In [1]:

```
import numpy as np # linear algebra
import pandas as pd # data processing, CSV file I/O (e.g. pd.read_csv)
import matplotlib.pyplot as plt
import seaborn  as sb
import warnings
warnings.filterwarnings('ignore')
```

Project Introduction

I'll analyze my performance during the matches for this project. I'll try to figure out which agents I play best with and which maps I have the best win rate on. What is the best agent for each map, and finally, a small machine learning model that can predict whether a match will win or lose.

In [2]:

```
data=pd.read_csv("C:/Users/LITE/Documents/Valorant Analysis/Lite.csv")
```

In [3]:

```
data.head()
```

Out[3]:

	Date	Map Name	Match Result	Agent Name	kills	headshots	deaths	assists	damage	damageReceived	plants	defuses	firstBloods	kdRatio	placement	rank
0	2021-11-08T15:49:57.865-05:00	Icebox	defeat	Jett	5	1	14	3	1327	2447	0	0	0	0.357143	9	Silver 1
1	2021-11-07T17:06:44.201-05:00	Fracture	victory	Killjoy	12	5	9	1	2169	1871	9	0	2	1.333333	7	Silver 1
2	2021-11-07T16:28:18.946-05:00	Breeze	defeat	Yoru	3	1	17	2	895	3077	0	0	1	0.176471	9	Silver 1
3	2021-11-07T15:32:01.224-05:00	Haven	victory	Jett	11	6	19	6	2685	3633	1	0	0	0.578947	9	Silver 1
4	2021-11-07T13:40:04.085-05:00	Ascent	defeat	Breach	15	8	20	3	2925	3671	0	0	1	0.750000	4	Silver 1

Data Cleaning

In this section, I'll split the date column into two columns: datetime and hour.

In [4]:

```
hour=[]
for i in range(len(data['Date'])):
    hour.append(data['Date'][i].split('T')[1].split('.')[0])
data.insert(1,'hour',hour)


day=pd.to_datetime(data['Date'])
for i in range(len(day)):
    day[i]=day[i].date()
data['Date']=day
```

In [5]:

```
data.head()
```

Out[5]:

	Date	hour	Map Name	Match Result	Agent Name	kills	headshots	deaths	assists	damage	damageReceived	plants	defuses	firstBloods	kdRatio	placement	rank
0	2021-11-08	15:49:57	Icebox	defeat	Jett	5	1	14	3	1327	2447	0	0	0	0.357143	9	Silver 1
1	2021-11-07	17:06:44	Fracture	victory	Killjoy	12	5	9	1	2169	1871	9	0	2	1.333333	7	Silver 1
2	2021-11-07	16:28:18	Breeze	defeat	Yoru	3	1	17	2	895	3077	0	0	1	0.176471	9	Silver 1
3	2021-11-07	15:32:01	Haven	victory	Jett	11	6	19	6	2685	3633	1	0	0	0.578947	9	Silver 1
4	2021-11-07	13:40:04	Ascent	defeat	Breach	15	8	20	3	2925	3671	0	0	1	0.750000	4	Silver 1

Data Visualisation

Top Agent kills

In this section, I'm looking for the agent with the most kills across all competitive matches.

In [6]:

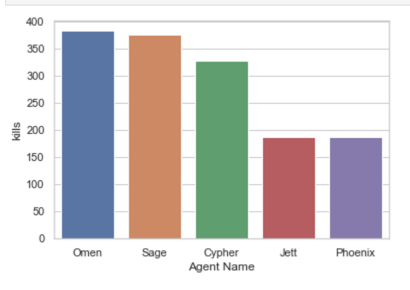
```
agent_kills=data[['Agent Name','kills']]
agent_kills=agent_kills.set_index('Agent Name')
agent_kills=agent_kills.groupby(['Agent Name']).sum()
agent_kills=agent_kills.sort_values(by=['kills'],ascending=False)
agent_kills=agent_kills.head()
agent_kills
```

Out[6]:

Agent Name	kills
Omen	383
Sage	375
Cypher	327
Jett	188
Phoenix	187

In [7]:

```
sb.set_theme(style="whitegrid")
ax = sb.barplot(x=agent_kills.index, y=agent_kills['kills'], data=agent_kills)
```



Based on this bar chart, we can conclude that Omen (type: controler), Sage (type: sentinelle), and Cypher (type: sentinelle) are the top three agents in terms of kills, followed by two dualists, Jett and Pheonix. But is it enough to say that you're the best agent I've ever played with? Let's dig deeper to see what we can find.

Best Agent performance

We are calculating the kd ratio for each agent, which is: the number of kills + the number of deaths / the number of times that agent has been played.

In [8]:

```
agent_ADR_Count=data[['Agent Name']]
agent_ADR_Count=agent_ADR_Count['Agent Name'].groupby(agent_ADR_Count['Agent Name'].tolist()).size().reset_index().\
    rename(columns={0:'records'})
agent_ADR_Count.rename(columns = {'index': 'Agent Name', 'Agent Name': 'Count'}, inplace = True)
agent_ADR_Count.sort_values('Agent Name')
agent_ADR_Count=agent_ADR_Count.set_index('Agent Name')
```

In [9]:

```
agent_ADR=data[['Agent Name','kdRatio']]
agent_ADR=agent_ADR.set_index('Agent Name')
agent_ADR=agent_ADR.groupby(['Agent Name']).sum()
agent_ADR
```

Out[9]:

Agent Name	kdRatio
Breach	4.083683
Cypher	23.639299
Jett	10.136827
Killjoy	11.782649
Omen	25.622983
Phoenix	10.666659
Reyna	14.548084
Sage	25.082575
Skye	1.090909
Sova	2.802438
Yoru	0.176471

In [10]:

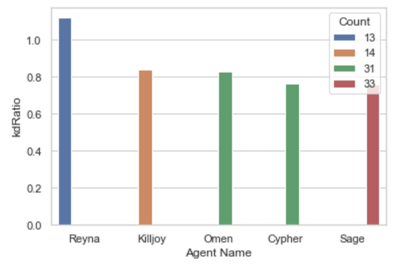
```
agent_ADR_mean= pd.concat([agent_ADR_Count, agent_ADR], axis=1)
agent_ADR_mean['kdRatio']=agent_ADR_mean['kdRatio']/agent_ADR_mean['Count']
agent_ADR_mean=agent_ADR_mean.drop('Skye')
agent_ADR_mean=agent_ADR_mean.sort_values(by='kdRatio',ascending=False)
agent_ADR_mean=agent_ADR_mean.head()
agent_ADR_mean
```

Out[10]:

Agent Name	Count	kdRatio
Reyna	13	1.119083
Killjoy	14	0.841618
Omen	31	0.826548
Cypher	31	0.762558
Sage	33	0.760078

In [11]:

```
sb.set_theme(style="whitegrid")
ax = sb.barplot(x=agent_ADR_mean.index, y=agent_ADR_mean['kdRatio'],hue="Count", data=agent_ADR_mean)
```



As we can see, there are additional results: Reyna, a dualist, has the highest kd ration of 1.119, followed by Killjoy, a sentinelle, with 0.84, and then Omen, Cypher, and Sage. As a result, we have three sentinelle , one controler, and one dualist.

Match Results Base Map

In [12]:

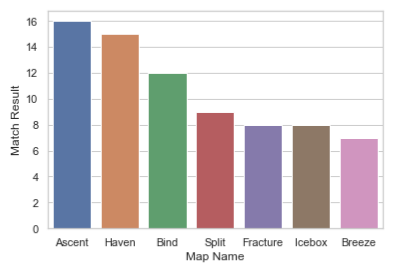
```
Match_Stats=data[['Map Name','Match Result']]
Match_Stats['Match Result'].replace(('victory', 'defeat'), (1, 0), inplace=True)
Match_Stats=Match_Stats.groupby(['Map Name']).sum()
Match_Stats=Match_Stats.sort_values(by='Match Result',ascending=False)
Match_Stats
```

Out[12]:

Map Name	Match Result
Ascent	16
Haven	15
Bind	12
Split	9
Fracture	8
Icebox	8
Breeze	7

In [13]:

```
sb.set_theme(style="whitegrid")
ax = sb.barplot(x=Match_Stats.index, y=Match_Stats['Match Result'], data=Match_Stats)
```



According to the graph, the most popular maps with a high win rate are Ascent, Haven, and Bind. Actually, as a valorant player, these maps are the first ones that come with the game, so I am very familiar with them. Split, on the other hand, is a cursed map.

In [14]:

```
Match_Stats=Match_Stats.head(4)
```

Agent and Map

In this part of analysis, I am going to conclude the performance of the agent that I play and there win rate in the maps

In [15]:

```
Map_Agent=data[['Map Name','Agent Name']]
Map_Agent=Map_Agent.groupby(['Map Name','Agent Name'])['Agent Name'].count()
Map_Agent=Map_Agent.to_frame()

Map_Agent=Map_Agent.rename(columns={'Agent Name':'N° of Play'})
Map_Agent_KD_Ratio=data[['Map Name','Agent Name','kdRatio']]
Map_Agent_KD_Ratio=Map_Agent_KD_Ratio.groupby(['Map Name','Agent Name'])['kdRatio'].sum()
Map_Agent_KD_Ratio=Map_Agent_KD_Ratio.to_frame()
Map_Agent_KD_Ratio_Normalized= pd.concat([Map_Agent, Map_Agent_KD_Ratio], axis=1)
Map_Agent_KD_Ratio_Normalized['kdRatio']=Map_Agent_KD_Ratio_Normalized['kdRatio']/Map_Agent_KD_Ratio_Normalized['N° of Play']
Map_Agent_KD_Ratio_Normalized

Match_Stats_By_Agent=data[['Map Name','Agent Name','Match Result']]
Match_Stats_By_Agent['Match Result'].replace(('victory', 'defeat'), (1, 0), inplace=True)
Match_Stats_By_Agent=Match_Stats_By_Agent.groupby(['Map Name','Agent Name'])['Match Result'].sum()
Match_Stats_By_Agent=Match_Stats_By_Agent.to_frame()
Match_Stats_By_Agent

Player_Performance_based_Map_and_Agent= pd.concat([Map_Agent_KD_Ratio_Normalized, Match_Stats_By_Agent], axis=1)
Player_Performance_based_Map_and_Agent
```

Out[15]:

Map Name	Agent Name	N° of Play	kdRatio	Match Result
Ascent	Breach	3	0.826389	1
	Cypher	6	0.521119	3
	Jett	3	0.826087	1
	Killjoy	4	0.644841	3
	Omen	4	0.648510	0
	Phoenix	5	0.712692	2
	Reyna	3	2.126984	1
	Sage	9	0.727167	5
Bind	Breach	1	0.571429	0
	Cypher	9	0.953159	4
	Jett	3	0.829714	1
	Killjoy	1	0.909091	1
	Omen	3	1.062530	2
	Phoenix	2	0.528708	0
	Reyna	1	0.800000	1
	Sage	6	0.636338	1
	Sova	2	0.717105	2
Breeze	Jett	2	0.500000	2
	Killjoy	1	0.928571	1
	Omen	5	0.734324	2
	Phoenix	3	0.511586	0
	Sage	3	0.710395	1
	Sova	2	0.420956	1
	Yoru	1	0.176471	0
Fracture	Cypher	3	1.079365	1
	Killjoy	1	1.333333	1
	Omen	8	0.891876	5
	Reyna	1	1.307692	1
Haven	Breach	2	0.516544	0
	Cypher	4	0.745705	3
	Jett	2	0.422807	1
	Killjoy	1	0.846154	1
	Omen	7	0.780013	3
	Phoenix	3	0.748718	3
	Reyna	1	0.636364	0
	Sage	8	0.739096	4
	Sova	1	0.526316	0
Icebox	Cypher	1	0.636364	0
	Jett	4	0.580952	1
	Killjoy	6	0.864356	4
	Omen	4	0.893661	1
	Phoenix	2	0.658750	0
	Sage	4	1.047078	2
Split	Cypher	8	0.634609	1
	Jett	1	1.000000	1
	Phoenix	1	0.947368	1
	Reyna	7	0.774725	3
	Sage	3	0.829261	2
	Skye	1	1.090909	1

In [16]:

```
Player_Performance_based_Map_and_Agent.sort_values(by='Match Result',ascending=False)
Player_Performance_based_Map_and_Agent

Best_agent_based_map=pd.DataFrame(columns=['Map Name', 'Agent Name', 'N° of Play','kdRatio','Match Result'])
Best_agent_based_map.reset_index()

data_row={}
for index, row in Player_Performance_based_Map_and_Agent.iterrows():
      if(row['Match Result']>row['N° of Play']/2 and row['N° of Play']>3 ):
        data_row={'Map Name':index[0],'Agent Name':index[1],'N° of Play':row['N° of Play'],'kdRatio':row['kdRatio'],'Match Result':row['Match Result']}
        Best_agent_based_map=Best_agent_based_map.append(data_row,ignore_index=True)
Best_agent_based_map=Best_agent_based_map.sort_values(by='N° of Play',ascending=False)
Best_agent_based_map
```

Out[16]:

	Map Name	Agent Name	N° of Play	kdRatio	Match Result
1	Ascent	Sage	9.0	0.727167	5.0
2	Fracture	Omen	8.0	0.891876	5.0
4	Icebox	Killjoy	6.0	0.864356	4.0
0	Ascent	Killjoy	4.0	0.644841	3.0
3	Haven	Cypher	4.0	0.745705	3.0

This table provides all of the information that I require; as we can see, I am a sentinelle type of player who does not play aggressively as a dualist. I enjoy playing Ascent, Haven, Fracture, and Icebox Ascent, Haven, Fracture, and Icebox. My main as a controler is omen omen.

Machine Learning

In this machine learning section, I will use a model called linear regression to predict the kd ratio for the agent and the map. Logistic regression is used to predict win-loss outcomes for the agent and the map.

In [17]:

```
data_ML=data
```

In [18]:

```
data_ML=data_ML.replace(to_replace=['defeat', 'victory'], value=[0, 1])
data_ML=data_ML.replace(to_replace=['Ascent', 'Haven','Bind','Split','Fracture','Icebox','Breeze'], value=[0, 1,2,3,4,5,6])
data_ML=data_ML.replace(to_replace=['Breach', 'Killjoy','Skye','Reyna','Sage','Omen','Cypher','Jett','Phoenix','Yoru','Sova'], value=[0, 1,2,3,4,5,6,7,8,9,10])


data_ML
```

Out[18]:

	Date	hour	Map Name	Match Result	Agent Name	kills	headshots	deaths	assists	damage	damageReceived	plants	defuses	firstBloods	kdRatio	placement	rank
0	2021-11-08	15:49:57	5	0	7	5	1	14	3	1327	2447	0	0	0	0.357143	9	Silver 1
1	2021-11-07	17:06:44	4	1	1	12	5	9	1	2169	1871	9	0	2	1.333333	7	Silver 1
2	2021-11-07	16:28:18	6	0	9	3	1	17	2	895	3077	0	0	1	0.176471	9	Silver 1
3	2021-11-07	15:32:01	1	1	7	11	6	19	6	2685	3633	1	0	0	0.578947	9	Silver 1
4	2021-11-07	13:40:04	0	0	0	15	8	20	3	2925	3671	0	0	1	0.750000	4	Silver 1
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
161	2021-07-16	15:05:30	2	1	1	10	5	11	8	2270	2012	2	1	0	0.909091	6	Bronze 3
162	2021-07-16	09:44:52	2	0	5	8	2	14	3	1440	2130	0	0	1	0.571429	8	Bronze 3
163	2021-07-16	07:13:18	3	0	4	14	7	16	3	2907	2687	3	0	1	0.875000	9	Bronze 3
164	2021-07-15	15:02:45	0	1	4	10	4	14	5	1810	2577	8	1	1	0.714286	10	Bronze 3
165	2021-07-15	14:15:02	1	0	5	11	8	19	2	2204	3279	4	0	2	0.578947	10	Bronze 3

166 rows × 17 columns

In [28]:

```
data_ML=data_ML[['Map Name','Agent Name','kdRatio','Match Result']]
data_ML
```

Out[28]:

	Map Name	Agent Name	kdRatio	Match Result
0	5	7	0.357143	0
1	4	1	1.333333	1
2	6	9	0.176471	0
3	1	7	0.578947	1
4	0	0	0.750000	0
...	...	...	...	...
161	2	1	0.909091	1
162	2	5	0.571429	0
163	3	4	0.875000	0
164	0	4	0.714286	1
165	1	5	0.578947	0

166 rows × 4 columns

In [35]:

```
X_Result=data_ML[["Map Name","Agent Name"]]
Y_Result=data_ML[["Match Result"]]
X_kd=data_ML[["Map Name","Agent Name"]]
Y_kd=data_ML[["kdRatio"]]
```

In [30]:

```
from sklearn.model_selection import train_test_split
X_train_R,X_test_R,Y_train_R,Y_test_R=train_test_split(X_Result,Y_Result,test_size=0.3,random_state=0)
X_train_KD,X_test_KD,Y_train_KD,Y_test_KD=train_test_split(X_kd,Y_kd,test_size=0.4,random_state=0)
```

In [37]:

```
from sklearn.linear_model import LogisticRegression, LinearRegression
model_R=LogisticRegression()
model_R.fit(X_train_R,Y_train_R)
model_KD=LinearRegression()
model_KD.fit(X_train_KD,Y_train_KD)
```

Out[37]:

```
LinearRegression()
```

In [42]:

```
y_pred_R=model_R.predict(X_test_R)
y_pred_KD=model_KD.predict(X_test_KD)
```

Finally, those models could not provide a good prediction because there are so many features that should be implemented in the ML input, such as ping(latency is the technically more correct term) means the time it takes for a small data set to be transmitted from your device to a server on the Internet and back to your device again.) packet loss, computer configuration, team mmr... those features will provide a good prediction with high accuracy.

In [ ]:

```
Data_for_report=data
Data_for_report=Data_for_report.replace(to_replace=['defeat', 'victory'], value=[0, 1])
Data_for_report.to_csv('Valorant Lite Performance.csv')
Best_agent_based_map.to_csv('Best_agent_based_map.csv')
```