **Player Actions**

- Kills are most important
- Dragon, regular minion and jungle minion kills are all similarly important
- Assists, first blood, and wards have little impact
- **Model accuracy 70.68%**

Conclusions

- Total Gold is the most important factor in predicting a victory, experience and average level are also important
- When only considering player actions, kills is the best predictor of victory. Defeating the dragon and killing minions are also important
- Wards placed, wards destroyed, and assists were not significant to our model

Recommendations

- Within the first 10 minutes, victory can be predicted with 72% accuracy
  - Should this be the case? Does sensing defeat this early discourage newer players? Should it be lowered to 2/3 probability or 66%?
  - To lower predictive quality, consider altering rewards for kills, dragon, and minions
- Wards were barely relevant to our model, increasing their significance might add more complexity or variety to gameplay

Next Steps

- Expand dataset to include matches between mid-tier and low-tier players
- Re-examine same matches from current dataset but at 20 and 30 minute intervals
  - Does predictive quality improve or stay the same?

Thank you for your time!

Please feel free to ask any questions