

eda

November 4, 2024

1 EDA of Oracle's Elixir League of Legends 2024 Match Data

1.0.1 Data Description:

Comprehensive dataset of all professional level games of League of Legends maintained by Oracle's Elixir. This data contains practically all possible data points for the games: teams, players, leagues, kills/deaths/assists per player, objectives taken, gold earned per player etc.

1.0.2 Data Source:

CSV file of 2024 match data from Oracle's Elixir Google Drive collection of League of Legends match datasets, can be found at <https://oracleselixir.com/tools/downloads>

```
[1]: import pandas as pd;
import numpy as np;
```

```
[2]: # full dataset
all_data = pd.read_csv('../OraclesElixirLoLData2024.csv', low_memory=False)
all_data
```

```
[2]:
```

	gameid	datacompleteness	\
0	10660-10660_game_1	partial	
1	10660-10660_game_1	partial	
2	10660-10660_game_1	partial	
3	10660-10660_game_1	partial	
4	10660-10660_game_1	partial	
...	
114283	LOLTMNT02_181861	complete	
114284	LOLTMNT02_181861	complete	
114285	LOLTMNT02_181861	complete	
114286	LOLTMNT02_181861	complete	
114287	LOLTMNT02_181861	complete	

	url	league	year	split	\
0	https://lpl.qq.com/es/stats.shtml?bmid=10660	DCup	2023	NaN	
1	https://lpl.qq.com/es/stats.shtml?bmid=10660	DCup	2023	NaN	
2	https://lpl.qq.com/es/stats.shtml?bmid=10660	DCup	2023	NaN	
3	https://lpl.qq.com/es/stats.shtml?bmid=10660	DCup	2023	NaN	
4	https://lpl.qq.com/es/stats.shtml?bmid=10660	DCup	2023	NaN	

...
114283	NaN	HW	2024	NaN
114284	NaN	HW	2024	NaN
114285	NaN	HW	2024	NaN
114286	NaN	HW	2024	NaN
114287	NaN	HW	2024	NaN

	playoffs		date	game	patch	...	opp_csat25	\
0	0	2024-01-01	05:13:15	1	13.24	...	NaN	
1	0	2024-01-01	05:13:15	1	13.24	...	NaN	
2	0	2024-01-01	05:13:15	1	13.24	...	NaN	
3	0	2024-01-01	05:13:15	1	13.24	...	NaN	
4	0	2024-01-01	05:13:15	1	13.24	...	NaN	
...
114283	0	2024-11-03	21:08:36	5	14.18	...	200.0	
114284	0	2024-11-03	21:08:36	5	14.18	...	264.0	
114285	0	2024-11-03	21:08:36	5	14.18	...	36.0	
114286	0	2024-11-03	21:08:36	5	14.18	...	862.0	
114287	0	2024-11-03	21:08:36	5	14.18	...	870.0	

	golddiffat25	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	\
0	NaN	NaN	NaN	NaN	NaN	NaN	
1	NaN	NaN	NaN	NaN	NaN	NaN	
2	NaN	NaN	NaN	NaN	NaN	NaN	
3	NaN	NaN	NaN	NaN	NaN	NaN	
4	NaN	NaN	NaN	NaN	NaN	NaN	
...
114283	716.0	2609.0	14.0	1.0	6.0	0.0	
114284	-445.0	1274.0	-28.0	1.0	5.0	0.0	
114285	151.0	1043.0	8.0	1.0	5.0	2.0	
114286	-2295.0	-7637.0	8.0	4.0	9.0	9.0	
114287	2295.0	7637.0	-8.0	9.0	23.0	4.0	

	opp_killsat25	opp_assistsat25	opp_deathsat25
0	NaN	NaN	NaN
1	NaN	NaN	NaN
2	NaN	NaN	NaN
3	NaN	NaN	NaN
4	NaN	NaN	NaN
...
114283	1.0	2.0	3.0
114284	1.0	2.0	0.0
114285	0.0	3.0	1.0
114286	9.0	23.0	4.0
114287	4.0	9.0	9.0

[114288 rows x 161 columns]

```
[3]: all_data.describe()
```

```
[3]:
```

	year	playoffs	game	patch	\
count	114288.000000	114288.000000	114288.000000	114084.000000	
mean	2024.022890	0.212621	1.672092	14.090678	
std	0.161697	0.409163	0.932914	0.066573	
min	2023.000000	0.000000	1.000000	13.240000	
25%	2024.000000	0.000000	1.000000	14.040000	
50%	2024.000000	0.000000	1.000000	14.100000	
75%	2024.000000	0.000000	2.000000	14.130000	
max	2025.000000	1.000000	5.000000	14.210000	

	participantid	gamelength	result	kills	\
count	114288.000000	114288.000000	114288.000000	114288.000000	
mean	29.583333	1898.281184	0.499895	5.014122	
std	57.650720	337.363127	0.500002	6.024943	
min	1.000000	522.000000	0.000000	0.000000	
25%	3.750000	1662.000000	0.000000	1.000000	
50%	6.500000	1859.000000	0.000000	3.000000	
75%	9.250000	2098.000000	1.000000	6.000000	
max	200.000000	3482.000000	1.000000	59.000000	

	deaths	assists	...	opp_csat25	golddiffat25	\
count	114288.000000	114288.000000	...	90984.000000	90984.000000	
mean	5.024622	11.540022	...	283.248901	0.000000	
std	5.754987	13.535652	...	264.284837	3157.733412	
min	0.000000	0.000000	...	9.000000	-20366.000000	
25%	2.000000	4.000000	...	153.000000	-1338.000000	
50%	3.000000	7.000000	...	210.000000	0.000000	
75%	5.000000	13.000000	...	247.000000	1338.000000	
max	59.000000	104.000000	...	1060.000000	20366.000000	

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	\
count	90984.000000	90984.000000	90984.000000	90984.000000	90984.000000	
mean	0.000000	0.000000	3.252220	6.884309	3.259584	
std	3205.588475	46.251919	4.095869	8.459254	3.941982	
min	-19754.000000	-283.000000	0.000000	0.000000	0.000000	
25%	-1398.000000	-20.000000	1.000000	2.000000	1.000000	
50%	0.000000	0.000000	2.000000	4.000000	2.000000	
75%	1398.000000	20.000000	4.000000	8.000000	4.000000	
max	19754.000000	283.000000	59.000000	100.000000	59.000000	

	opp_killsat25	opp_assistsat25	opp_deathsat25
count	90984.000000	90984.000000	90984.000000
mean	3.252220	6.884309	3.259584
std	4.095869	8.459254	3.941982
min	0.000000	0.000000	0.000000

25%	1.000000	2.000000	1.000000
50%	2.000000	4.000000	2.000000
75%	4.000000	8.000000	4.000000
max	59.000000	100.000000	59.000000

[8 rows x 138 columns]

```
[4]: all_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 114288 entries, 0 to 114287
Columns: 161 entries, gameid to opp_deathsat25
dtypes: float64(118), int64(20), object(23)
memory usage: 140.4+ MB
```

```
[5]: # see what the column names look like
columns_list = all_data.columns.tolist()
columns_list
```

```
[5]: ['gameid',
      'datacompleteness',
      'url',
      'league',
      'year',
      'split',
      'playoffs',
      'date',
      'game',
      'patch',
      'participantid',
      'side',
      'position',
      'playername',
      'playerid',
      'teamname',
      'teamid',
      'champion',
      'ban1',
      'ban2',
      'ban3',
      'ban4',
      'ban5',
      'pick1',
      'pick2',
      'pick3',
      'pick4',
      'pick5',
      'gamelength',
```

'result',
'kills',
'deaths',
'assists',
'teamkills',
'teamdeaths',
'doublekills',
'triplekills',
'quadrakills',
'pentakills',
'firstblood',
'firstbloodkill',
'firstbloodassist',
'firstbloodvictim',
'team kpm',
'ckpm',
'firstdragon',
'dragons',
'opp_dragons',
'elementaldrakes',
'opp_elementaldrakes',
'infernals',
'mountains',
'clouds',
'oceans',
'chemtechs',
'hextechs',
'dragons (type unknown)',
'elders',
'opp_elders',
'firstherald',
'heralds',
'opp_heralds',
'void_grubs',
'opp_void_grubs',
'firstbaron',
'barons',
'opp_barons',
'firsttower',
'towers',
'opp_towers',
'firstmidtower',
'firsttothreetowers',
'turretplates',
'opp_turretplates',
'inhibitors',
'opp_inhibitors',

'damagetochampions',
'dpm',
'damageshare',
'damagetakenperminute',
'damagemitigatedperminute',
'wardsplaced',
'wpm',
'wardskilled',
'wcpm',
'controlwardsbought',
'visionscore',
'vspm',
'totalgold',
'earnedgold',
'earned gpm',
'earnedgoldshare',
'goldspent',
'gspd',
'gpr',
'total cs',
'minionkills',
'monsterkills',
'monsterkillsownjungle',
'monsterkillsenemyjungle',
'cspm',
'goldat10',
'xpat10',
'csat10',
'opp_goldat10',
'opp_xpat10',
'opp_csat10',
'golddiffat10',
'xpdiffat10',
'csdiffat10',
'killsat10',
'assistsat10',
'deathsat10',
'opp_killsat10',
'opp_assistsat10',
'opp_deathsat10',
'goldat15',
'xpat15',
'csat15',
'opp_goldat15',
'opp_xpat15',
'opp_csat15',
'golddiffat15',

```

'xpdiffat15',
'csdiffat15',
'killsat15',
'assistsat15',
'deathsat15',
'opp_killsat15',
'opp_assistsat15',
'opp_deathsat15',
'goldat20',
'xpat20',
'csat20',
'opp_goldat20',
'opp_xpat20',
'opp_csat20',
'golddiffat20',
'xpdiffat20',
'csdiffat20',
'killsat20',
'assistsat20',
'deathsat20',
'opp_killsat20',
'opp_assistsat20',
'opp_deathsat20',
'goldat25',
'xpat25',
'csat25',
'opp_goldat25',
'opp_xpat25',
'opp_csat25',
'golddiffat25',
'xpdiffat25',
'csdiffat25',
'killsat25',
'assistsat25',
'deathsat25',
'opp_killsat25',
'opp_assistsat25',
'opp_deathsat25']

```

```

[6]: # notice there is a column name datacompleteness. lets only keep rows that have
      ↪ this column set to complete
      complete_data = all_data[all_data['datacompleteness'] == 'complete']
      complete_data.info()

```

```

<class 'pandas.core.frame.DataFrame'>
Index: 97596 entries, 180 to 114287
Columns: 161 entries, gameid to opp_deathsat25
dtypes: float64(118), int64(20), object(23)

```

memory usage: 120.6+ MB

```
[7]: # drop datacompleteness and url columns as they are unnecessary
cleaned_data = complete_data.drop(['datacompleteness', 'url'], axis=1)
cleaned_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 97596 entries, 180 to 114287
Columns: 159 entries, gameid to opp_deathsat25
dtypes: float64(118), int64(20), object(21)
memory usage: 119.1+ MB
```

```
[8]: cleaned_data.head()
```

```
[8]:
```

	gameid	league	year	split	playoffs	date	\
180	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
181	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
182	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
183	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
184	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	

	game	patch	participantid	side	...	opp_csat25	golddiffat25	xpdiffat25	\
180	1	14.01	1	Blue	...	207.0	1928.0	1127.0	
181	1	14.01	2	Blue	...	154.0	2943.0	1955.0	
182	1	14.01	3	Blue	...	190.0	660.0	2223.0	
183	1	14.01	4	Blue	...	170.0	5016.0	2473.0	
184	1	14.01	5	Blue	...	31.0	2194.0	3049.0	

	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	opp_assistsat25	\
180	3.0	4.0	4.0	1.0	1.0	1.0	
181	0.0	5.0	11.0	1.0	2.0	3.0	
182	18.0	1.0	8.0	3.0	1.0	4.0	
183	64.0	8.0	7.0	1.0	1.0	4.0	
184	-6.0	2.0	17.0	1.0	2.0	2.0	

	opp_deathsat25
180	3.0
181	2.0
182	3.0
183	5.0
184	7.0

[5 rows x 159 columns]

```
[9]: # reset the indices for the rows
cleaned_data.reset_index(drop=True, inplace=True)
cleaned_data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```



```
RangeIndex: 97596 entries, 0 to 97595
Columns: 159 entries, gameid to opp_deathsat25
dtypes: float64(118), int64(20), object(21)
memory usage: 118.4+ MB
```

```
[10]: cleaned_data.columns
```

```
[10]: Index(['gameid', 'league', 'year', 'split', 'playoffs', 'date', 'game',
        'patch', 'participantid', 'side',
        ...,
        'opp_csat25', 'golddiffat25', 'xpdiffat25', 'csdiffat25', 'killsat25',
        'assistsat25', 'deathsat25', 'opp_killsat25', 'opp_assistsat25',
        'opp_deathsat25'],
        dtype='object', length=159)
```

```
[11]: for col in cleaned_data.columns:
        print(col)
```

```
gameid
league
year
split
playoffs
date
game
patch
participantid
side
position
playername
playerid
teamname
teamid
champion
ban1
ban2
ban3
ban4
ban5
pick1
pick2
pick3
pick4
pick5
gamelength
result
kills
deaths
```

assists
teamkills
teamdeaths
doublekills
triplekills
quadrakills
pentakills
firstblood
firstbloodkill
firstbloodassist
firstbloodvictim
team kpm
ckpm
firstdragon
dragons
opp_dragons
elementaldrakes
opp_elementaldrakes
infernals
mountains
clouds
oceans
chemtechs
hextechs
dragons (type unknown)
elders
opp_elders
firstherald
heralds
opp_heralds
void_grubs
opp_void_grubs
firstbaron
barons
opp_barons
firsttower
towers
opp_towers
firstmidtower
firsttothreetowers
turretplates
opp_turretplates
inhibitors
opp_inhibitors
damagetochampions
dpm
damageshare
damagetakenperminute

damagemitigatedperminute
wardsplaced
wpm
wardskilled
wcpm
controlwardsbought
visionscore
vspm
totalgold
earnedgold
earned gpm
earnedgoldshare
goldspent
gspd
gpr
total cs
minionkills
monsterkills
monsterkillsownjungle
monsterkillsenemyjungle
cspm
goldat10
xpat10
csat10
opp_goldat10
opp_xpat10
opp_csat10
golddiffat10
xpdiffat10
csdiffat10
killsat10
assistsat10
deathsat10
opp_killsat10
opp_assistsat10
opp_deathsat10
goldat15
xpat15
csat15
opp_goldat15
opp_xpat15
opp_csat15
golddiffat15
xpdiffat15
csdiffat15
killsat15
assistsat15
deathsat15

```

opp_killsat15
opp_assistsat15
opp_deathsat15
goldat20
xpat20
csat20
opp_goldat20
opp_xpat20
opp_csat20
golddiffat20
xpdiffat20
csdiffat20
killsat20
assistsat20
deathsat20
opp_killsat20
opp_assistsat20
opp_deathsat20
goldat25
xpat25
csat25
opp_goldat25
opp_xpat25
opp_csat25
golddiffat25
xpdiffat25
csdiffat25
killsat25
assistsat25
deathsat25
opp_killsat25
opp_assistsat25
opp_deathsat25

```

```
[12]: cleaned_data.head()
```

```

[12]:
   gameid league year split playoffs date game \
0  LOLTMNT99_132542  TSC  2024  Winter      0  2024-01-05 14:08:39  1
1  LOLTMNT99_132542  TSC  2024  Winter      0  2024-01-05 14:08:39  1
2  LOLTMNT99_132542  TSC  2024  Winter      0  2024-01-05 14:08:39  1
3  LOLTMNT99_132542  TSC  2024  Winter      0  2024-01-05 14:08:39  1
4  LOLTMNT99_132542  TSC  2024  Winter      0  2024-01-05 14:08:39  1

   patch participantid side ... opp_csat25 golddiffat25 xpdiffat25 \
0  14.01              1  Blue ...      207.0      1928.0      1127.0
1  14.01              2  Blue ...      154.0      2943.0      1955.0
2  14.01              3  Blue ...      190.0      660.0      2223.0

```

3	14.01	4	Blue	...	170.0	5016.0	2473.0
4	14.01	5	Blue	...	31.0	2194.0	3049.0

	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	opp_assistsat25	\
0	3.0	4.0	4.0	1.0	1.0	1.0	
1	0.0	5.0	11.0	1.0	2.0	3.0	
2	18.0	1.0	8.0	3.0	1.0	4.0	
3	64.0	8.0	7.0	1.0	1.0	4.0	
4	-6.0	2.0	17.0	1.0	2.0	2.0	

	opp_deathsat25
0	3.0
1	2.0
2	3.0
3	5.0
4	7.0

[5 rows x 159 columns]

```
[13]: # looking for a specific team Top Esports
search_for_TES = cleaned_data[cleaned_data['teamname'].str.contains('top',
↪case=False)]
search_for_TES.head()
```

	gameid	league	year	split	playoffs	date	\
61085	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48	
61086	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48	
61087	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48	
61088	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48	
61089	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48	

	game	patch	participantid	side	...	opp_csat25	golddiffat25	\
61085	1	14.13	6	Red	...	176.0	735.0	
61086	1	14.13	7	Red	...	205.0	-2837.0	
61087	1	14.13	8	Red	...	260.0	-655.0	
61088	1	14.13	9	Red	...	241.0	-894.0	
61089	1	14.13	10	Red	...	29.0	212.0	

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	\
61085	-262.0	32.0	2.0	1.0	1.0	0.0	
61086	-2583.0	-72.0	0.0	2.0	1.0	3.0	
61087	-923.0	-11.0	1.0	0.0	0.0	0.0	
61088	-1295.0	8.0	1.0	0.0	1.0	2.0	
61089	979.0	-1.0	1.0	2.0	2.0	0.0	

	opp_assistsat25	opp_deathsat25
61085	2.0	1.0

61086	2.0	1.0
61087	2.0	0.0
61088	2.0	0.0
61089	1.0	3.0

[5 rows x 159 columns]

```
[14]: # the team exists, lets store their ID
TES_ID = search_for_TES['teamid'].iloc[0]
TES_ID
```

```
[14]: 'oe:team:fcec508e780bbd1ad493852640f5b36'
```

```
[15]: # find all game data related to Top Esports
TES_game_data = cleaned_data[cleaned_data['teamid'] == TES_ID]
TES_game_data
```

```
[15]:
```

	gameid	league	year	split	playoffs	date \
61085	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48
61086	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48
61087	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48
61088	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48
61089	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48
...
94417	LOLTMNT05_88932	WLDs	2024	NaN	0	2024-10-19 14:02:39
94418	LOLTMNT05_88932	WLDs	2024	NaN	0	2024-10-19 14:02:39
94419	LOLTMNT05_88932	WLDs	2024	NaN	0	2024-10-19 14:02:39
94420	LOLTMNT05_88932	WLDs	2024	NaN	0	2024-10-19 14:02:39
94426	LOLTMNT05_88932	WLDs	2024	NaN	0	2024-10-19 14:02:39

	game	patch	participantid	side	...	opp_csat25	golddiffat25 \
61085	1	14.13	6	Red	...	176.0	735.0
61086	1	14.13	7	Red	...	205.0	-2837.0
61087	1	14.13	8	Red	...	260.0	-655.0
61088	1	14.13	9	Red	...	241.0	-894.0
61089	1	14.13	10	Red	...	29.0	212.0
...
94417	3	14.18	2	Blue	...	137.0	264.0
94418	3	14.18	3	Blue	...	198.0	-938.0
94419	3	14.18	4	Blue	...	283.0	-1422.0
94420	3	14.18	5	Blue	...	26.0	-1461.0
94426	3	14.18	100	Blue	...	853.0	-4617.0

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25 \
61085	-262.0	32.0	2.0	1.0	1.0	0.0
61086	-2583.0	-72.0	0.0	2.0	1.0	3.0
61087	-923.0	-11.0	1.0	0.0	0.0	0.0

61088	-1295.0	8.0	1.0	0.0	1.0	2.0
61089	979.0	-1.0	1.0	2.0	2.0	0.0
...
94417	58.0	14.0	2.0	1.0	0.0	1.0
94418	1195.0	5.0	0.0	4.0	3.0	2.0
94419	-1784.0	-37.0	3.0	1.0	2.0	3.0
94420	-828.0	9.0	0.0	5.0	2.0	3.0
94426	-2647.0	-27.0	5.0	13.0	9.0	9.0

	opp_assistsat25	opp_deathsat25
61085	2.0	1.0
61086	2.0	1.0
61087	2.0	0.0
61088	2.0	0.0
61089	1.0	3.0
...
94417	3.0	2.0
94418	5.0	1.0
94419	2.0	0.0
94420	4.0	1.0
94426	20.0	5.0

[96 rows x 159 columns]

```
[16]: # remove unnecessary null data
TES_data_cleaned = TES_game_data.dropna(axis=1)
TES_data_cleaned
```

```
[16]:
```

	gameid	league	year	playoffs		date	game	\
61085	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61086	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61087	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61088	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61089	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
...
94417	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3	
94418	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3	
94419	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3	
94420	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3	
94426	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3	

	patch	participantid	side	position	...	opp_csat20	golddiffat20	\
61085	14.13	6	Red	top	...	162.0	732.0	
61086	14.13	7	Red	jng	...	181.0	-2009.0	
61087	14.13	8	Red	mid	...	210.0	374.0	
61088	14.13	9	Red	bot	...	193.0	-233.0	
61089	14.13	10	Red	sup	...	28.0	500.0	

...	
94417	14.18		2	Blue	jng	...	120.0	370.0
94418	14.18		3	Blue	mid	...	174.0	-1069.0
94419	14.18		4	Blue	bot	...	222.0	-1587.0
94420	14.18		5	Blue	sup	...	21.0	-1045.0
94426	14.18		100	Blue	team	...	703.0	-4024.0

	xpdiffat20	csdiffat20	killsat20	assistsat20	deathsat20	opp_killsat20	\
61085	3.0	19.0	1.0	1.0	1.0	0.0	
61086	-2254.0	-72.0	0.0	1.0	0.0	2.0	
61087	-238.0	-7.0	0.0	0.0	0.0	0.0	
61088	-535.0	5.0	1.0	0.0	1.0	1.0	
61089	1213.0	-3.0	1.0	1.0	1.0	0.0	

...
94417	-324.0	3.0	2.0	0.0	0.0	1.0	
94418	876.0	0.0	0.0	2.0	2.0	2.0	
94419	-1246.0	-28.0	0.0	1.0	1.0	1.0	
94420	-396.0	9.0	0.0	2.0	1.0	1.0	
94426	-1249.0	-23.0	2.0	6.0	5.0	5.0	

	opp_assistsat20	opp_deathsat20
61085	1.0	1.0
61086	1.0	0.0
61087	0.0	0.0
61088	1.0	0.0
61089	0.0	2.0

...
94417	1.0	1.0
94418	1.0	0.0
94419	0.0	0.0
94420	2.0	0.0
94426	7.0	2.0

[96 rows x 98 columns]

```
[17]: # see all of the rows
pd.set_option('display.max_rows', None)
TES_data_cleaned
```

```
[17]:
```

	gameid	league	year	playoffs		date	game	\
61085	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61086	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61087	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61088	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61089	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61091	LOLTMNT03_108519	EWC	2024	1	2024-07-05	15:06:48	1	
61097	LOLTMNT03_108547	EWC	2024	1	2024-07-05	16:02:32	2	

61098	LOLTMNT03_108547	EWC	2024	1	2024-07-05	16:02:32	2
61099	LOLTMNT03_108547	EWC	2024	1	2024-07-05	16:02:32	2
61100	LOLTMNT03_108547	EWC	2024	1	2024-07-05	16:02:32	2
61101	LOLTMNT03_108547	EWC	2024	1	2024-07-05	16:02:32	2
61103	LOLTMNT03_108547	EWC	2024	1	2024-07-05	16:02:32	2
61656	LOLTMNT03_110117	EWC	2024	1	2024-07-06	18:28:27	1
61657	LOLTMNT03_110117	EWC	2024	1	2024-07-06	18:28:27	1
61658	LOLTMNT03_110117	EWC	2024	1	2024-07-06	18:28:27	1
61659	LOLTMNT03_110117	EWC	2024	1	2024-07-06	18:28:27	1
61660	LOLTMNT03_110117	EWC	2024	1	2024-07-06	18:28:27	1
61666	LOLTMNT03_110117	EWC	2024	1	2024-07-06	18:28:27	1
61685	LOLTMNT03_111008	EWC	2024	1	2024-07-06	19:21:49	2
61686	LOLTMNT03_111008	EWC	2024	1	2024-07-06	19:21:49	2
61687	LOLTMNT03_111008	EWC	2024	1	2024-07-06	19:21:49	2
61688	LOLTMNT03_111008	EWC	2024	1	2024-07-06	19:21:49	2
61689	LOLTMNT03_111008	EWC	2024	1	2024-07-06	19:21:49	2
61691	LOLTMNT03_111008	EWC	2024	1	2024-07-06	19:21:49	2
61956	LOLTMNT03_111456	EWC	2024	1	2024-07-07	16:08:24	1
61957	LOLTMNT03_111456	EWC	2024	1	2024-07-07	16:08:24	1
61958	LOLTMNT03_111456	EWC	2024	1	2024-07-07	16:08:24	1
61959	LOLTMNT03_111456	EWC	2024	1	2024-07-07	16:08:24	1
61960	LOLTMNT03_111456	EWC	2024	1	2024-07-07	16:08:24	1
61966	LOLTMNT03_111456	EWC	2024	1	2024-07-07	16:08:24	1
61973	LOLTMNT03_111473	EWC	2024	1	2024-07-07	16:55:35	2
61974	LOLTMNT03_111473	EWC	2024	1	2024-07-07	16:55:35	2
61975	LOLTMNT03_111473	EWC	2024	1	2024-07-07	16:55:35	2
61976	LOLTMNT03_111473	EWC	2024	1	2024-07-07	16:55:35	2
61977	LOLTMNT03_111473	EWC	2024	1	2024-07-07	16:55:35	2
61979	LOLTMNT03_111473	EWC	2024	1	2024-07-07	16:55:35	2
61980	LOLTMNT03_111502	EWC	2024	1	2024-07-07	18:16:30	3
61981	LOLTMNT03_111502	EWC	2024	1	2024-07-07	18:16:30	3
61982	LOLTMNT03_111502	EWC	2024	1	2024-07-07	18:16:30	3
61983	LOLTMNT03_111502	EWC	2024	1	2024-07-07	18:16:30	3
61984	LOLTMNT03_111502	EWC	2024	1	2024-07-07	18:16:30	3
61990	LOLTMNT03_111502	EWC	2024	1	2024-07-07	18:16:30	3
61992	LOLTMNT03_112180	EWC	2024	1	2024-07-07	19:38:09	4
61993	LOLTMNT03_112180	EWC	2024	1	2024-07-07	19:38:09	4
61994	LOLTMNT03_112180	EWC	2024	1	2024-07-07	19:38:09	4
61995	LOLTMNT03_112180	EWC	2024	1	2024-07-07	19:38:09	4
61996	LOLTMNT03_112180	EWC	2024	1	2024-07-07	19:38:09	4
62002	LOLTMNT03_112180	EWC	2024	1	2024-07-07	19:38:09	4
89628	LOLTMNT05_87211	WLDs	2024	0	2024-10-03	13:31:54	1
89629	LOLTMNT05_87211	WLDs	2024	0	2024-10-03	13:31:54	1
89630	LOLTMNT05_87211	WLDs	2024	0	2024-10-03	13:31:54	1
89631	LOLTMNT05_87211	WLDs	2024	0	2024-10-03	13:31:54	1
89632	LOLTMNT05_87211	WLDs	2024	0	2024-10-03	13:31:54	1
89638	LOLTMNT05_87211	WLDs	2024	0	2024-10-03	13:31:54	1

89729	LOLTMNT05_88031	WLDs	2024	0	2024-10-04	13:05:50	1
89730	LOLTMNT05_88031	WLDs	2024	0	2024-10-04	13:05:50	1
89731	LOLTMNT05_88031	WLDs	2024	0	2024-10-04	13:05:50	1
89732	LOLTMNT05_88031	WLDs	2024	0	2024-10-04	13:05:50	1
89733	LOLTMNT05_88031	WLDs	2024	0	2024-10-04	13:05:50	1
89735	LOLTMNT05_88031	WLDs	2024	0	2024-10-04	13:05:50	1
89976	LOLTMNT05_88332	WLDs	2024	0	2024-10-06	12:10:39	1
89977	LOLTMNT05_88332	WLDs	2024	0	2024-10-06	12:10:39	1
89978	LOLTMNT05_88332	WLDs	2024	0	2024-10-06	12:10:39	1
89979	LOLTMNT05_88332	WLDs	2024	0	2024-10-06	12:10:39	1
89980	LOLTMNT05_88332	WLDs	2024	0	2024-10-06	12:10:39	1
89986	LOLTMNT05_88332	WLDs	2024	0	2024-10-06	12:10:39	1
92292	LOLTMNT05_89529	WLDs	2024	0	2024-10-10	12:13:23	1
92293	LOLTMNT05_89529	WLDs	2024	0	2024-10-10	12:13:23	1
92294	LOLTMNT05_89529	WLDs	2024	0	2024-10-10	12:13:23	1
92295	LOLTMNT05_89529	WLDs	2024	0	2024-10-10	12:13:23	1
92296	LOLTMNT05_89529	WLDs	2024	0	2024-10-10	12:13:23	1
92302	LOLTMNT05_89529	WLDs	2024	0	2024-10-10	12:13:23	1
92309	LOLTMNT05_88568	WLDs	2024	0	2024-10-10	13:10:29	2
92310	LOLTMNT05_88568	WLDs	2024	0	2024-10-10	13:10:29	2
92311	LOLTMNT05_88568	WLDs	2024	0	2024-10-10	13:10:29	2
92312	LOLTMNT05_88568	WLDs	2024	0	2024-10-10	13:10:29	2
92313	LOLTMNT05_88568	WLDs	2024	0	2024-10-10	13:10:29	2
92315	LOLTMNT05_88568	WLDs	2024	0	2024-10-10	13:10:29	2
94392	LOLTMNT05_89869	WLDs	2024	0	2024-10-19	12:15:26	1
94393	LOLTMNT05_89869	WLDs	2024	0	2024-10-19	12:15:26	1
94394	LOLTMNT05_89869	WLDs	2024	0	2024-10-19	12:15:26	1
94395	LOLTMNT05_89869	WLDs	2024	0	2024-10-19	12:15:26	1
94396	LOLTMNT05_89869	WLDs	2024	0	2024-10-19	12:15:26	1
94402	LOLTMNT05_89869	WLDs	2024	0	2024-10-19	12:15:26	1
94404	LOLTMNT05_89870	WLDs	2024	0	2024-10-19	13:08:41	2
94405	LOLTMNT05_89870	WLDs	2024	0	2024-10-19	13:08:41	2
94406	LOLTMNT05_89870	WLDs	2024	0	2024-10-19	13:08:41	2
94407	LOLTMNT05_89870	WLDs	2024	0	2024-10-19	13:08:41	2
94408	LOLTMNT05_89870	WLDs	2024	0	2024-10-19	13:08:41	2
94414	LOLTMNT05_89870	WLDs	2024	0	2024-10-19	13:08:41	2
94416	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3
94417	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3
94418	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3
94419	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3
94420	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3
94426	LOLTMNT05_88932	WLDs	2024	0	2024-10-19	14:02:39	3

	patch	participantid	side	position	...	opp_csat20	golddiffat20	\
61085	14.13	6	Red	top	...	162.0	732.0	
61086	14.13	7	Red	jng	...	181.0	-2009.0	
61087	14.13	8	Red	mid	...	210.0	374.0	

61088	14.13	9	Red	bot	...	193.0	-233.0
61089	14.13	10	Red	sup	...	28.0	500.0
61091	14.13	200	Red	team	...	774.0	-636.0
61097	14.13	6	Red	top	...	172.0	845.0
61098	14.13	7	Red	jng	...	134.0	1564.0
61099	14.13	8	Red	mid	...	213.0	2389.0
61100	14.13	9	Red	bot	...	189.0	-68.0
61101	14.13	10	Red	sup	...	29.0	826.0
61103	14.13	200	Red	team	...	737.0	5556.0
61656	14.13	1	Blue	top	...	152.0	478.0
61657	14.13	2	Blue	jng	...	122.0	1496.0
61658	14.13	3	Blue	mid	...	200.0	1093.0
61659	14.13	4	Blue	bot	...	188.0	309.0
61660	14.13	5	Blue	sup	...	14.0	-3.0
61666	14.13	100	Blue	team	...	676.0	3373.0
61685	14.13	6	Red	top	...	150.0	-818.0
61686	14.13	7	Red	jng	...	130.0	-472.0
61687	14.13	8	Red	mid	...	176.0	1662.0
61688	14.13	9	Red	bot	...	194.0	1962.0
61689	14.13	10	Red	sup	...	16.0	468.0
61691	14.13	200	Red	team	...	666.0	2802.0
61956	14.13	1	Blue	top	...	156.0	1174.0
61957	14.13	2	Blue	jng	...	161.0	352.0
61958	14.13	3	Blue	mid	...	189.0	3673.0
61959	14.13	4	Blue	bot	...	196.0	-491.0
61960	14.13	5	Blue	sup	...	25.0	-214.0
61966	14.13	100	Blue	team	...	727.0	4494.0
61973	14.13	6	Red	top	...	145.0	-1580.0
61974	14.13	7	Red	jng	...	157.0	-1688.0
61975	14.13	8	Red	mid	...	200.0	-891.0
61976	14.13	9	Red	bot	...	215.0	-1940.0
61977	14.13	10	Red	sup	...	22.0	-965.0
61979	14.13	200	Red	team	...	739.0	-7064.0
61980	14.13	1	Blue	top	...	160.0	1738.0
61981	14.13	2	Blue	jng	...	172.0	-2531.0
61982	14.13	3	Blue	mid	...	203.0	-755.0
61983	14.13	4	Blue	bot	...	190.0	-216.0
61984	14.13	5	Blue	sup	...	33.0	-356.0
61990	14.13	100	Blue	team	...	758.0	-2120.0
61992	14.13	1	Blue	top	...	173.0	-1338.0
61993	14.13	2	Blue	jng	...	164.0	-1292.0
61994	14.13	3	Blue	mid	...	192.0	267.0
61995	14.13	4	Blue	bot	...	191.0	319.0
61996	14.13	5	Blue	sup	...	26.0	-410.0
62002	14.13	100	Blue	team	...	746.0	-2454.0
89628	14.18	1	Blue	top	...	137.0	-1592.0
89629	14.18	2	Blue	jng	...	145.0	-536.0

89630	14.18	3	Blue	mid	...	157.0	-199.0
89631	14.18	4	Blue	bot	...	180.0	194.0
89632	14.18	5	Blue	sup	...	26.0	141.0
89638	14.18	100	Blue	team	...	645.0	-1992.0
89729	14.18	6	Red	top	...	157.0	2470.0
89730	14.18	7	Red	jng	...	134.0	205.0
89731	14.18	8	Red	mid	...	176.0	-174.0
89732	14.18	9	Red	bot	...	188.0	-1927.0
89733	14.18	10	Red	sup	...	13.0	-475.0
89735	14.18	200	Red	team	...	668.0	99.0
89976	14.18	1	Blue	top	...	149.0	-739.0
89977	14.18	2	Blue	jng	...	135.0	-97.0
89978	14.18	3	Blue	mid	...	190.0	1813.0
89979	14.18	4	Blue	bot	...	191.0	1873.0
89980	14.18	5	Blue	sup	...	27.0	897.0
89986	14.18	100	Blue	team	...	692.0	3747.0
92292	14.18	1	Blue	top	...	126.0	574.0
92293	14.18	2	Blue	jng	...	135.0	986.0
92294	14.18	3	Blue	mid	...	201.0	627.0
92295	14.18	4	Blue	bot	...	213.0	1832.0
92296	14.18	5	Blue	sup	...	22.0	957.0
92302	14.18	100	Blue	team	...	697.0	4976.0
92309	14.18	6	Red	top	...	171.0	1407.0
92310	14.18	7	Red	jng	...	120.0	1017.0
92311	14.18	8	Red	mid	...	163.0	122.0
92312	14.18	9	Red	bot	...	194.0	-1103.0
92313	14.18	10	Red	sup	...	27.0	657.0
92315	14.18	200	Red	team	...	675.0	2100.0
94392	14.18	1	Blue	top	...	180.0	262.0
94393	14.18	2	Blue	jng	...	136.0	-221.0
94394	14.18	3	Blue	mid	...	172.0	354.0
94395	14.18	4	Blue	bot	...	206.0	-73.0
94396	14.18	5	Blue	sup	...	45.0	-656.0
94402	14.18	100	Blue	team	...	739.0	-334.0
94404	14.18	1	Blue	top	...	178.0	-617.0
94405	14.18	2	Blue	jng	...	143.0	-301.0
94406	14.18	3	Blue	mid	...	165.0	-651.0
94407	14.18	4	Blue	bot	...	218.0	-171.0
94408	14.18	5	Blue	sup	...	31.0	-186.0
94414	14.18	100	Blue	team	...	735.0	-1926.0
94416	14.18	1	Blue	top	...	166.0	-693.0
94417	14.18	2	Blue	jng	...	120.0	370.0
94418	14.18	3	Blue	mid	...	174.0	-1069.0
94419	14.18	4	Blue	bot	...	222.0	-1587.0
94420	14.18	5	Blue	sup	...	21.0	-1045.0
94426	14.18	100	Blue	team	...	703.0	-4024.0

	xpdiffat20	csdiffat20	killsat20	assistsat20	deathsat20	opp_killsat20	\
61085	3.0	19.0	1.0	1.0	1.0	0.0	
61086	-2254.0	-72.0	0.0	1.0	0.0	2.0	
61087	-238.0	-7.0	0.0	0.0	0.0	0.0	
61088	-535.0	5.0	1.0	0.0	1.0	1.0	
61089	1213.0	-3.0	1.0	1.0	1.0	0.0	
61091	-1811.0	-58.0	3.0	3.0	3.0	3.0	
61097	983.0	9.0	3.0	0.0	0.0	0.0	
61098	295.0	5.0	3.0	6.0	0.0	1.0	
61099	-404.0	-3.0	4.0	4.0	1.0	0.0	
61100	262.0	0.0	2.0	6.0	2.0	2.0	
61101	751.0	2.0	0.0	9.0	0.0	0.0	
61103	1887.0	13.0	12.0	25.0	3.0	3.0	
61656	971.0	33.0	0.0	1.0	2.0	0.0	
61657	1858.0	43.0	3.0	1.0	0.0	0.0	
61658	776.0	25.0	1.0	0.0	1.0	3.0	
61659	378.0	17.0	1.0	2.0	0.0	2.0	
61660	-838.0	16.0	0.0	4.0	2.0	0.0	
61666	3145.0	134.0	5.0	8.0	5.0	5.0	
61685	426.0	-5.0	1.0	2.0	2.0	3.0	
61686	-183.0	-7.0	1.0	7.0	1.0	2.0	
61687	1420.0	26.0	3.0	4.0	0.0	0.0	
61688	1669.0	16.0	6.0	5.0	1.0	1.0	
61689	1212.0	12.0	1.0	5.0	2.0	0.0	
61691	4544.0	42.0	12.0	23.0	6.0	6.0	
61956	1242.0	26.0	2.0	1.0	2.0	1.0	
61957	-169.0	-42.0	2.0	5.0	1.0	0.0	
61958	626.0	32.0	3.0	1.0	0.0	1.0	
61959	-747.0	-5.0	3.0	1.0	1.0	2.0	
61960	52.0	9.0	0.0	4.0	0.0	0.0	
61966	1004.0	20.0	10.0	12.0	4.0	4.0	
61973	166.0	19.0	1.0	1.0	1.0	3.0	
61974	-2510.0	-40.0	1.0	0.0	3.0	2.0	
61975	-229.0	-8.0	0.0	1.0	1.0	2.0	
61976	-986.0	-18.0	2.0	0.0	2.0	3.0	
61977	-655.0	10.0	0.0	1.0	3.0	0.0	
61979	-4214.0	-37.0	4.0	3.0	10.0	10.0	
61980	450.0	25.0	0.0	0.0	1.0	0.0	
61981	-1593.0	-30.0	0.0	1.0	1.0	5.0	
61982	-645.0	1.0	0.0	1.0	2.0	1.0	
61983	-1355.0	-25.0	1.0	0.0	2.0	1.0	
61984	174.0	7.0	0.0	1.0	1.0	0.0	
61990	-2969.0	-22.0	1.0	3.0	7.0	7.0	
61992	-53.0	-20.0	1.0	2.0	2.0	0.0	
61993	-1691.0	-62.0	0.0	4.0	3.0	2.0	
61994	118.0	-1.0	1.0	1.0	1.0	2.0	
61995	204.0	7.0	4.0	0.0	0.0	2.0	

61996	798.0	15.0	0.0	5.0	1.0	1.0
62002	-624.0	-61.0	6.0	12.0	7.0	7.0
89628	363.0	23.0	0.0	0.0	2.0	3.0
89629	-662.0	-16.0	1.0	5.0	1.0	1.0
89630	851.0	-7.0	0.0	4.0	1.0	0.0
89631	3.0	7.0	4.0	1.0	2.0	3.0
89632	316.0	5.0	1.0	5.0	1.0	0.0
89638	871.0	12.0	6.0	15.0	7.0	7.0
89729	1099.0	11.0	6.0	3.0	1.0	0.0
89730	-475.0	-6.0	2.0	6.0	2.0	0.0
89731	682.0	18.0	2.0	4.0	1.0	4.0
89732	-607.0	-10.0	1.0	5.0	2.0	5.0
89733	310.0	18.0	0.0	5.0	3.0	0.0
89735	1009.0	31.0	11.0	23.0	9.0	9.0
89976	-455.0	2.0	0.0	3.0	3.0	2.0
89977	-224.0	-10.0	2.0	5.0	0.0	2.0
89978	720.0	5.0	2.0	3.0	1.0	0.0
89979	-390.0	10.0	3.0	2.0	1.0	1.0
89980	869.0	6.0	0.0	7.0	0.0	0.0
89986	520.0	13.0	7.0	20.0	5.0	5.0
92292	1283.0	12.0	2.0	1.0	0.0	0.0
92293	317.0	8.0	1.0	5.0	1.0	0.0
92294	-176.0	-28.0	1.0	2.0	1.0	0.0
92295	18.0	5.0	4.0	3.0	0.0	2.0
92296	1084.0	2.0	0.0	8.0	1.0	1.0
92302	2526.0	-1.0	8.0	19.0	3.0	3.0
92309	838.0	10.0	1.0	3.0	0.0	0.0
92310	380.0	15.0	3.0	5.0	1.0	1.0
92311	502.0	4.0	3.0	4.0	2.0	3.0
92312	-1741.0	-31.0	2.0	2.0	3.0	3.0
92313	617.0	-7.0	1.0	7.0	1.0	0.0
92315	596.0	-9.0	10.0	21.0	7.0	7.0
94392	244.0	-13.0	1.0	0.0	0.0	0.0
94393	-118.0	-20.0	0.0	1.0	1.0	0.0
94394	-231.0	-7.0	1.0	0.0	0.0	1.0
94395	-392.0	1.0	0.0	0.0	0.0	0.0
94396	-672.0	-11.0	0.0	1.0	0.0	0.0
94402	-1169.0	-50.0	2.0	2.0	1.0	1.0
94404	-751.0	-36.0	0.0	0.0	1.0	0.0
94405	169.0	12.0	0.0	0.0	1.0	1.0
94406	-351.0	7.0	0.0	0.0	0.0	3.0
94407	-623.0	-18.0	0.0	0.0	1.0	0.0
94408	-236.0	1.0	0.0	0.0	1.0	0.0
94414	-1792.0	-34.0	0.0	0.0	4.0	4.0
94416	-159.0	-7.0	0.0	1.0	1.0	0.0
94417	-324.0	3.0	2.0	0.0	0.0	1.0
94418	876.0	0.0	0.0	2.0	2.0	2.0

94419	-1246.0	-28.0	0.0	1.0	1.0	1.0
94420	-396.0	9.0	0.0	2.0	1.0	1.0
94426	-1249.0	-23.0	2.0	6.0	5.0	5.0

	opp_assistsat20	opp_deathsat20
61085	1.0	1.0
61086	1.0	0.0
61087	0.0	0.0
61088	1.0	0.0
61089	0.0	2.0
61091	3.0	3.0
61097	0.0	2.0
61098	1.0	2.0
61099	2.0	2.0
61100	1.0	1.0
61101	1.0	5.0
61103	5.0	12.0
61656	2.0	0.0
61657	1.0	1.0
61658	0.0	1.0
61659	1.0	1.0
61660	4.0	2.0
61666	8.0	5.0
61685	3.0	2.0
61686	4.0	3.0
61687	5.0	1.0
61688	0.0	2.0
61689	5.0	4.0
61691	17.0	12.0
61956	1.0	2.0
61957	2.0	2.0
61958	1.0	3.0
61959	0.0	2.0
61960	2.0	1.0
61966	6.0	10.0
61973	5.0	2.0
61974	6.0	0.0
61975	2.0	1.0
61976	2.0	1.0
61977	5.0	0.0
61979	20.0	4.0
61980	3.0	1.0
61981	1.0	0.0
61982	4.0	0.0
61983	3.0	0.0
61984	6.0	0.0
61990	17.0	1.0

61992	5.0	2.0
61993	4.0	0.0
61994	1.0	1.0
61995	3.0	1.0
61996	4.0	2.0
62002	17.0	6.0
89628	2.0	0.0
89629	4.0	1.0
89630	5.0	2.0
89631	4.0	2.0
89632	6.0	1.0
89638	21.0	6.0
89729	2.0	3.0
89730	5.0	4.0
89731	1.0	1.0
89732	4.0	1.0
89733	8.0	2.0
89735	20.0	11.0
89976	2.0	2.0
89977	2.0	2.0
89978	2.0	2.0
89979	1.0	0.0
89980	2.0	1.0
89986	9.0	7.0
92292	1.0	2.0
92293	2.0	1.0
92294	1.0	1.0
92295	0.0	1.0
92296	2.0	3.0
92302	6.0	8.0
92309	1.0	1.0
92310	4.0	2.0
92311	1.0	2.0
92312	3.0	1.0
92313	4.0	4.0
92315	13.0	10.0
94392	0.0	0.0
94393	1.0	1.0
94394	0.0	1.0
94395	0.0	0.0
94396	1.0	0.0
94402	2.0	2.0
94404	2.0	0.0
94405	2.0	0.0
94406	1.0	0.0
94407	2.0	0.0
94408	3.0	0.0

94414	10.0	0.0
94416	3.0	1.0
94417	1.0	1.0
94418	1.0	0.0
94419	0.0	0.0
94420	2.0	0.0
94426	7.0	2.0

[96 rows x 98 columns]

```
[18]: # reset row view. we can notice that rows with participantid being 100 or 200
      ↪ are full team draft information rows, since there are only 10 participants
      ↪ per game, 100 and 200 don't usually exist. extract these rows to get Top
      ↪ Esports's draft data
pd.set_option('display.max_rows', 10)
TES_draft_data = TES_game_data[TES_game_data['participantid'].isin([100, 200])]
TES_draft_data
```

```
[18]:
```

	gameid	league	year	split	playoffs	date	\
61091	LOLTMNT03_108519	EWC	2024	NaN	1	2024-07-05 15:06:48	
61103	LOLTMNT03_108547	EWC	2024	NaN	1	2024-07-05 16:02:32	
61666	LOLTMNT03_110117	EWC	2024	NaN	1	2024-07-06 18:28:27	
61691	LOLTMNT03_111008	EWC	2024	NaN	1	2024-07-06 19:21:49	
61966	LOLTMNT03_111456	EWC	2024	NaN	1	2024-07-07 16:08:24	
...	
92302	LOLTMNT05_89529	WLDs	2024	NaN	0	2024-10-10 12:13:23	
92315	LOLTMNT05_88568	WLDs	2024	NaN	0	2024-10-10 13:10:29	
94402	LOLTMNT05_89869	WLDs	2024	NaN	0	2024-10-19 12:15:26	
94414	LOLTMNT05_89870	WLDs	2024	NaN	0	2024-10-19 13:08:41	
94426	LOLTMNT05_88932	WLDs	2024	NaN	0	2024-10-19 14:02:39	

	game	patch	participantid	side	...	opp_csat25	golddiffat25	\
61091	1	14.13	200	Red	...	911.0	-3439.0	
61103	2	14.13	200	Red	...	899.0	5219.0	
61666	1	14.13	100	Blue	...	850.0	4828.0	
61691	2	14.13	200	Red	...	795.0	8122.0	
61966	1	14.13	100	Blue	...	NaN	NaN	
...	
92302	1	14.18	100	Blue	...	863.0	7038.0	
92315	2	14.18	200	Red	...	815.0	547.0	
94402	1	14.18	100	Blue	...	926.0	-953.0	
94414	2	14.18	100	Blue	...	923.0	-2105.0	
94426	3	14.18	100	Blue	...	853.0	-4617.0	

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	\
61091	-4084.0	-44.0	5.0	5.0	5.0	5.0	
61103	2917.0	5.0	16.0	33.0	4.0	4.0	

61666	5898.0	147.0	5.0	8.0	7.0	7.0
61691	11202.0	67.0	19.0	38.0	7.0	7.0
61966	NaN	NaN	NaN	NaN	NaN	NaN
...
92302	9334.0	46.0	10.0	23.0	3.0	3.0
92315	-1488.0	-27.0	16.0	44.0	14.0	14.0
94402	-2162.0	-64.0	2.0	2.0	1.0	1.0
94414	-2288.0	-36.0	0.0	0.0	4.0	4.0
94426	-2647.0	-27.0	5.0	13.0	9.0	9.0

	opp_assistsat25	opp_deathsat25
61091	9.0	5.0
61103	6.0	16.0
61666	12.0	5.0
61691	20.0	19.0
61966	NaN	NaN
...
92302	6.0	10.0
92315	29.0	16.0
94402	2.0	2.0
94414	10.0	0.0
94426	20.0	5.0

[16 rows x 159 columns]

```
[19]: # find all of their champion picks
picks = ['pick1', 'pick2', 'pick3', 'pick4', 'pick5']
TES_picks = TES_draft_data[picks].values.flatten()
TES_picks
```

```
[19]: array(['Leona', 'Ezreal', 'Tristana', 'Mordekaiser', 'Ivern', 'Rumble',
        'Corki', 'Sejuani', 'Ashe', 'Braum', 'Tristana', 'Ezreal', 'Leona',
        'Zyra', "K'Sante", 'Yone', 'Kennen', 'Maokai', 'Leona', "Kai'Sa",
        'Tristana', 'Ashe', 'Renekton', 'Braum', 'Ivern', 'Maokai', 'Yone',
        "K'Sante", 'Ezreal', 'Braum', 'Corki', 'Zyra', 'Renekton',
        'Nautilus', 'Draven', 'Corki', 'Ezreal', 'Leona', "K'Sante",
        'Ivern', 'Aurora', 'Jhin', 'Renekton', 'Rell', 'Skarner', 'Rumble',
        'Jhin', 'Lucian', 'Sejuani', 'Rell', 'Yone', 'Rumble', 'Sejuani',
        'Miss Fortune', 'Rell', 'Aurora', "K'Sante", 'Xin Zhao', 'Ashe',
        'Braum', 'Aurora', 'Skarner', "K'Sante", 'Rell', 'Kalista',
        'Rumble', 'Ivern', 'Tristana', 'Leona', 'Miss Fortune', 'Sylas',
        'Ezreal', 'Rell', 'Galio', 'Viego', 'Sylas', 'Xin Zhao', "Kai'Sa",
        'Kennen', 'Leona'], dtype=object)
```

```
[20]: # put into a dataframe
TES_pick_df = pd.DataFrame(TES_picks, columns=['Champion'])
TES_pick_df
```

```
[20]:      Champion
0      Leona
1      Ezreal
2      Tristana
3  Mordekaiser
4      Ivern
..      ...
75     Sylas
76   Xin Zhao
77   Kai'Sa
78   Kennen
79     Leona

[80 rows x 1 columns]
```

```
[21]: # find the frequency of their chosen picks
frequency = TES_pick_df['Champion'].value_counts()
frequency
```

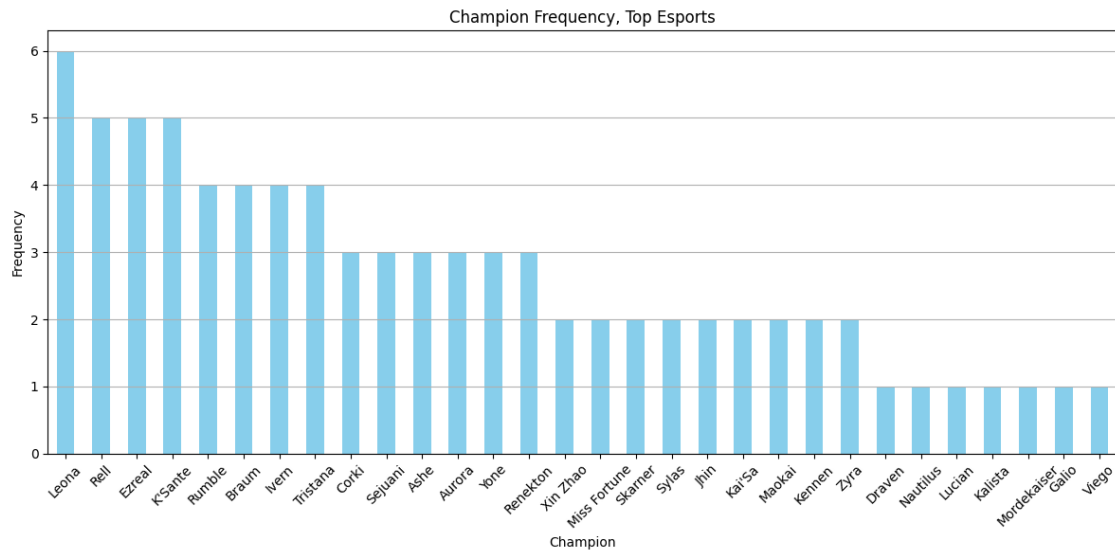
```
[21]: Champion
Leona      6
Rell       5
Ezreal     5
K'Sante    5
Rumble     4
..
Lucian     1
Kalista    1
Mordekaiser 1
Galio      1
Viego      1
Name: count, Length: 30, dtype: int64
```

```
[22]: import matplotlib.pyplot as plt;

# A plot showing the champions drafted by a specific LoL esports team by
# frequency. From this, we can see what the most common champions are for this
# specific team to understand their draft preferences.
plt.figure(figsize=(12, 6))
frequency.plot(kind='bar', color='skyblue')
plt.title('Champion Frequency, Top Esports')
plt.xlabel('Champion')
plt.ylabel('Frequency')
plt.xticks(rotation=45)
plt.grid(axis='y')

plt.tight_layout()
```

```
plt.show()
```



```
[23]: cleaned_data
```

```
[23]:
```

	gameid	league	year	split	playoffs	date	\
0	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
1	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
2	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
3	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
4	LOLTMNT99_132542	TSC	2024	Winter	0	2024-01-05 14:08:39	
...	
97591	LOLTMNT02_181861	HW	2024	NaN	0	2024-11-03 21:08:36	
97592	LOLTMNT02_181861	HW	2024	NaN	0	2024-11-03 21:08:36	
97593	LOLTMNT02_181861	HW	2024	NaN	0	2024-11-03 21:08:36	
97594	LOLTMNT02_181861	HW	2024	NaN	0	2024-11-03 21:08:36	
97595	LOLTMNT02_181861	HW	2024	NaN	0	2024-11-03 21:08:36	

	game	patch	participantid	side	...	opp_csat25	golddiffat25	\
0	1	14.01	1	Blue	...	207.0	1928.0	
1	1	14.01	2	Blue	...	154.0	2943.0	
2	1	14.01	3	Blue	...	190.0	660.0	
3	1	14.01	4	Blue	...	170.0	5016.0	
4	1	14.01	5	Blue	...	31.0	2194.0	
...	
97591	5	14.18	8	Red	...	200.0	716.0	
97592	5	14.18	9	Red	...	264.0	-445.0	
97593	5	14.18	10	Red	...	36.0	151.0	
97594	5	14.18	100	Blue	...	862.0	-2295.0	

97595	5	14.18	200	Red	...	870.0	2295.0
-------	---	-------	-----	-----	-----	-------	--------

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	\
0	1127.0	3.0	4.0	4.0	1.0	1.0	
1	1955.0	0.0	5.0	11.0	1.0	2.0	
2	2223.0	18.0	1.0	8.0	3.0	1.0	
3	2473.0	64.0	8.0	7.0	1.0	1.0	
4	3049.0	-6.0	2.0	17.0	1.0	2.0	
...	
97591	2609.0	14.0	1.0	6.0	0.0	1.0	
97592	1274.0	-28.0	1.0	5.0	0.0	1.0	
97593	1043.0	8.0	1.0	5.0	2.0	0.0	
97594	-7637.0	8.0	4.0	9.0	9.0	9.0	
97595	7637.0	-8.0	9.0	23.0	4.0	4.0	

	opp_assistsat25	opp_deathsat25
0	1.0	3.0
1	3.0	2.0
2	4.0	3.0
3	4.0	5.0
4	2.0	7.0
...
97591	2.0	3.0
97592	2.0	0.0
97593	3.0	1.0
97594	23.0	4.0
97595	9.0	9.0

[97596 rows x 159 columns]

```
[24]: # look at the list of available leagues
leagues_list = set(cleaned_data['league'])
leagues_list
```

```
[24]: {'AL',
      'CBLLOL',
      'CBLLOLA',
      'CDF',
      'CT',
      'EBL',
      'EBLPA',
      'EM',
      'EPL',
      'ESLOL',
      'EWC',
      'GLL',
      'GLLPA',
```

```

'HC',
'HM',
'HW',
'IC',
'LAS',
'LCK',
'LCKC',
'LCO',
'LCS',
'LEC',
'LFL',
'LFL2',
'LIT',
'LJL',
'LLA',
'LPLOL',
'LRN',
'LRS',
'LVP SL',
'NACL',
'NEXO',
'NLC',
'NLC Aurora Open',
'PCS',
'PRM',
'PRMP',
'TCL',
'TSC',
'UL',
'USP',
'VCS',
'WLDs'}

```

```

[25]: # filter by Worlds event, which is WLD's as we can surmise from looking at the ↵
      ↪data
      worlds_data = cleaned_data[cleaned_data['league'] == 'WLDs']
      worlds_data

```

```

[25]:
      gameid league year split playoffs date \
86256 LOLTMNT03_146711 WLDs 2024 NaN 0 2024-09-12 08:07:23
86257 LOLTMNT03_146711 WLDs 2024 NaN 0 2024-09-12 08:07:23
86258 LOLTMNT03_146711 WLDs 2024 NaN 0 2024-09-12 08:07:23
86259 LOLTMNT03_146711 WLDs 2024 NaN 0 2024-09-12 08:07:23
86260 LOLTMNT03_146711 WLDs 2024 NaN 0 2024-09-12 08:07:23
...
97387 LOLTMNT05_90307 WLDs 2024 NaN 0 2024-11-02 17:53:48
97388 LOLTMNT05_90307 WLDs 2024 NaN 0 2024-11-02 17:53:48

```

97389	LOLTMNT05_90307	WLDs	2024	NaN	0	2024-11-02 17:53:48
97390	LOLTMNT05_90307	WLDs	2024	NaN	0	2024-11-02 17:53:48
97391	LOLTMNT05_90307	WLDs	2024	NaN	0	2024-11-02 17:53:48

	game	patch	participantid	side	...	opp_csat25	golddiffat25	\
86256	1	14.16	1	Blue	...	143.0	824.0	
86257	1	14.16	2	Blue	...	146.0	968.0	
86258	1	14.16	3	Blue	...	281.0	-1648.0	
86259	1	14.16	4	Blue	...	247.0	230.0	
86260	1	14.16	5	Blue	...	36.0	191.0	
...	
97387	5	14.18	8	Red	...	259.0	-1408.0	
97388	5	14.18	9	Red	...	250.0	892.0	
97389	5	14.18	10	Red	...	37.0	230.0	
97390	5	14.18	100	Blue	...	967.0	-592.0	
97391	5	14.18	200	Red	...	932.0	592.0	

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	\
86256	-210.0	24.0	3.0	0.0	3.0	1.0	
86257	2146.0	36.0	1.0	3.0	2.0	0.0	
86258	-1133.0	-47.0	1.0	2.0	2.0	5.0	
86259	1166.0	30.0	0.0	0.0	2.0	2.0	
86260	838.0	-5.0	0.0	3.0	0.0	1.0	
...	
97387	564.0	-14.0	1.0	0.0	1.0	3.0	
97388	-49.0	35.0	1.0	1.0	0.0	0.0	
97389	-290.0	-8.0	0.0	2.0	1.0	0.0	
97390	-846.0	-35.0	3.0	7.0	2.0	2.0	
97391	846.0	35.0	2.0	5.0	3.0	3.0	

	opp_assistsat25	opp_deathsat25
86256	4.0	2.0
86257	7.0	0.0
86258	0.0	0.0
86259	5.0	1.0
86260	6.0	2.0
...
97387	0.0	0.0
97388	0.0	0.0
97389	2.0	2.0
97390	5.0	3.0
97391	7.0	2.0

[1428 rows x 159 columns]

```
[26]: # all data related to ADC (Attack Damage Carry) role players at Worlds 2024
worlds_adc_data = worlds_data[worlds_data['position'] == 'bot']
```

```
worlds_adc_data
```

```
[26]:
      gameid league year split playoffs      date \
86259 LOLTMNT03_146711 WLDs 2024 NaN      0 2024-09-12 08:07:23
86264 LOLTMNT03_146711 WLDs 2024 NaN      0 2024-09-12 08:07:23
86271 LOLTMNT03_146712 WLDs 2024 NaN      0 2024-09-12 09:12:13
86276 LOLTMNT03_146712 WLDs 2024 NaN      0 2024-09-12 09:12:13
86283 LOLTMNT03_146714 WLDs 2024 NaN      0 2024-09-12 10:08:20
...
97364 LOLTMNT05_90306 WLDs 2024 NaN      0 2024-11-02 16:14:54
97371 LOLTMNT05_91214 WLDs 2024 NaN      0 2024-11-02 17:01:42
97376 LOLTMNT05_91214 WLDs 2024 NaN      0 2024-11-02 17:01:42
97383 LOLTMNT05_90307 WLDs 2024 NaN      0 2024-11-02 17:53:48
97388 LOLTMNT05_90307 WLDs 2024 NaN      0 2024-11-02 17:53:48

      game patch participantid side ... opp_csat25 golddiffat25 \
86259      1 14.16              4 Blue ...      247.0      230.0
86264      1 14.16              9 Red  ...      277.0     -230.0
86271      2 14.16              4 Blue ...      278.0     -765.0
86276      2 14.16              9 Red  ...      246.0      765.0
86283      3 14.16              4 Blue ...      279.0      406.0
...
97364      3 14.18              9 Red  ...      219.0     -2051.0
97371      4 14.18              4 Blue ...      204.0      1577.0
97376      4 14.18              9 Red  ...      233.0     -1577.0
97383      5 14.18              4 Blue ...      285.0     -892.0
97388      5 14.18              9 Red  ...      250.0      892.0

      xpdiffat25 csdiffat25 killsat25 assistsat25 deathsat25 opp_killsat25 \
86259      1166.0      30.0      0.0      0.0      2.0      2.0
86264     -1166.0     -30.0      2.0      5.0      1.0      0.0
86271     -1538.0     -32.0      0.0      6.0      0.0      1.0
86276      1538.0      32.0      1.0      3.0      0.0      0.0
86283     -421.0       7.0      3.0      1.0      1.0      3.0
...
97364     -481.0      48.0      1.0      0.0      1.0      3.0
97371      125.0      29.0      2.0      4.0      1.0      2.0
97376     -125.0     -29.0      2.0      2.0      3.0      2.0
97383       49.0     -35.0      0.0      0.0      0.0      1.0
97388     -49.0      35.0      1.0      1.0      0.0      0.0

      opp_assistsat25 opp_deathsat25
86259              5.0              1.0
86264              0.0              2.0
86271              3.0              0.0
86276              6.0              0.0
86283              2.0              0.0
```



```

...
97364      3.0      0.0
97371      2.0      3.0
97376      4.0      1.0
97383      1.0      0.0
97388      0.0      0.0

```

[238 rows x 159 columns]

```

[27]: # drop missing data
worlds_adc_data_clean = worlds_adc_data.dropna(axis=1)
worlds_adc_data_clean

```

```

[27]:
      gameid league  year  playoffs      date  game  \
86259  LOLTMNT03_146711  WLDs  2024      0  2024-09-12 08:07:23  1
86264  LOLTMNT03_146711  WLDs  2024      0  2024-09-12 08:07:23  1
86271  LOLTMNT03_146712  WLDs  2024      0  2024-09-12 09:12:13  2
86276  LOLTMNT03_146712  WLDs  2024      0  2024-09-12 09:12:13  2
86283  LOLTMNT03_146714  WLDs  2024      0  2024-09-12 10:08:20  3
...
97364  LOLTMNT05_90306  WLDs  2024      0  2024-11-02 16:14:54  3
97371  LOLTMNT05_91214  WLDs  2024      0  2024-11-02 17:01:42  4
97376  LOLTMNT05_91214  WLDs  2024      0  2024-11-02 17:01:42  4
97383  LOLTMNT05_90307  WLDs  2024      0  2024-11-02 17:53:48  5
97388  LOLTMNT05_90307  WLDs  2024      0  2024-11-02 17:53:48  5

      patch  participantid  side position  ... opp_csat20  golddiffat20  \
86259  14.16      4  Blue      bot  ...      202.0      -417.0
86264  14.16      9  Red      bot  ...      218.0       417.0
86271  14.16      4  Blue      bot  ...      217.0     -505.0
86276  14.16      9  Red      bot  ...      183.0       505.0
86283  14.16      4  Blue      bot  ...      220.0       224.0
...
97364  14.18      9  Red      bot  ...      182.0     -746.0
97371  14.18      4  Blue      bot  ...      179.0        91.0
97376  14.18      9  Red      bot  ...      184.0       -91.0
97383  14.18      4  Blue      bot  ...      215.0    -1019.0
97388  14.18      9  Red      bot  ...      184.0     1019.0

      xpdiffat20  csdiffat20  killsat20  assistsat20  deathsat20  opp_killsat20  \
86259     -174.0      16.0      0.0      0.0      2.0      2.0
86264      174.0     -16.0      2.0      5.0      1.0      0.0
86271    -2333.0     -34.0      0.0      2.0      0.0      0.0
86276     2333.0      34.0      0.0      1.0      0.0      0.0
86283     -565.0      -1.0      1.0      1.0      1.0      1.0
...
97364      833.0      30.0      1.0      0.0      0.0      1.0

```

97371	-1141.0	5.0	1.0	1.0	1.0	2.0
97376	1141.0	-5.0	2.0	1.0	2.0	1.0
97383	434.0	-31.0	0.0	0.0	0.0	1.0
97388	-434.0	31.0	1.0	1.0	0.0	0.0

	opp_assistsat20	opp_deathsat20
86259	5.0	1.0
86264	0.0	2.0
86271	1.0	0.0
86276	2.0	0.0
86283	2.0	0.0
...
97364	2.0	0.0
97371	1.0	2.0
97376	1.0	1.0
97383	1.0	0.0
97388	0.0	0.0

[238 rows x 106 columns]

```
[28]: # calculate KD (kills-to-death ratio) per adc player at worlds
adc_kd = (
    worlds_adc_data_clean
    .groupby('playername')
    .agg(kills=('kills', 'sum'), deaths=('deaths', 'sum'))
    .assign(kd=lambda x: (x['kills'] / x['deaths']).round(2))
    .reset_index()
)

adc_kd
```

```
[28]:
```

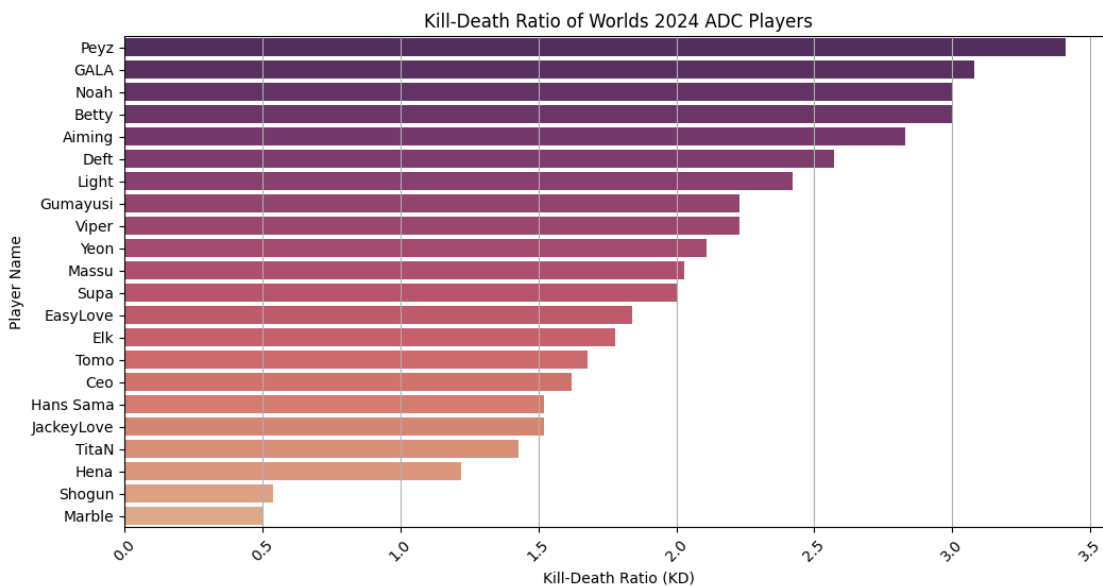
	playername	kills	deaths	kd
0	Aiming	65	23	2.83
1	Betty	60	20	3.00
2	Ceo	39	24	1.62
3	Deft	36	14	2.57
4	EasyLove	46	25	1.84
..
17	Supa	56	28	2.00
18	TitaN	40	28	1.43
19	Tomo	32	19	1.68
20	Viper	67	30	2.23
21	Yeon	38	18	2.11

[22 rows x 4 columns]

```
[29]: import seaborn as sns

adc_kd_sorted = adc_kd.sort_values(by='kd', ascending=False)

# Bar plot showing ADC role players ranked by their kill-death ratios. We can
# use this to estimate who the best performing players are
plt.figure(figsize=(12, 6))
sns.barplot(data=adc_kd_sorted, x='kd', y='playername', palette=sns.
color_palette("flare", n_colors=len(adc_kd_sorted))[:, :-1], hue='playername')
plt.title('Kill-Death Ratio of Worlds 2024 ADC Players')
plt.xlabel('Kill-Death Ratio (KD)')
plt.ylabel('Player Name')
plt.xticks(rotation=45)
plt.grid(axis='x')
plt.show()
```



```
[30]: # Creep Score Per Minute for each ADC at worlds
adc_cs = worlds_adc_data_clean.groupby('playername')['cspm'].mean().
reset_index().round(2)

adc_cs
```

```
[30]:   playername  cspm
0      Aiming  10.18
1       Betty   9.85
2        Ceo   8.53
3       Deft   9.96
```

```

4    EasyLove    9.42
..    ...    ...
17    Supa    9.62
18    TitaN    9.66
19    Tomo    9.31
20    Viper    10.48
21    Yeon    10.00

```

[22 rows x 2 columns]

```

[31]: # merge the kd and cs info per player
adc_kd_cs = pd.merge(adc_kd, adc_cs, on='playername')
adc_kd_cs

```

```

[31]:  playername  kills  deaths    kd  cspm
0      Aiming    65     23  2.83  10.18
1      Betty    60     20  3.00   9.85
2       Ceo    39     24  1.62   8.53
3      Deft    36     14  2.57   9.96
4    EasyLove    46     25  1.84   9.42
..    ...    ...    ...    ...    ...
17     Supa    56     28  2.00   9.62
18    TitaN    40     28  1.43   9.66
19     Tomo    32     19  1.68   9.31
20    Viper    67     30  2.23  10.48
21     Yeon    38     18  2.11  10.00

```

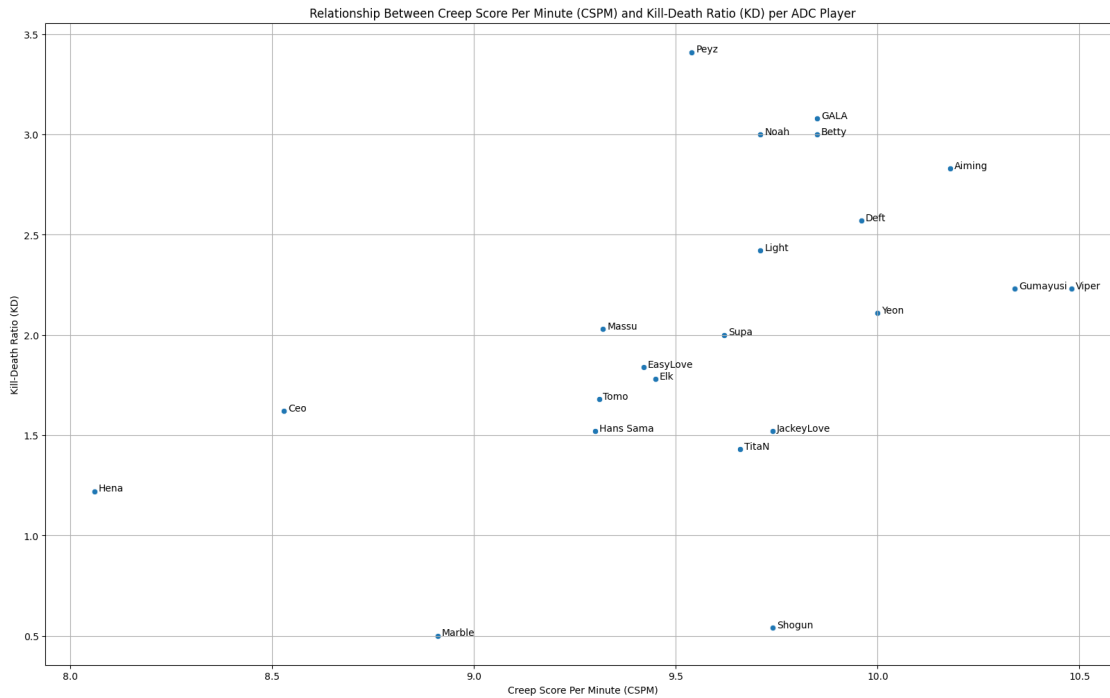
[22 rows x 5 columns]

```

[32]: # create a scatter plot for CSPM vs. KD
plt.figure(figsize=(20, 12))
scatter = sns.scatterplot(data=adc_kd_cs, x='cspm', y='kd')

# annotate each point with the player name
for line in adc_kd_cs.itertuples():
    scatter.text(line.cspm + 0.01, line.kd, line.playername,
        ↪horizontalalignment='left', size='medium', color='black')
    plt.title('Relationship Between Creep Score Per Minute (CSPM) and
        ↪Kill-Death Ratio (KD) per ADC Player')
plt.xlabel('Creep Score Per Minute (CSPM)')
plt.ylabel('Kill-Death Ratio (KD)')
plt.grid(True)
plt.show()

```



```
[33]: # lets do this for all players across all Tier 1 games, not just worlds ADC's.
      ↪for this, lets first define what tournament names are tier 1
tier1events = ['LCK', 'LPL', 'LEC', 'LCS', 'EWC', 'WLDs', 'MSI'] # official
      ↪Riot Games Definition of Tier 1 events.
leagues_list
```

```
[33]: {'AL',
      'CBLLOL',
      'CBLOLA',
      'CDF',
      'CT',
      'EBL',
      'EBLPA',
      'EM',
      'EPL',
      'ESLOL',
      'EWC',
      'GLL',
      'GLLPA',
      'HC',
      'HM',
      'HW',
      'IC',
      'LAS',
```

```

'LCK',
'LCKC',
'LCO',
'LCS',
'LEC',
'LFL',
'LFL2',
'LIT',
'LJL',
'LLA',
'LPLOL',
'LRN',
'LRS',
'LVP SL',
'NACL',
'NEXO',
'NLC',
'NLC Aurora Open',
'PCS',
'PRM',
'PRMP',
'TCL',
'TSC',
'UL',
'USP',
'VCS',
'WLDs'}

```

```

[34]: # if we look at our leagues list, we can't see the tier 1 event named MSI. lets
      ↪ check the full events list even with partial data to see if we can find MSI
full_leagues_list = set(all_data['league'])
full_leagues_list

```

```

[34]: {'AL',
      'CBLLOL',
      'CBLOLA',
      'CDF',
      'CT',
      'DCup',
      'EBL',
      'EBLPA',
      'EM',
      'EPL',
      'ESLOL',
      'EWC',
      'GLL',
      'GLLPA',

```

```

'HC',
'HM',
'HW',
'IC',
'LAS',
'LCK',
'LCKC',
'LCO',
'LCS',
'LDL',
'LEC',
'LFL',
'LFL2',
'LIT',
'LJL',
'LLA',
'LPL',
'LPLOL',
'LRN',
'LRS',
'LVP SL',
'MSI',
'NACL',
'NEXO',
'NLC',
'NLC Aurora Open',
'PCS',
'PRM',
'PRMP',
'TCL',
'TSC',
'UL',
'USP',
'VCS',
'WLDs'}

```

```

[35]: # we can see that MSI is there. lets see if MSI has the values we need:
      ↪playernames, kills, deaths, cspm
msi_data = all_data[all_data['league'] == 'MSI']
msi_data

```

```

[35]:
      gameid datacompleteness \
47712  11038-11038_game_1      partial
47713  11038-11038_game_1      partial
47714  11038-11038_game_1      partial
47715  11038-11038_game_1      partial
47716  11038-11038_game_1      partial

```

...
51115	11061-11061_game_4	partial
51116	11061-11061_game_4	partial
51117	11061-11061_game_4	partial
51118	11061-11061_game_4	partial
51119	11061-11061_game_4	partial

	url	league	year	split	\
47712	https://lpl.qq.com/es/stats.shtml?bmid=11038	MSI	2024	NaN	
47713	https://lpl.qq.com/es/stats.shtml?bmid=11038	MSI	2024	NaN	
47714	https://lpl.qq.com/es/stats.shtml?bmid=11038	MSI	2024	NaN	
47715	https://lpl.qq.com/es/stats.shtml?bmid=11038	MSI	2024	NaN	
47716	https://lpl.qq.com/es/stats.shtml?bmid=11038	MSI	2024	NaN	
...	
51115	https://lpl.qq.com/es/stats.shtml?bmid=11061	MSI	2024	NaN	
51116	https://lpl.qq.com/es/stats.shtml?bmid=11061	MSI	2024	NaN	
51117	https://lpl.qq.com/es/stats.shtml?bmid=11061	MSI	2024	NaN	
51118	https://lpl.qq.com/es/stats.shtml?bmid=11061	MSI	2024	NaN	
51119	https://lpl.qq.com/es/stats.shtml?bmid=11061	MSI	2024	NaN	

	playoffs		date	game	patch	...	opp_csat25	\
47712	0	2024-05-01	08:16:45	1	14.08	...	NaN	
47713	0	2024-05-01	08:16:45	1	14.08	...	NaN	
47714	0	2024-05-01	08:16:45	1	14.08	...	NaN	
47715	0	2024-05-01	08:16:45	1	14.08	...	NaN	
47716	0	2024-05-01	08:16:45	1	14.08	...	NaN	
...	
51115	0	2024-05-19	12:09:53	4	14.08	...	NaN	
51116	0	2024-05-19	12:09:53	4	14.08	...	NaN	
51117	0	2024-05-19	12:09:53	4	14.08	...	NaN	
51118	0	2024-05-19	12:09:53	4	14.08	...	NaN	
51119	0	2024-05-19	12:09:53	4	14.08	...	NaN	

	golddiffat25	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	\
47712	NaN	NaN	NaN	NaN	NaN	NaN	
47713	NaN	NaN	NaN	NaN	NaN	NaN	
47714	NaN	NaN	NaN	NaN	NaN	NaN	
47715	NaN	NaN	NaN	NaN	NaN	NaN	
47716	NaN	NaN	NaN	NaN	NaN	NaN	
...	
51115	NaN	NaN	NaN	NaN	NaN	NaN	
51116	NaN	NaN	NaN	NaN	NaN	NaN	
51117	NaN	NaN	NaN	NaN	NaN	NaN	
51118	NaN	NaN	NaN	NaN	NaN	NaN	
51119	NaN	NaN	NaN	NaN	NaN	NaN	

opp_killsat25	opp_assistsat25	opp_deathsat25
---------------	-----------------	----------------

47712	NaN	NaN	NaN
47713	NaN	NaN	NaN
47714	NaN	NaN	NaN
47715	NaN	NaN	NaN
47716	NaN	NaN	NaN
...
51115	NaN	NaN	NaN
51116	NaN	NaN	NaN
51117	NaN	NaN	NaN
51118	NaN	NaN	NaN
51119	NaN	NaN	NaN

[936 rows x 161 columns]

```
[36]: # scrolling through the data, we can see that our parameters exist within msi.
      ↳ this means all of the tier 1 leagues can be used
tier1_data = all_data[all_data['league'].isin(tier1events)]
tier1_data
```

```
[36]:
```

	gameid	datacompleteness	url	league	year	split	playoffs	\
708	LOLTMNT06_13630	complete	NaN	LEC	2024	Winter	0	
709	LOLTMNT06_13630	complete	NaN	LEC	2024	Winter	0	
710	LOLTMNT06_13630	complete	NaN	LEC	2024	Winter	0	
711	LOLTMNT06_13630	complete	NaN	LEC	2024	Winter	0	
712	LOLTMNT06_13630	complete	NaN	LEC	2024	Winter	0	
...
114079	LOLTMNT05_90307	complete	NaN	WLDs	2024	NaN	0	
114080	LOLTMNT05_90307	complete	NaN	WLDs	2024	NaN	0	
114081	LOLTMNT05_90307	complete	NaN	WLDs	2024	NaN	0	
114082	LOLTMNT05_90307	complete	NaN	WLDs	2024	NaN	0	
114083	LOLTMNT05_90307	complete	NaN	WLDs	2024	NaN	0	

	date	game	patch	...	opp_csat25	golddiffat25	\
708	2024-01-13 16:10:20	1	14.01	...	230.0	940.0	
709	2024-01-13 16:10:20	1	14.01	...	151.0	320.0	
710	2024-01-13 16:10:20	1	14.01	...	256.0	-453.0	
711	2024-01-13 16:10:20	1	14.01	...	223.0	55.0	
712	2024-01-13 16:10:20	1	14.01	...	39.0	325.0	
...
114079	2024-11-02 17:53:48	5	14.18	...	259.0	-1408.0	
114080	2024-11-02 17:53:48	5	14.18	...	250.0	892.0	
114081	2024-11-02 17:53:48	5	14.18	...	37.0	230.0	
114082	2024-11-02 17:53:48	5	14.18	...	967.0	-592.0	
114083	2024-11-02 17:53:48	5	14.18	...	932.0	592.0	

	xpdiffat25	csdiffat25	killsat25	assistsat25	deathsat25	opp_killsat25	\
708	-1286.0	-9.0	3.0	2.0	2.0	2.0	

709	1483.0	39.0	2.0	2.0	0.0	2.0
710	-3524.0	-54.0	2.0	1.0	1.0	0.0
711	1091.0	32.0	2.0	2.0	2.0	3.0
712	-316.0	-3.0	0.0	3.0	2.0	0.0
...
114079	564.0	-14.0	1.0	0.0	1.0	3.0
114080	-49.0	35.0	1.0	1.0	0.0	0.0
114081	-290.0	-8.0	0.0	2.0	1.0	0.0
114082	-846.0	-35.0	3.0	7.0	2.0	2.0
114083	846.0	35.0	2.0	5.0	3.0	3.0

	opp_assistsat25	opp_deathsat25
708	1.0	3.0
709	4.0	1.0
710	3.0	0.0
711	1.0	2.0
712	3.0	3.0
...
114079	0.0	0.0
114080	0.0	0.0
114081	2.0	2.0
114082	5.0	3.0
114083	7.0	2.0

[22968 rows x 161 columns]

```
[37]: # create a df that stores the necessary values for each player
player_kd_cs = (
    tier1_data.groupby('playername')
    .agg({'kills' : 'sum', 'deaths' : 'sum', 'cspm' : 'mean'})
    .reset_index()
)

player_kd_cs
```

```
[37]:   playername  kills  deaths   cspm
0       0909     11     11  8.249500
1        1xn    269    162  9.241224
2        369    379    302  8.307413
3        APA    377    226  9.178534
4       Able    164    132  9.301712
..      ...    ...    ...    ...
334   tinowns     16     12  9.304820
335     ucal    307    151  9.128032
336    vital      7     38  1.266318
337  xiaofang    177    149  6.149673
338 xiaoyueji     11      9  9.000400
```

[339 rows x 4 columns]

```
[38]: player_kd_cs['kd'] = (player_kd_cs['kills'] / player_kd_cs['deaths']).round(2)
      player_kd_cs
```

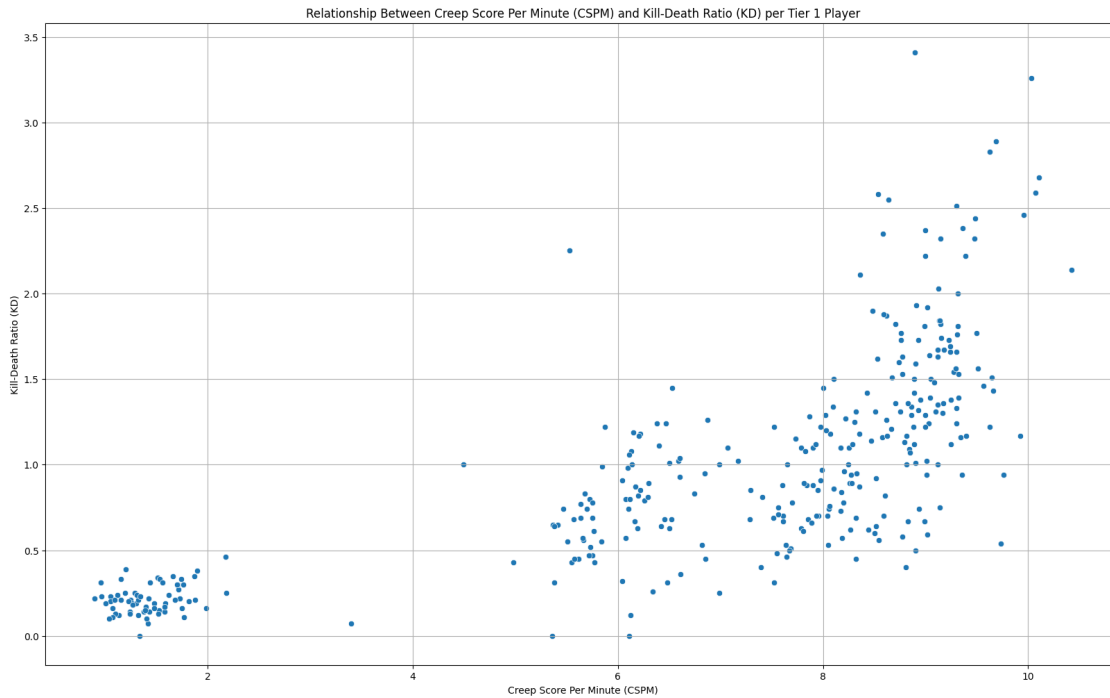
```
[38]:
```

	playername	kills	deaths	cspm	kd
0	0909	11	11	8.249500	1.00
1	1xn	269	162	9.241224	1.66
2	369	379	302	8.307413	1.25
3	APA	377	226	9.178534	1.67
4	Able	164	132	9.301712	1.24
...
334	tinowns	16	12	9.304820	1.33
335	ucal	307	151	9.128032	2.03
336	vital	7	38	1.266318	0.18
337	xiaofang	177	149	6.149673	1.19
338	xiaoyueji	11	9	9.000400	1.22

[339 rows x 5 columns]

```
[39]: # create a scatter plot for CSPM vs. KD
      plt.figure(figsize=(20, 12))
      scatter = sns.scatterplot(data=player_kd_cs, x='cspm', y='kd')

      for line in adc_kd_cs.itertuples():
          plt.title('Relationship Between Creep Score Per Minute (CSPM) and_
          ↳Kill-Death Ratio (KD) per Tier 1 Player')
      plt.xlabel('Creep Score Per Minute (CSPM)')
      plt.ylabel('Kill-Death Ratio (KD)')
      plt.grid(True)
      plt.show()
```



[40]: *# analyzing the graph, we can see there is a definite positive correlation ↪ between KD and CSPM.*

1.1 Through analyzing this dataset, two questions I have thought of that I would like to answer are:

1.1.1 Who are the best performing Tier 1 players?

To answer this, I will need to find a way to rank players by some combination of criteria. This will require more analysis of the dataset, as well as research into what constitutes a good ranking metric. ### Which Tier 1 team has the largest flexibility in drafts? To answer this, I will have to define what exactly defines flexibility in draft: is it the number of champions played? How adept every player is over a range of champions? This will require more research into drafting as well as performance ranking