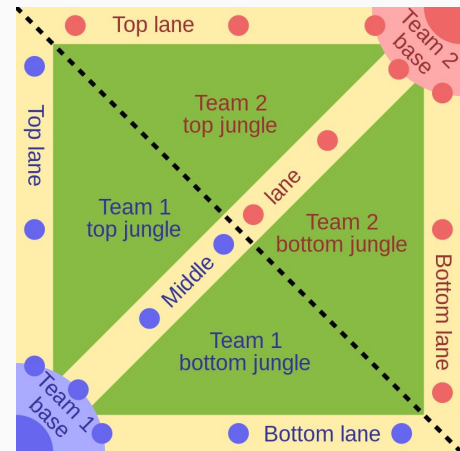# League of Legends Win Prediction

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Background

1. two teams (blue and red) of five players
2. Each player controls a character, or "champion"
3. Champions become more powerful to defeat the opposing team by:
   a. Collecting experience points
   b. Earning gold
   c. Purchasing items
4. A team wins by destroying the enemy's "Nexus" - a structure located within the enemy base.

Intro

Data:

- 180,000 data points that record games:
    - Which team has taken:
        - First blood, first dragon kill, first baron kill, first tower
    - The amount of:
        - Gold earned, levels reached, champions killed, towers killed

Goal:

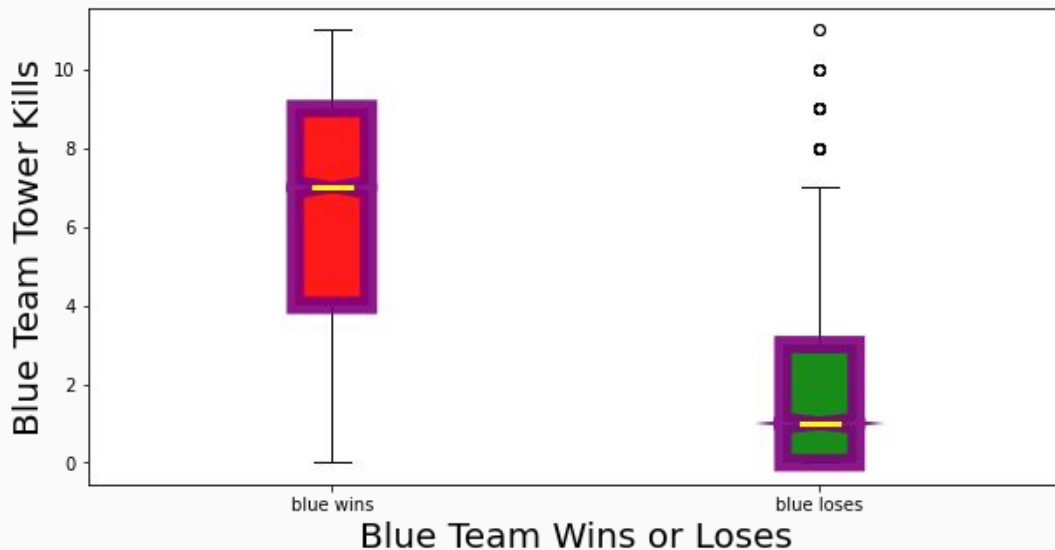- To predict if blue team won the game based on the game features

Cleaning Steps

1. Dropped unnamed: 0 and gameDuration
    a. Game duration has the same impact on both teams
2. Dropped redFirstBaron, redFirstDragon, and redFirstInhibitor
    a. if the blue team has first Baron, first Dragon, or first Inhibitor, the red team does not have it.
    b. hence the columns mentioned above do not provide more information to our model.
3. Dropped rank_Master and rank_Grandmaster
    a. less data that will result in a faster calculation
    b. the model will be specifically focusing on Rank_Challenger games
4. Dropped total_Level that are greater than 90
    a. in League of Legends, the max level a player could get in every game is 18 in most game modes
    b. there are 5 players on either blue or red side
    c. that the max level for each team is 18x5=90
5. Dropped outliers in blueWardPlaced, blue_Kills, blue_Death
    a. Outliers
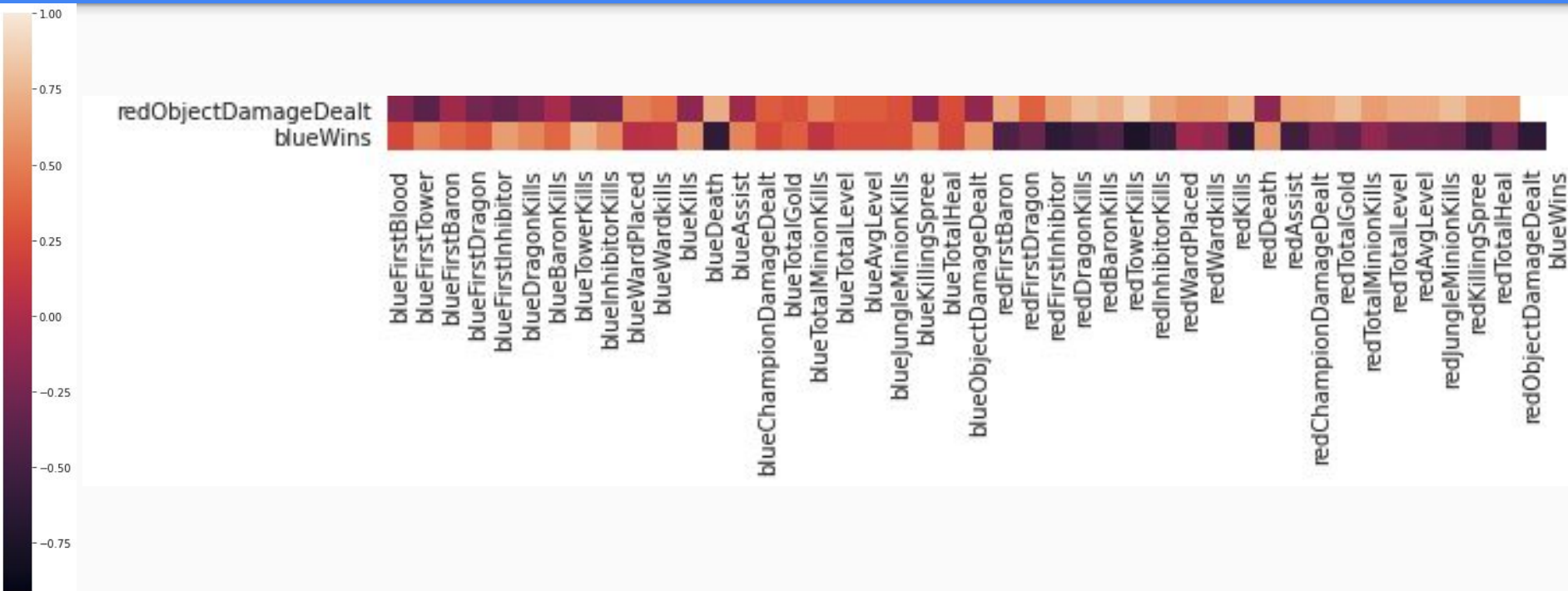6. 18,360 rows are left after data cleaning (originally 180,000 rows)

Explanatory Visual 1 - Tower Kills When Blue Team Wins

Insights:

1. When the Blue Team wins, it tends to have more tower kills than the Red Team

Explanatory Visual 2 - Heatmap

Explanatory Visual 2.1 - Heatmap

It's a tower push game.

```
[68]  1   sig_corr = corr.loc[abs(corr['blueWins']) > 0.6]
      2   sig_corr.index
      3   for i in sig_corr.index:
      4       print('The absolute correlation coefficient of Blue Team Wins vs.', i, 'is', abs(sig_corr.loc[i]['blueWins']))
```

```
The absolute correlation coefficient of Blue Team Wins vs. blueFirstInhibitor is 0.6412787999765784
The absolute correlation coefficient of Blue Team Wins vs. blueTowerKills is 0.7327588520385552
The absolute correlation coefficient of Blue Team Wins vs. blueKills is 0.6163453691668153
The absolute correlation coefficient of Blue Team Wins vs. blueDeath is 0.6075062767145276
The absolute correlation coefficient of Blue Team Wins vs. blueObjectDamageDealt is 0.6063150497098887
The absolute correlation coefficient of Blue Team Wins vs. redFirstInhibitor is 0.6280800703396792
The absolute correlation coefficient of Blue Team Wins vs. redTowerKills is 0.7337238400581659
The absolute correlation coefficient of Blue Team Wins vs. redKills is 0.6087807970239093
The absolute correlation coefficient of Blue Team Wins vs. redDeath is 0.6148981561179655
The absolute correlation coefficient of Blue Team Wins vs. redObjectDamageDealt is 0.6302138260303016
The absolute correlation coefficient of Blue Team Wins vs. blueWins is 1.0
```

```
  1   sig_corr = corr.loc[abs(corr['blueWins']) > 0.7]
  2   sig_corr.index
  3   for i in sig_corr.index:
  4       print('The absolute correlation coefficient of Blue Team Wins vs.', i, 'is', abs(sig_corr.loc[i]['blueWins']))
```

```
The absolute correlation coefficient of Blue Team Wins vs. blueTowerKills is 0.7327588520385552
The absolute correlation coefficient of Blue Team Wins vs. redTowerKills is 0.7337238400581659
The absolute correlation coefficient of Blue Team Wins vs. blueWins is 1.0
```

Explanatory Visual 2.2 - Heatmap

Don't Give Up

```
1   sig_corr = corr.loc[abs(corr['blueWins']) < 0.5]
2   sig_corr.index
3   for i in sig_corr.index:
4       print('The absolute correlation coefficient of Blue Team Wins vs.', i, 'is', abs(sig_corr.loc[i]['blueWins']))
```

```
The absolute correlation coefficient of Blue Team Wins vs. blueFirstBlood is 0.2378773278194205
The absolute correlation coefficient of Blue Team Wins vs. blueFirstBaron is 0.4011438077643077
The absolute correlation coefficient of Blue Team Wins vs. blueFirstDragon is 0.3161279610106788
The absolute correlation coefficient of Blue Team Wins vs. blueBaronKills is 0.3899203719076384
The absolute correlation coefficient of Blue Team Wins vs. blueWardPlaced is 0.059958818102568
The absolute correlation coefficient of Blue Team Wins vs. blueWardkills is 0.09104939654029563
The absolute correlation coefficient of Blue Team Wins vs. blueChampionDamageDealt is 0.23565479577012247
The absolute correlation coefficient of Blue Team Wins vs. blueTotalGold is 0.3461042870974987
The absolute correlation coefficient of Blue Team Wins vs. blueTotalMinionKills is 0.10431930890322165
The absolute correlation coefficient of Blue Team Wins vs. blueTotalLevel is 0.2665662927388104
The absolute correlation coefficient of Blue Team Wins vs. blueAvgLevel is 0.26656629273880933
The absolute correlation coefficient of Blue Team Wins vs. blueJungleMinionKills is 0.27224006598985423
The absolute correlation coefficient of Blue Team Wins vs. blueTotalHeal is 0.24324158766980974
The absolute correlation coefficient of Blue Team Wins vs. redFirstBaron is 0.43427142072526426
The absolute correlation coefficient of Blue Team Wins vs. redFirstDragon is 0.312156366813336
The absolute correlation coefficient of Blue Team Wins vs. redBaronKills is 0.4252986363622292
The absolute correlation coefficient of Blue Team Wins vs. redWardPlaced is 0.06937938112197957
The absolute correlation coefficient of Blue Team Wins vs. redWardkills is 0.12258863943160961
The absolute correlation coefficient of Blue Team Wins vs. redChampionDamageDealt is 0.24417504795334988
The absolute correlation coefficient of Blue Team Wins vs. redTotalGold is 0.35167698912555817
The absolute correlation coefficient of Blue Team Wins vs. redTotalMinionKills is 0.11730330995044684
The absolute correlation coefficient of Blue Team Wins vs. redTotalLevel is 0.2693757532219708
The absolute correlation coefficient of Blue Team Wins vs. redAvgLevel is 0.26937575322197255
The absolute correlation coefficient of Blue Team Wins vs. redJungleMinionKills is 0.3028826200608255
The absolute correlation coefficient of Blue Team Wins vs. redTotalHeal is 0.26518049786376613
```
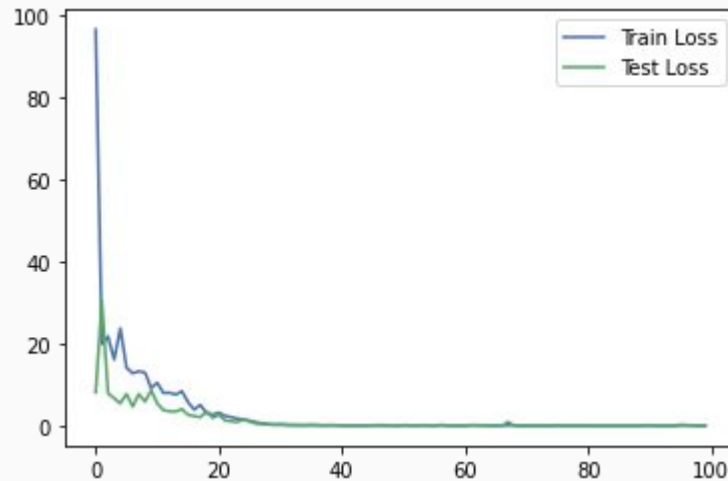
Model 1 - Random Forest Classfier


```python
1  print('Training accuracy:', rf_pipe.score(X_train, y_train))
2  print('Testing accuracy:', rf_pipe.score(X_test, y_test))
```

```
Training accuracy: 0.9999273783587509
Testing accuracy: 0.9888888888888889
```

Model 2 - Keras (without dropout and early stopping)

Model 2 - Keras (with dropout and early stopping)