Data Leads to Victory

League of Legends data analysis

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All dataset original from Riot API

What is League of Legends ?

League of Legends is an online team-based strategy game where two teams will face off to secure victory.

Each team consists of 5 unique champions from total 140 champions with different position.

Why do we choose League of Legends

- E-sports is currently one of the fastest growing industries in the world
- League of Legends is one of the largest esports events in the world, it has 100 million active players in 2020.
- It has 3.9 million peak viewer during the world championship 2019.

OutLine

- Introduction

- Analyze League of Legends through three aspects
  - Important map resources
  - Game results affected by first 10 mins performance
  - How Champions Selection Influence the Game

- Project summary

Introduction to important map resources

Dragons:

Baron:

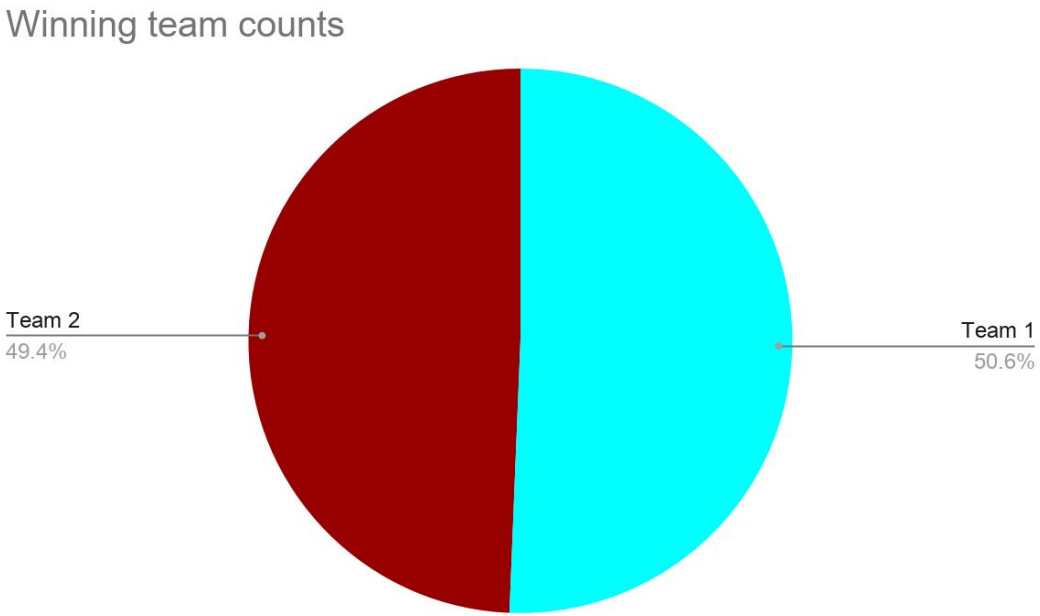
Inhibitors:

Tower:

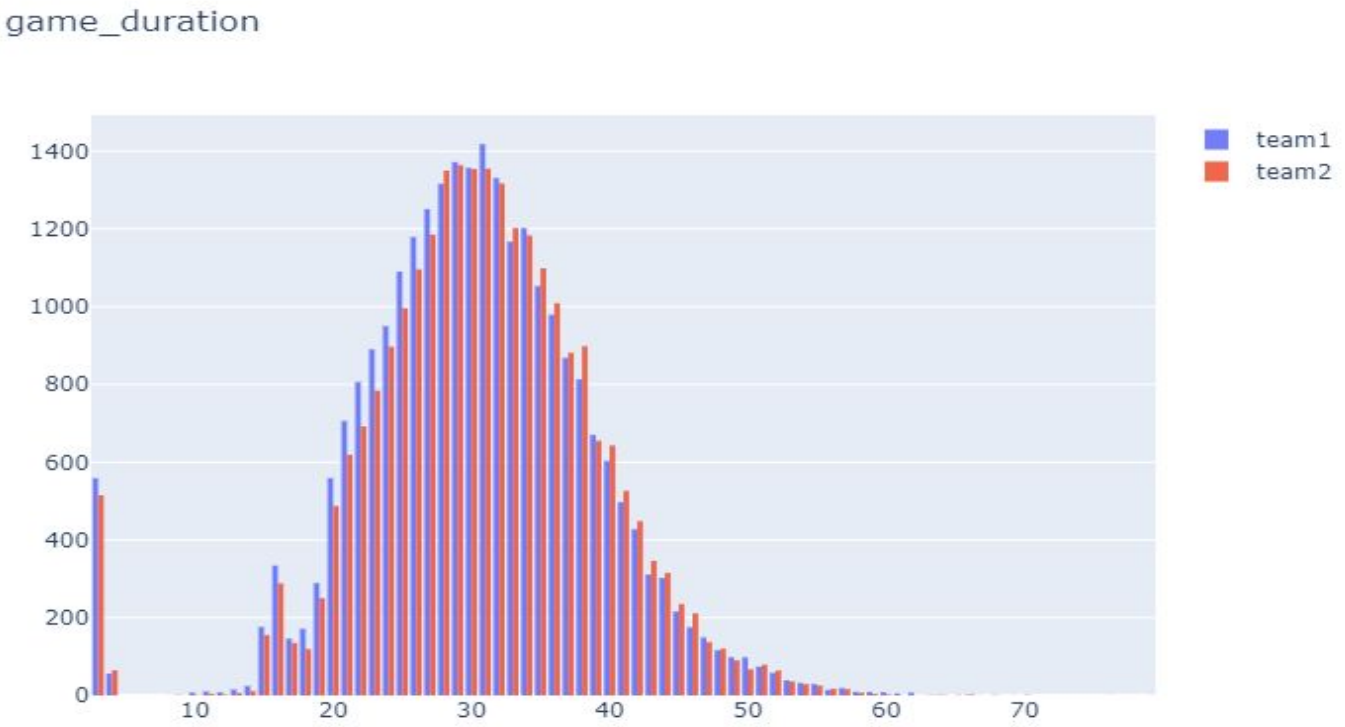
Rift Herald:

Teaming winning conditions.

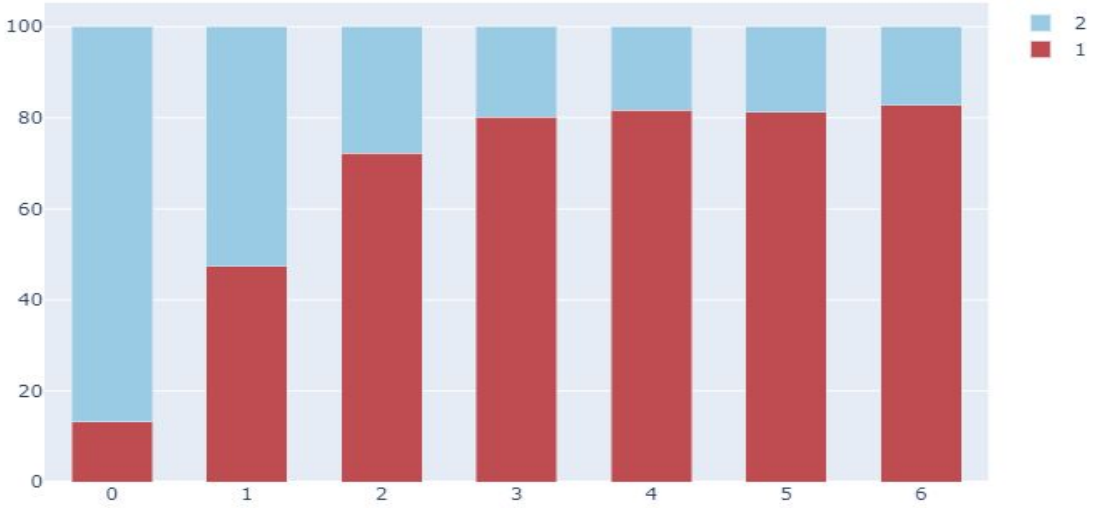
	Winning team counts
Team 1	26077
Team 2	25413



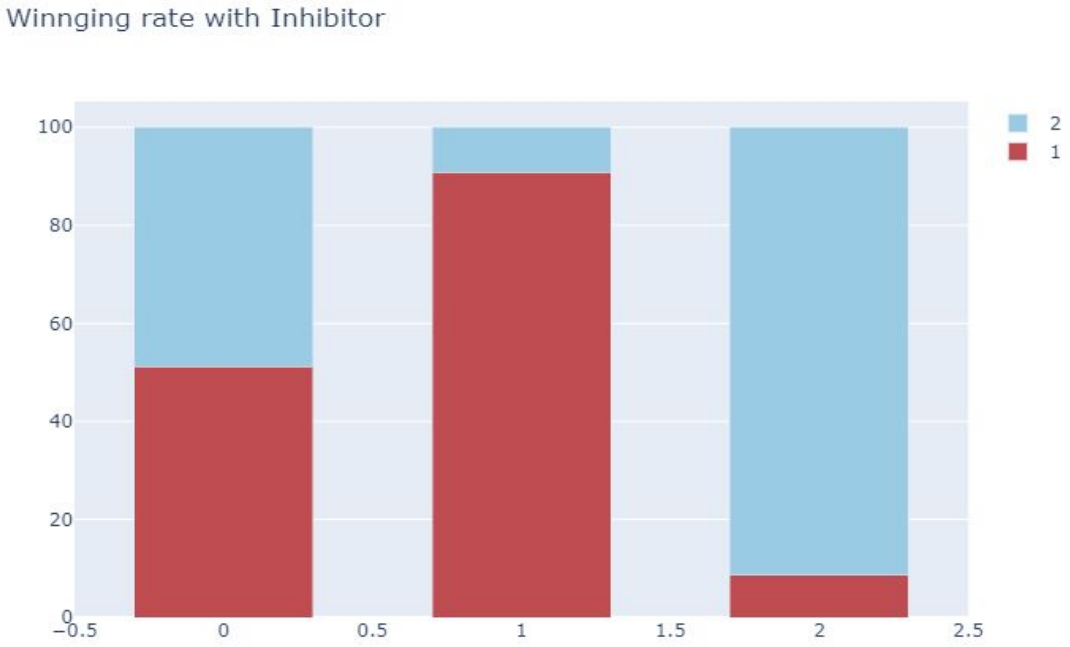
Game duration distribution



Dragon relate to winning rate

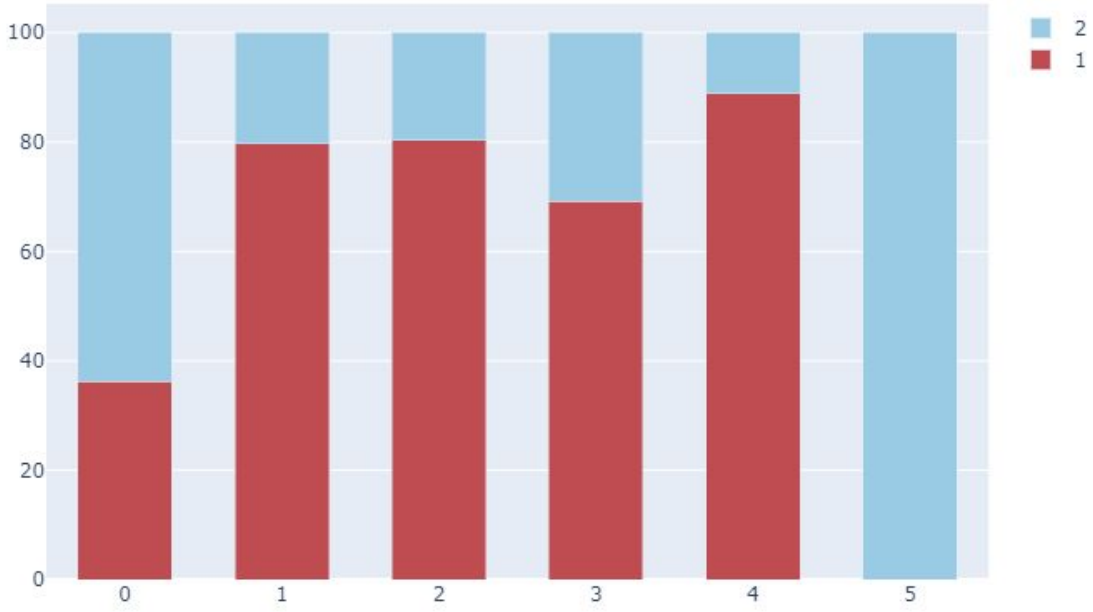


Killing the dragon will bring a permanent BUFF effect to the team. These effects can stack up to 4



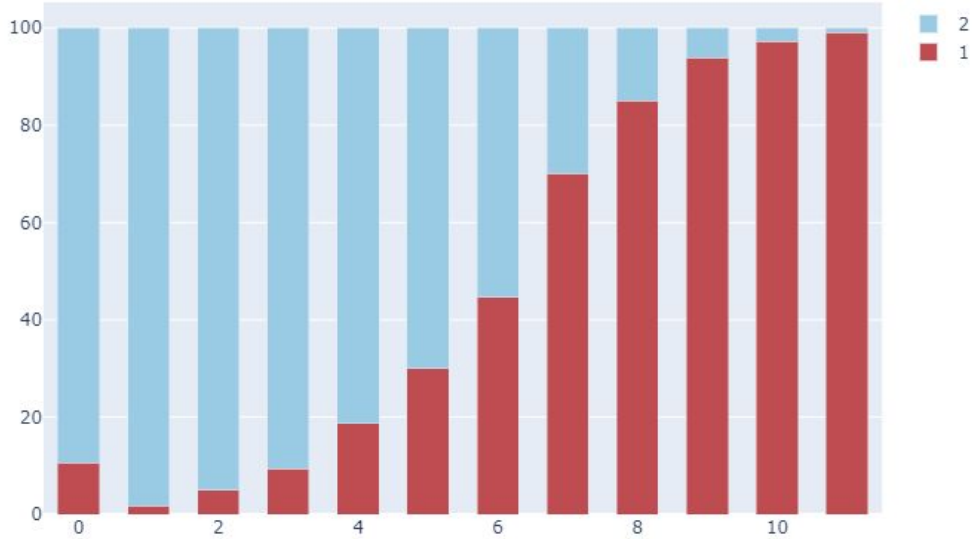
When one team loses the inhibitor, the other team will produce super soldiers.

Winning rate related to Baron kills



Killing baron will bring a short-term powerful BUFF to the team, allowing your soldiers to be greatly enhanced

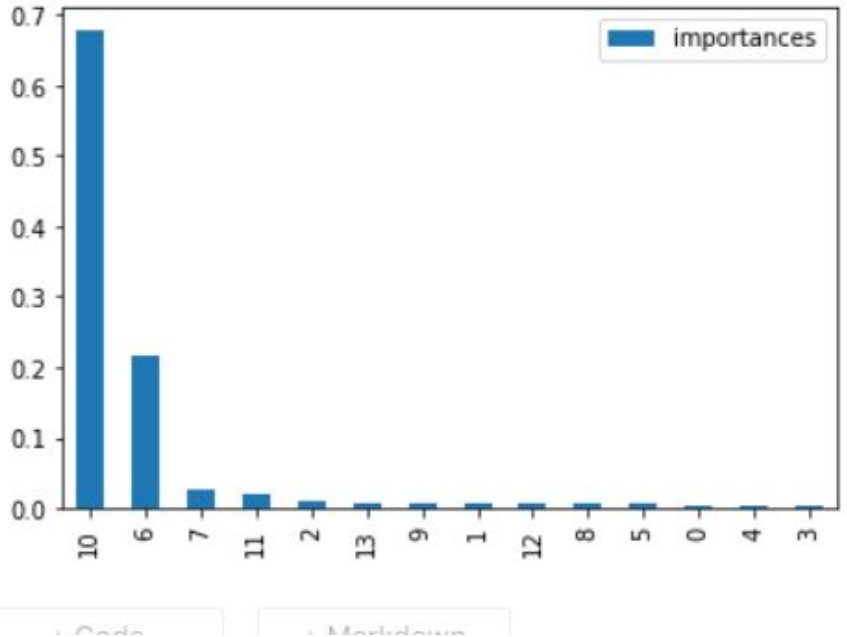
tower influence



The defense tower has high health volume and attack power, and the damage will continue to stack, but it can only attack one unit at a time and the frequency is low

Importance of different resources

	columns	importances
10	t2_towerKills	0.678253
6	t1_towerKills	0.215414
7	t1_inhibitorKills	0.027374
11	t2_inhibitorKills	0.020401
2	firstInhibitor	0.010286
13	t2_dragonKills	0.008265
9	t1_dragonKills	0.006700
1	firstTower	0.006172
12	t2_baronKills	0.006071
8	t1_baronKills	0.005718
5	firstRiftHerald	0.005086
0	firstBlood	0.003798
4	firstDragon	0.003631
3	firstBaron	0.002831



Prediction

Model	Prediction Accuracy
Decision Tree Classifier	0.9662249676198067

Feature chosen: 'winner', 't1_towerKills', 't1_inhibitorKills','t1_baronKills', 't1_dragonKills', 't2_towerKills', 't2_inhibitorKills', 't2_baronKills', 't2_dragonKills'

Match 1: [1, 1, 0, 1, 1, 2, 2, 3] (at 27 min) prediction: team 2 has 98% chance to win. (correct)

Match 2: [1, 0, 0, 1, 1, 0, 0, 2] (at 24 min) prediction: team 2 has 91% chance to win. (correct)

How game results affected by first 10 mins performance

- Dataset
  - First 10 mins stats of approx. 10k ranked games from a high ELO
  - 19 features per team (38 in total)
  - Target value: blueWins
  - Balanced dataset (blueWin:redWin ≈ 1:1)
  - Source: https://www.kaggle.com/bobbyscience/league-of-legends-diamond-ranked-games-10-min

```
data.shape
```

```
(9879, 39)
```

```
data.columns
```

```
Index(['blueWins', 'blueWardsPlaced', 'blueWardsDestroyed', 'blueFirstBlood',
       'blueKills', 'blueDeaths', 'blueAssists', 'blueEliteMonsters',
       'blueDragons', 'blueHeralds', 'blueTowersDestroyed', 'blueTotalGold',
       'blueAvgLevel', 'blueTotalExperience', 'blueTotalMinionsKilled',
       'blueTotalJungleMinionsKilled', 'blueGoldDiff', 'blueExperienceDiff',
       'blueCSPerMin', 'blueGoldPerMin', 'redWardsPlaced', 'redWardsDestroyed',
       'redFirstBlood', 'redKills', 'redDeaths', 'redAssists',
       'redEliteMonsters', 'redDragons', 'redHeralds', 'redTowersDestroyed',
       'redTotalGold', 'redAvgLevel', 'redTotalExperience',
       'redTotalMinionsKilled', 'redTotalJungleMinionsKilled', 'redGoldDiff',
       'redExperienceDiff', 'redCSPerMin', 'redGoldPerMin'],
      dtype='object')
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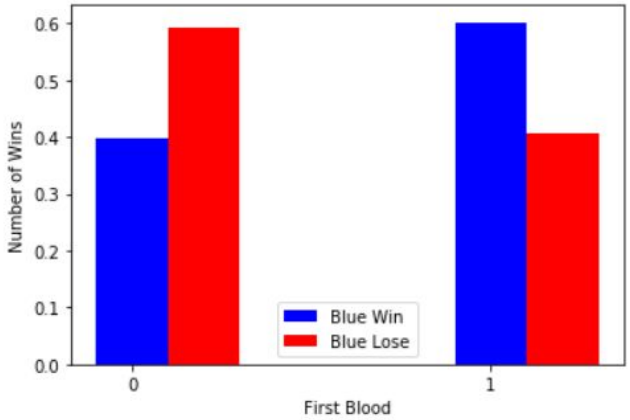
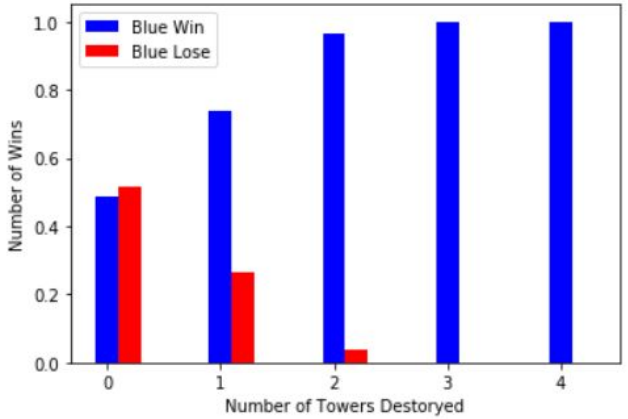
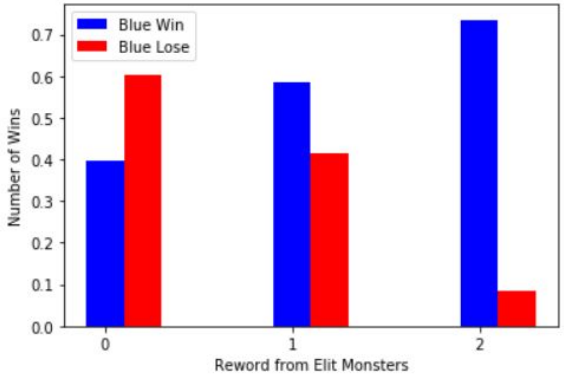
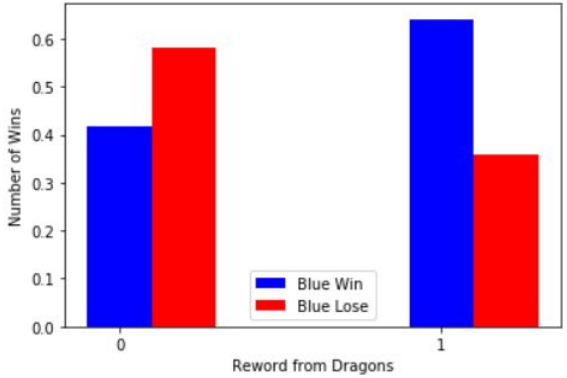
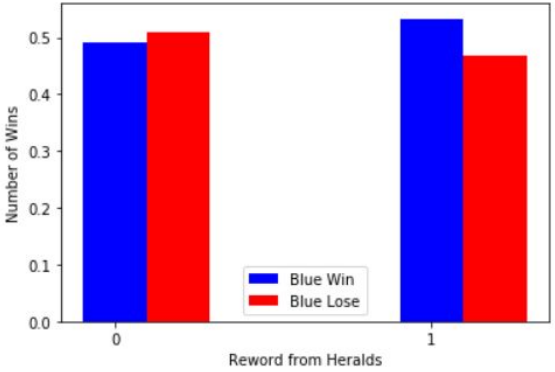
Some simple features



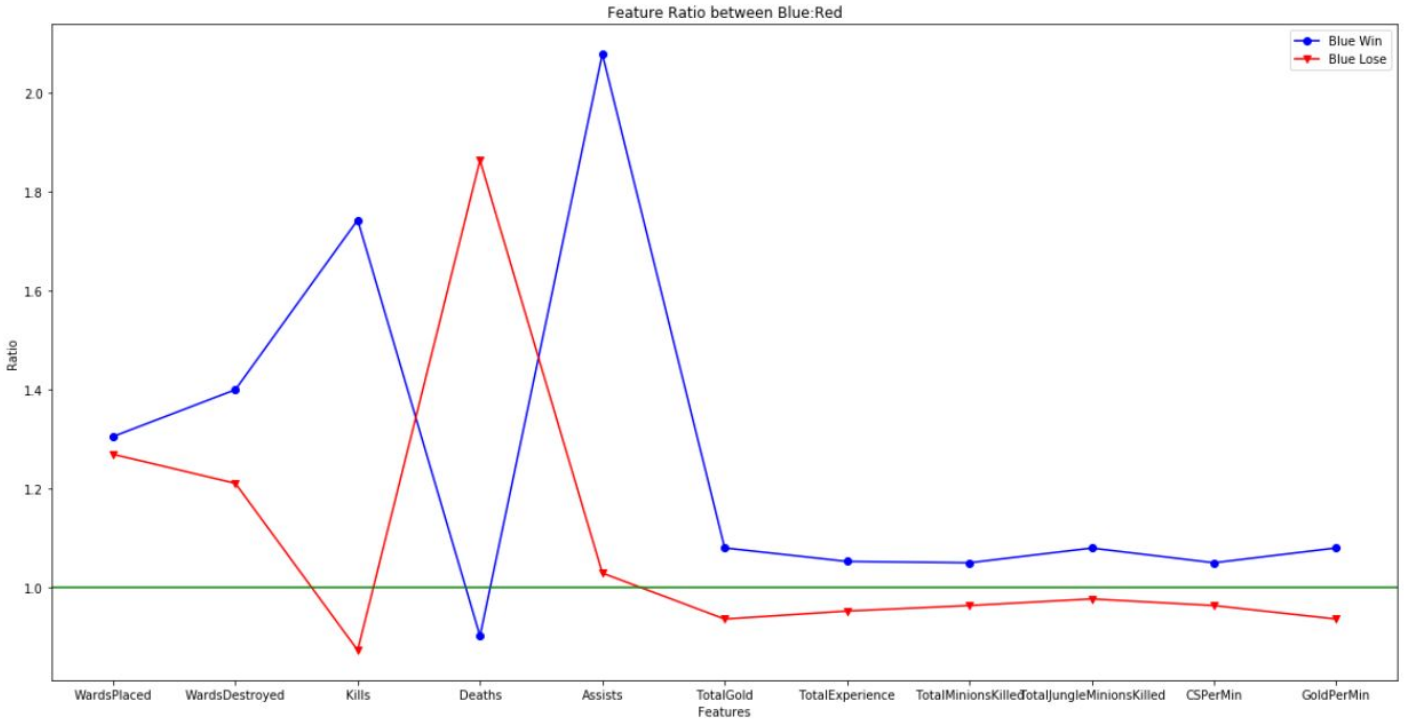




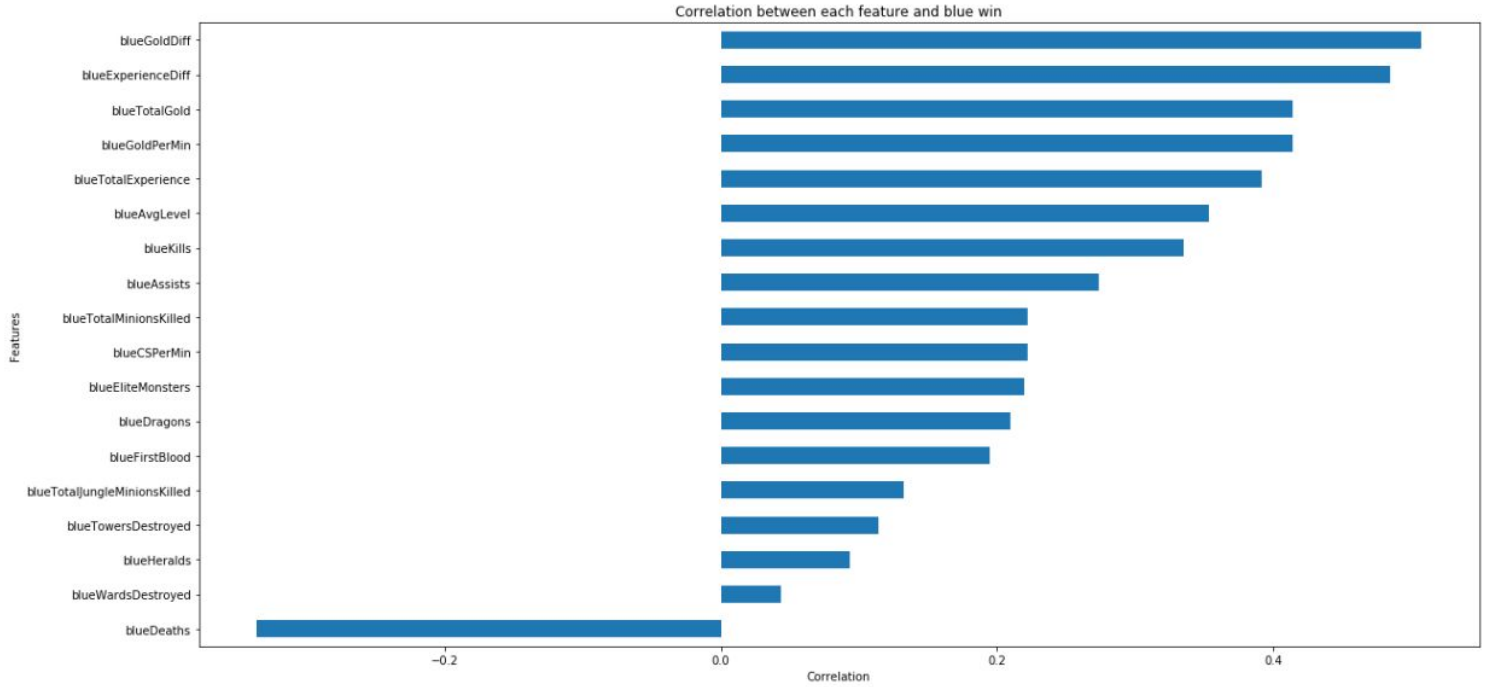




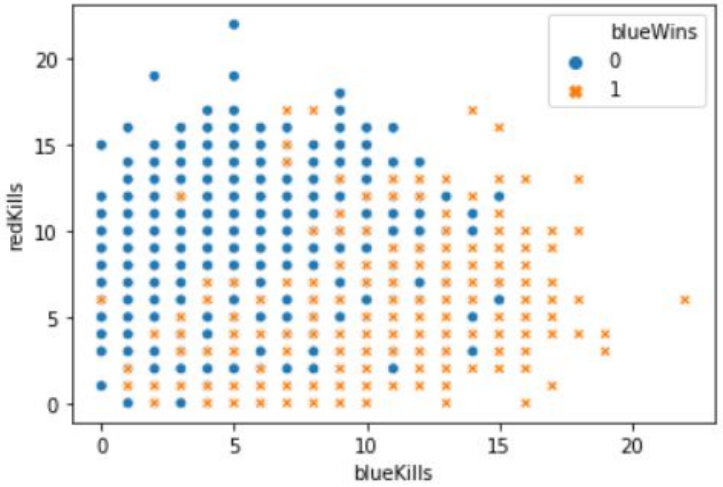
Average ratio of all features blue:red

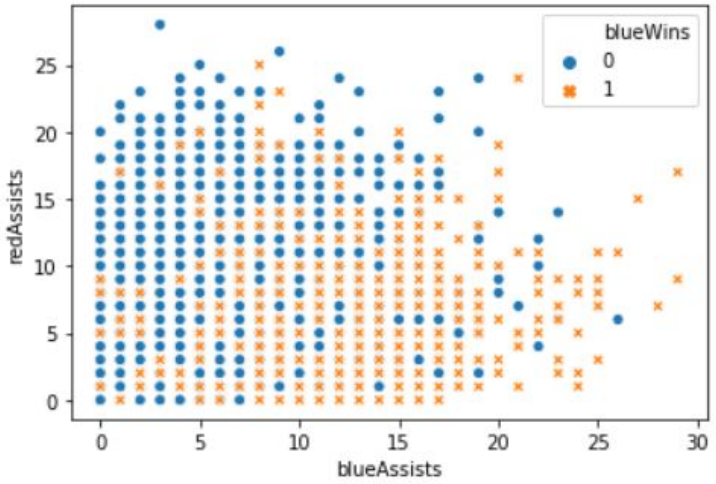


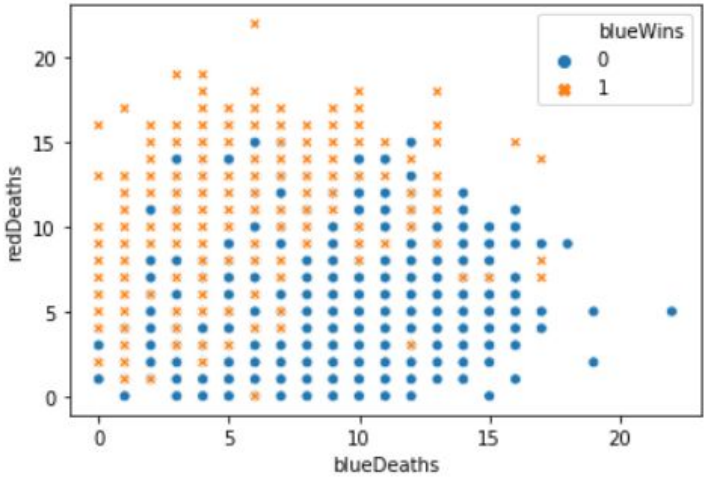
Correlation between features and blue wins



Kill, Death, Assistant

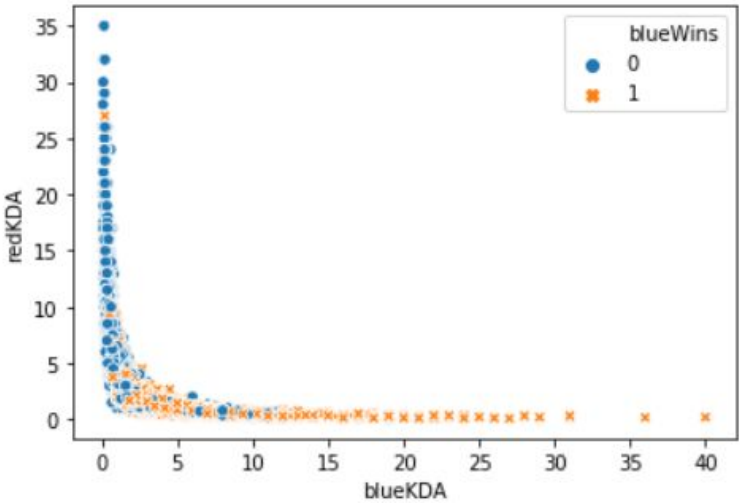


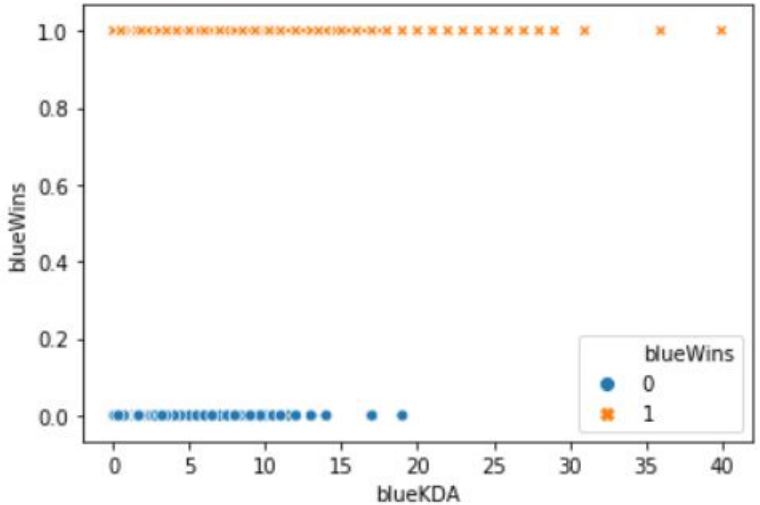




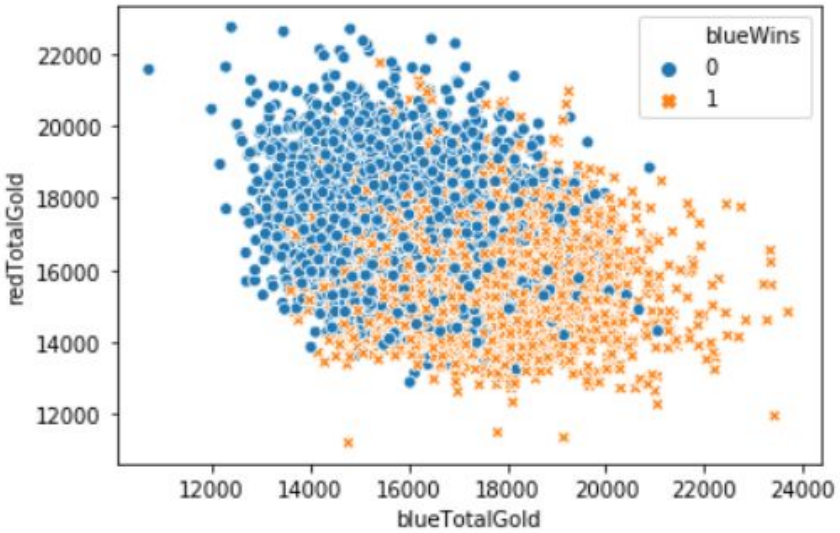
KDA Rate

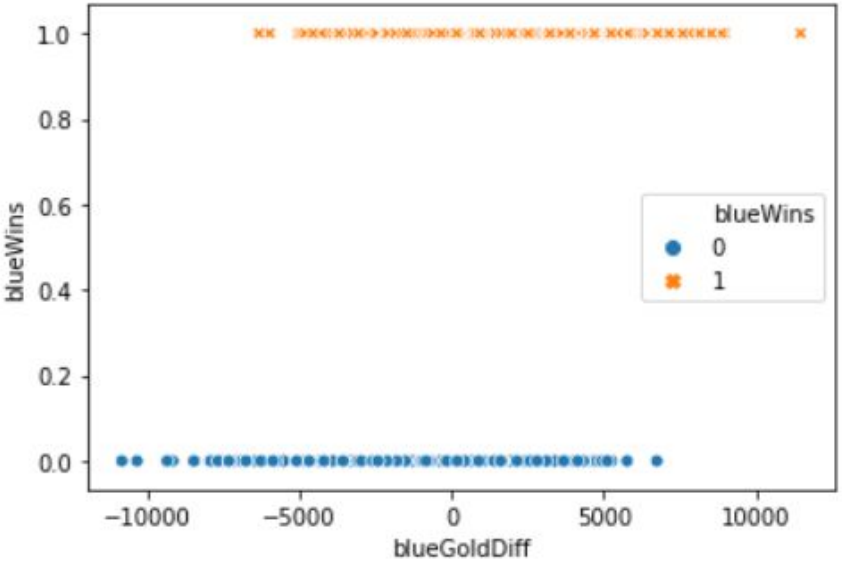
KDA Rate = (#Kills + #Assistant) / #Death



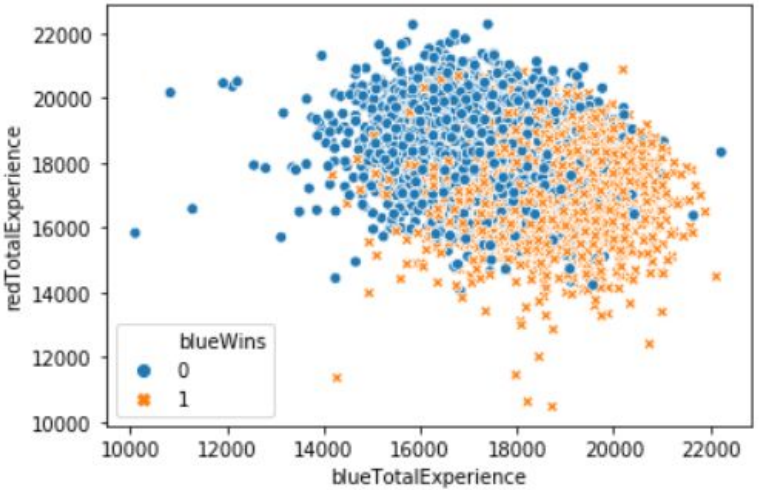


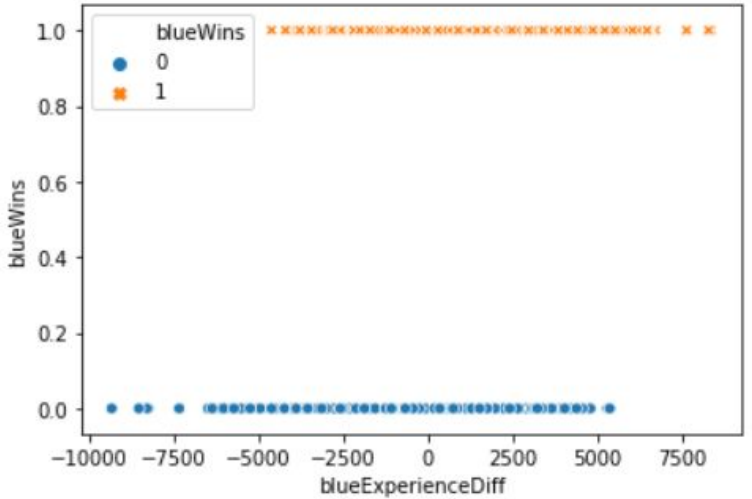
Gold


blueWins
0
1
redTotalGold
blueTotalGold
22000
20000
18000
16000
14000
12000
12000
14000
16000
18000
20000
22000
24000


blueWins
0
1
blueWins
blueGoldDiff
1.0
0.8
0.6
0.4
0.2
0.0
−10000
−5000
0
5000
10000

Experience


redTotalExperience
blueTotalExperience
blueWins
0
1
22000
20000
18000
16000
14000
12000
10000
10000
12000
14000
16000
18000
20000
22000


blueWins
blueExperienceDiff
blueWins
0
1
1.0
0.8
0.6
0.4
0.2
0.0
−10000
−7500
−5000
−2500
0
2500
5000
7500

Prediction

Model	Prediction Accuracy
Logistic Regression	0.721025641025641
Decision Tree Classifier	0.7169230769230769
Random Forest Classifier	0.717948717948718
K Neighbors Classifier	0.7107692307692308
Adaboost Classifier	0.7251282051282051

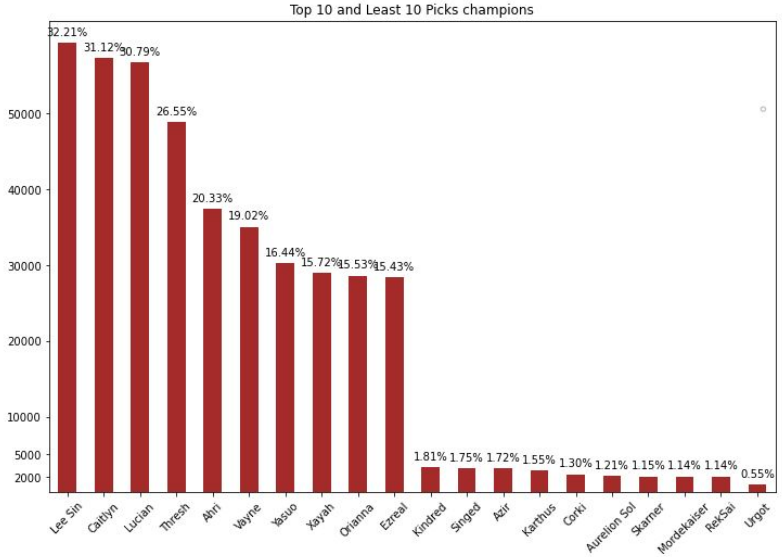
How Champions Selection Influence the Game?

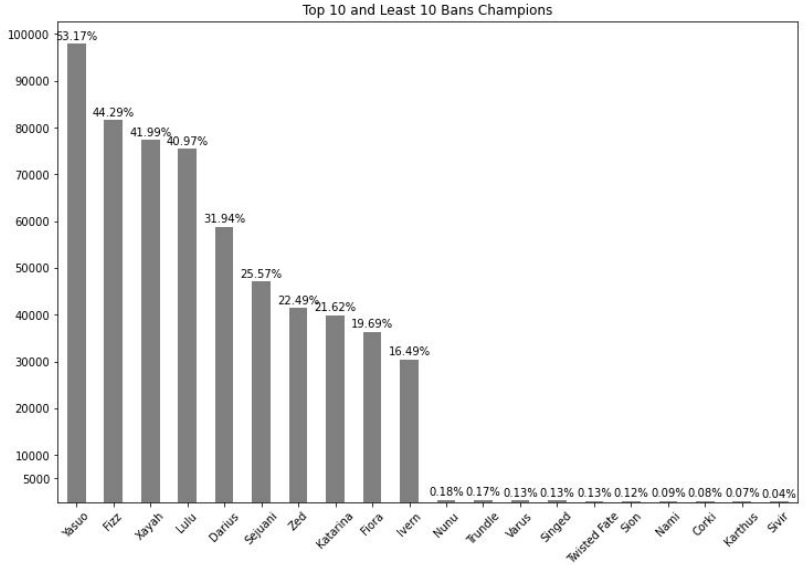
- Champions are individual units that are directly controlled by real player.
- Each team will have five champions, for a total of 10 champions per game.
- Champions are unique
- In a standard game, there can only be one of each champion per game.
- 138 champions that players can choose from.

Data Selection

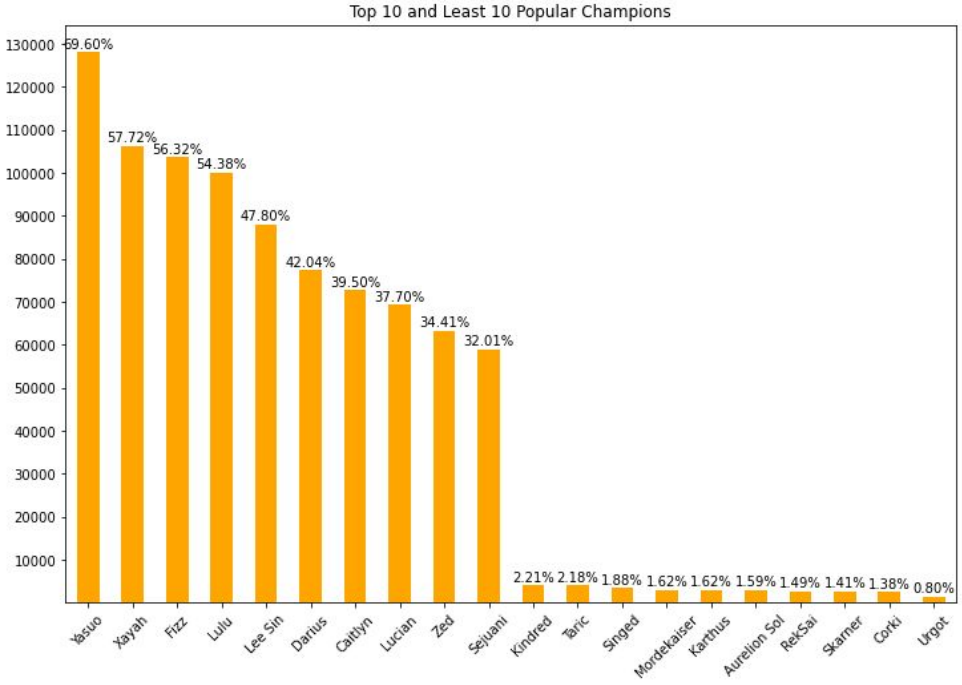
- This data contains about 184070 leagues of legends ranked solo games.
- It spanning across several years and game seasons (from 2014).
- Most data comes from EU server.
- Source: https://www.kaggle.com/paololol/league-of-legends-ranked-matches?select=champs.csv

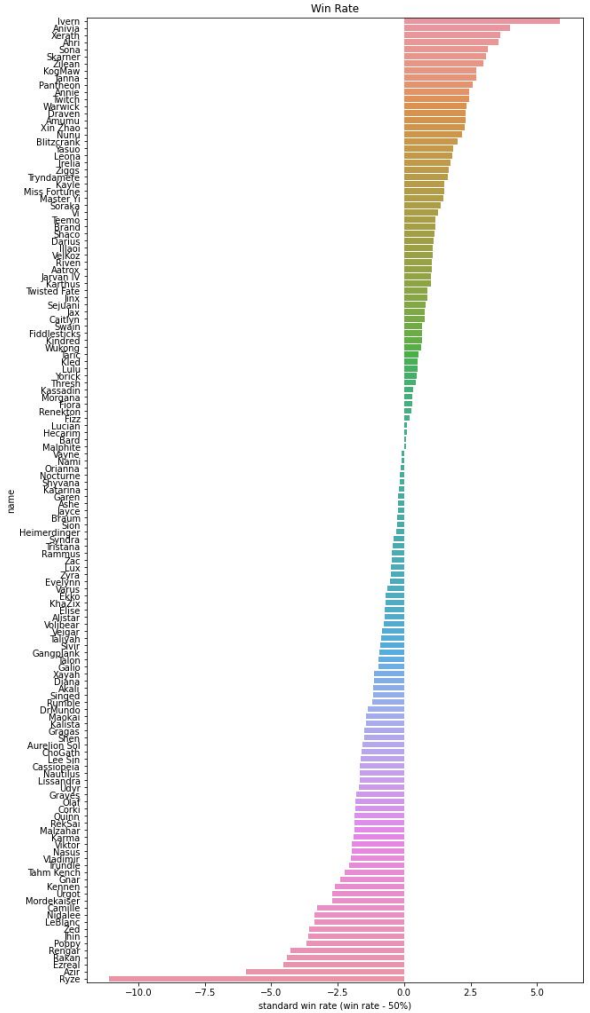
Picks and Bans





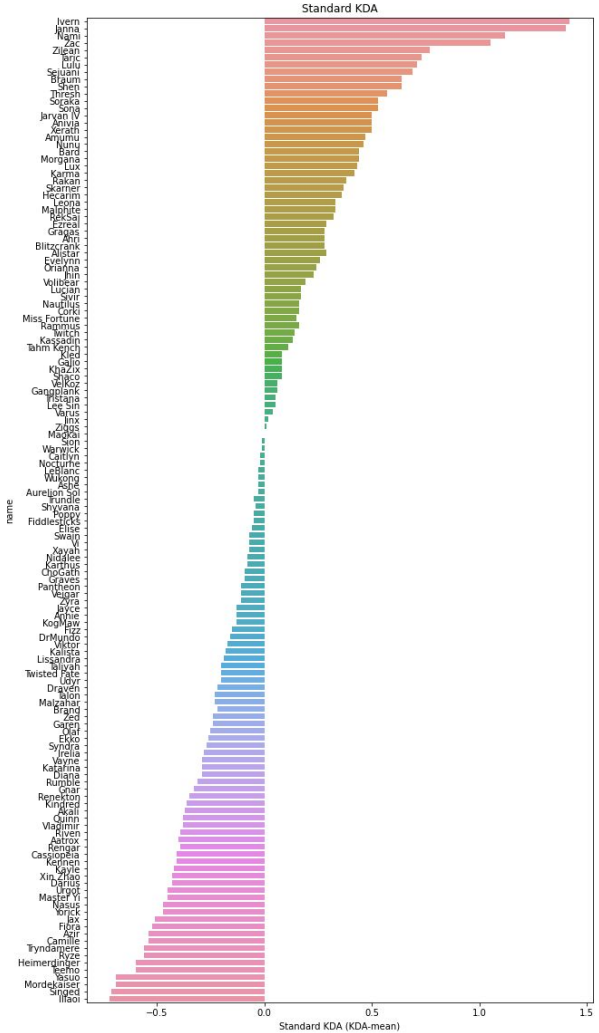
The Most Popular Champions and the Least Popular Champions





Standard Winning Rate

	name	total matches	win rate (%)	K	D	A	KDA
40	Ivern	6671	55.87	2.64	4.16	13.30	3.83
5	Anivia	6433	53.97	6.37	4.77	7.54	2.92
127	Xerath	5108	53.62	7.31	5.44	8.55	2.91
1	Ahri	30841	53.55	7.26	5.55	7.71	2.70
99	Sona	11847	53.14	2.97	5.74	13.95	2.95
98	Skarner	1720	53.08	4.79	5.02	9.22	2.79
134	Zilean	4797	52.99	3.16	4.73	11.91	3.19
57	KogMaw	6440	52.72	7.93	6.59	7.13	2.28
41	Janna	21182	52.71	0.87	4.02	14.48	3.82
80	Pantheon	8872	52.57	8.07	6.47	6.84	2.31



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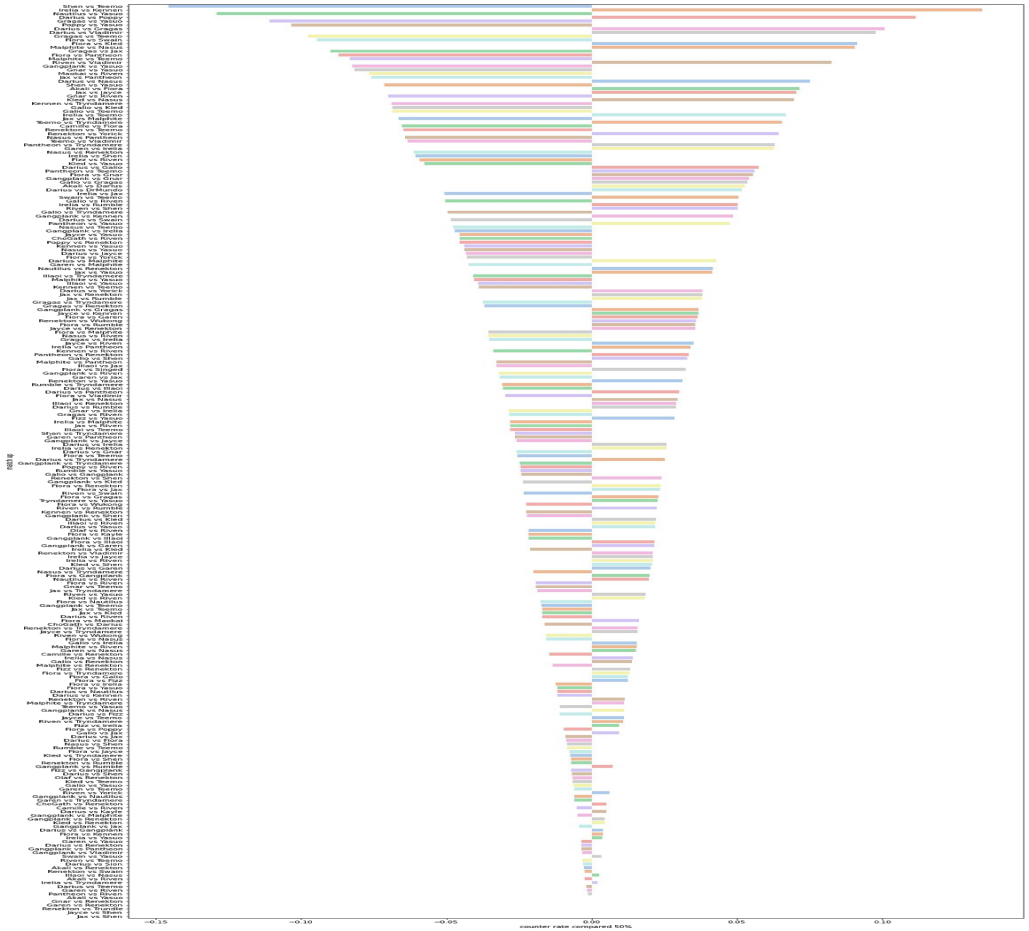
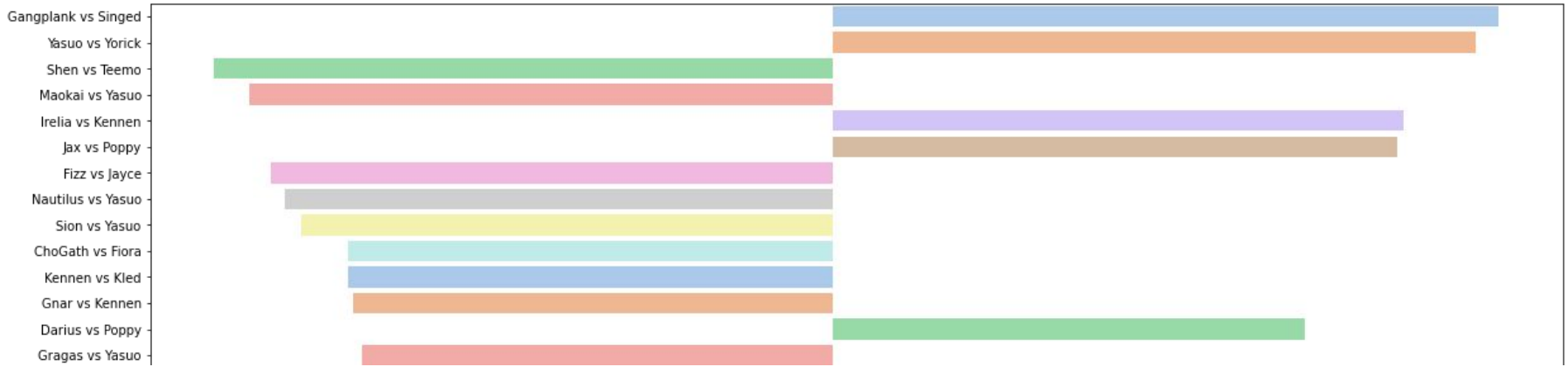
Map Introduction

- Top laner
- Mid laner
- Attack Damage Carry (ADC)
- Support

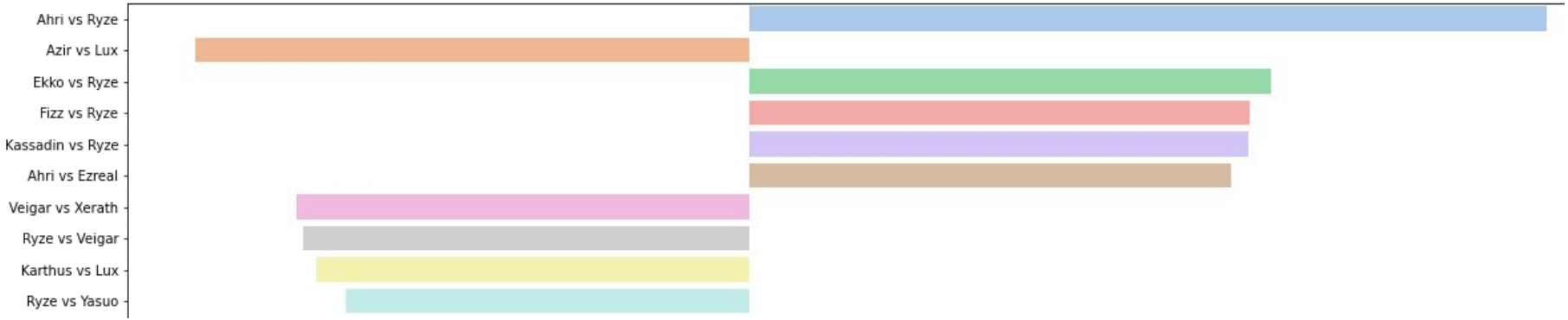

matchup
−0.15
−0.10
−0.05
0.00
0.05
0.10
counter rate compared 50%

Top Lane



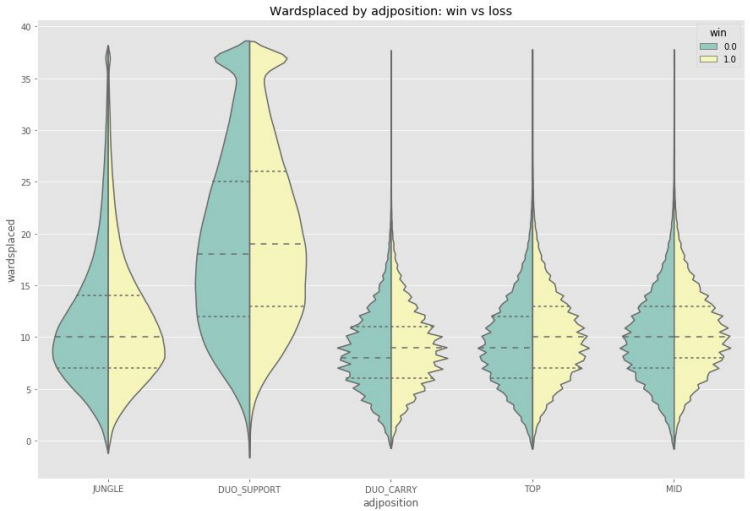
	index	match up	total matchs	total first win	counter rate	counter rate compared 50%	abs
0	1920	Gangplank vs Singed	102.0	67.0	0.656863	0.156863	0.156863
1	4993	Yasuo vs Yorick	109.0	71.0	0.651376	0.151376	0.151376
2	4573	Shen vs Teemo	189.0	67.0	0.354497	-0.145503	0.145503
3	3751	Maokai vs Yasuo	113.0	41.0	0.362832	-0.137168	0.137168
4	2502	Irelia vs Kennen	186.0	118.0	0.634409	0.134409	0.134409

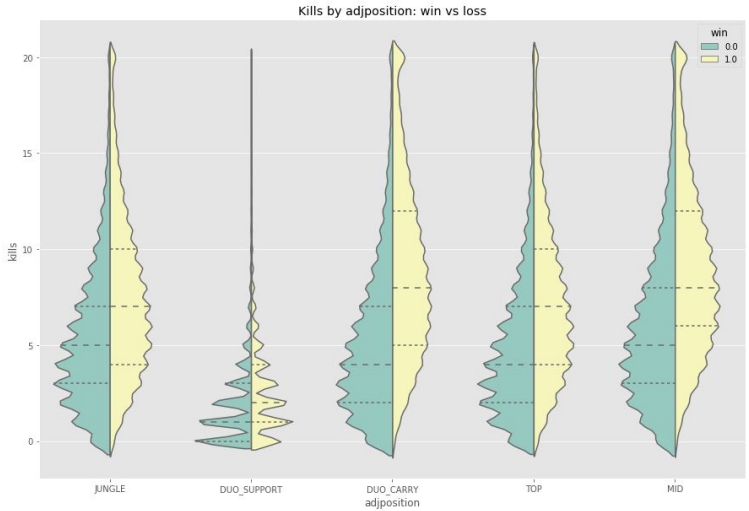
Mid Lane

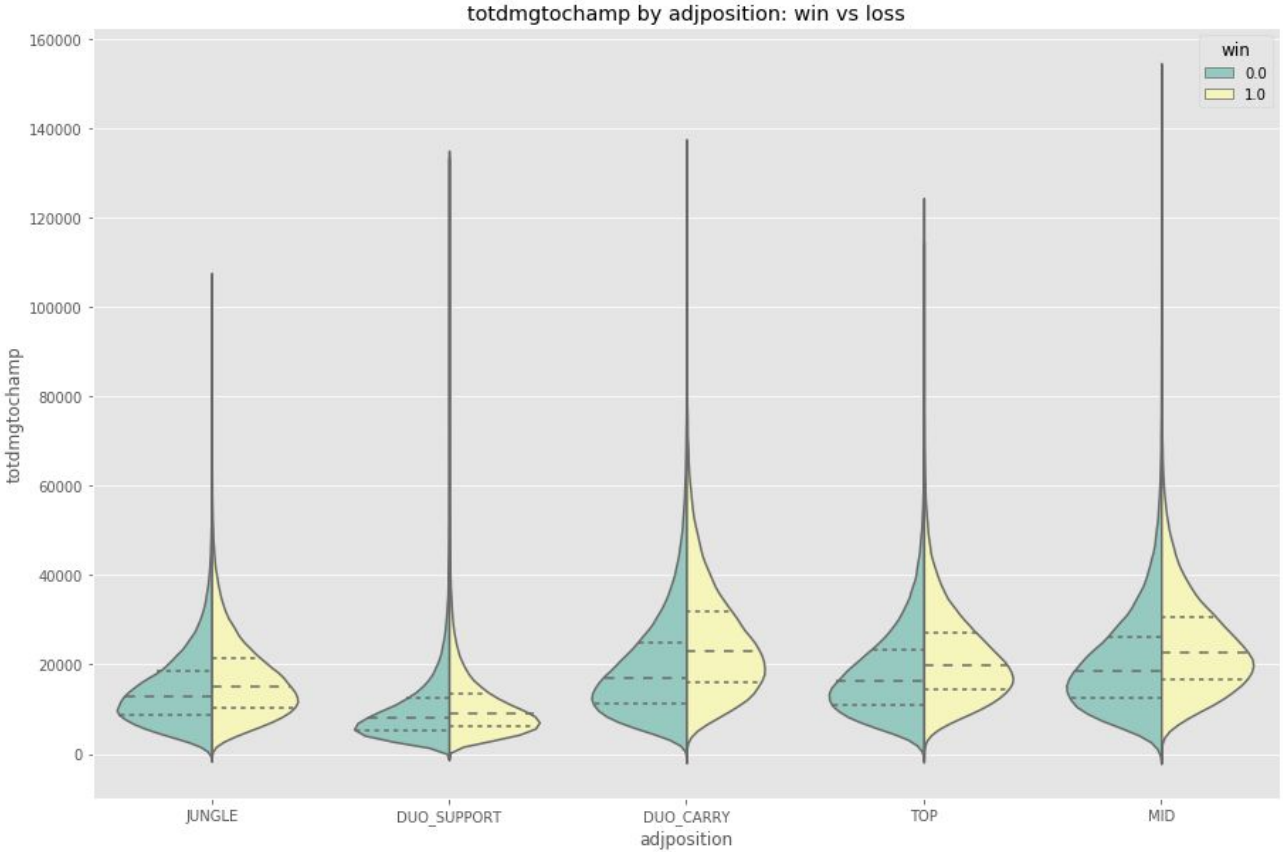


	index	match up	total matchs	total first win	counter rate	counter rate compared 50%	abs
0	96	Ahri vs Ryze	319.0	227.0	0.711599	0.211599	0.211599
1	568	Azir vs Lux	150.0	53.0	0.353333	-0.146667	0.146667
2	1192	Ekko vs Ryze	130.0	83.0	0.638462	0.138462	0.138462
3	1443	Fizz vs Ryze	158.0	100.0	0.632911	0.132911	0.132911
4	2092	Kassadin vs Ryze	147.0	93.0	0.632653	0.132653	0.132653

Who should be Responsible for Game?






totdmgtochamp by adjposition: win vs loss
win
0.0
1.0
totdmgtochamp
160000
140000
120000
100000
80000
60000
40000
20000
0
JUNGLE
DUO_SUPPORT
DUO_CARRY
TOP
MID
adjposition

Project Conclusion

- What we done ?
- What else can we do?
- Any questions?