import libraries

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

import dataset

In [2]:
```
data=pd.read_csv('game_sales.csv')
data
#مدل توصیفی است و فیچر لیبل نداریم
```

Out[2]:

	Rank	Name	Platform	Year	Genre	Publisher	EU_Sales	JP_Sales	Global_Sal
0	1	Wii Sports	Wii	2006.0	Sports	Nintendo	29.02	3.77	82.
1	2	Super Mario Bros.	NES	1985.0	Platform	Nintendo	3.58	6.81	40.
2	3	Mario Kart Wii	Wii	2008.0	Racing	Nintendo	12.88	3.79	35.
3	4	Wii Sports Resort	Wii	2009.0	Sports	Nintendo	11.01	3.28	33.
4	5	Pokemon Red/Pokemon Blue	GB	1996.0	Role-Playing	Nintendo	8.89	10.22	31.
...	...	...	...	...	...	...	...	...	
16593	16596	Woody Woodpecker in Crazy Castle 5	GBA	2002.0	Platform	Kemco	0.00	0.00	0.
16594	16597	Men in Black II: Alien Escape	GC	2003.0	Shooter	Infogrames	0.00	0.00	0.
16595	16598	SCORE International Baja 1000: The Official Game	PS2	2008.0	Racing	Activision	0.00	0.00	0.
16596	16599	Know How 2	DS	2010.0	Puzzle	7G//AMES	0.01	0.00	0.
16597	16600	Spirits & Spells	GBA	2003.0	Platform	Wanadoo	0.00	0.00	0.

16598 rows × 9 columns

pre_processing

handle categorical data

In [13]:
```
data1=data.drop(['Rank','Name','Platform','Publisher','Year'],axis=1)
data1  #ئی کتگوریکال بوده و از جنس نامینال بودن ، امکان استفاده از گت دامیز و ریپلیس نیز نبود#
```

Out[13]:

	Genre	EU_Sales	JP_Sales	Global_Sales
0	Sports	29.02	3.77	82.74
1	Platform	3.58	6.81	40.24
2	Racing	12.88	3.79	35.82
3	Sports	11.01	3.28	33.00
4	Role-Playing	8.89	10.22	31.37
...	...	...	...	...
16593	Platform	0.00	0.00	0.01
16594	Shooter	0.00	0.00	0.01
16595	Racing	0.00	0.00	0.01
16596	Puzzle	0.01	0.00	0.01
16597	Platform	0.00	0.00	0.01

16598 rows × 4 columns

In [16]:
```
data2=pd.get_dummies(data1)
data2       #این فیچر از نوع کتگوریکال نامینال هس چون برتری نسبتا به هم ندارن#
```

Out[16]:

	EU_Sales	JP_Sales	Global_Sales	Genre_Action	Genre_Adventure	Genre_Fighting	Genre_
0	29.02	3.77	82.74	0	0	0	
1	3.58	6.81	40.24	0	0	0	
2	12.88	3.79	35.82	0	0	0	
3	11.01	3.28	33.00	0	0	0	
4	8.89	10.22	31.37	0	0	0	
...	...	...	...	...	...	...	
16593	0.00	0.00	0.01	0	0	0	
16594	0.00	0.00	0.01	0	0	0	
16595	0.00	0.00	0.01	0	0	0	
16596	0.01	0.00	0.01	0	0	0	
16597	0.00	0.00	0.01	0	0	0	

16598 rows × 15 columns

handle missing value

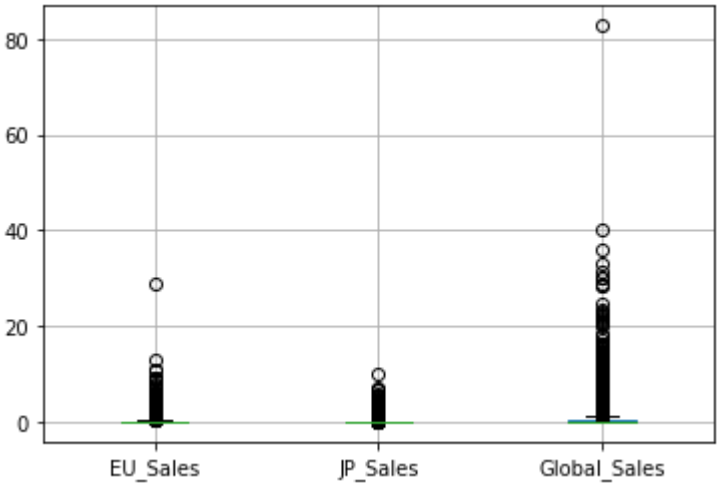
In [17]:
```
data2.isna().sum()
```

Out[17]:
```
EU_Sales              0
JP_Sales              0
Global_Sales          0
Genre_Action          0
Genre_Adventure       0
Genre_Fighting        0
Genre_Misc            0
Genre_Platform        0
Genre_Puzzle          0
Genre_Racing          0
Genre_Role-Playing    0
Genre_Shooter         0
Genre_Simulation      0
Genre_Sports          0
Genre_Strategy        0
dtype: int64
```

handle outlier data

In [18]:
```
data2.iloc[:,[0,1,2]].boxplot()
```

Out[18]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x20a68727e80>
```



In [21]:
```
#EU_Sales
Q1=data2.iloc[:,0].quantile(0.25)
Q3=data2.iloc[:,0].quantile(0.75)
LB=Q1-1.5*(Q3-Q1)
UB=Q3+1.5*(Q3-Q1)
print(LB,UB)
```

```
-0.165 0.275
```

In [22]:
```
data2[data2['EU_Sales']<-0.165].shape
```

Out[22]:
```
(0, 15)
```

In [76]:
```
data3=data2[data2['EU_Sales']<0.275].reset_index().drop('index',axis=1)
data3      #تعداد رکوردهای بیشتر از حد بالا زیاد بود ، به همین خاطر از متمم استفاده میکنیم
```

Out[76]:

	EU_Sales	JP_Sales	Global_Sales	Genre_Action	Genre_Adventure	Genre_Fighting	Genre_
0	0.01	1.10	11.66	0	0	0	
1	0.00	2.33	5.95	0	0	0	
2	0.26	0.01	5.23	0	0	0	
3	0.01	0.01	4.98	0	0	0	
4	0.26	0.01	4.91	0	0	0	
...	...	...	...	...	...	...	
14512	0.00	0.00	0.01	0	0	0	
14513	0.00	0.00	0.01	0	0	0	
14514	0.00	0.00	0.01	0	0	0	
14515	0.01	0.00	0.01	0	0	0	
14516	0.00	0.00	0.01	0	0	0	

14517 rows × 15 columns

In [77]:
```
#JP_Sales
Q1=data3.iloc[:,1].quantile(0.25)
Q3=data3.iloc[:,1].quantile(0.75)
LB=Q1-1.5*(Q3-Q1)
UB=Q3+1.5*(Q3-Q1)
print(LB,UB)
```

```
-0.045 0.075
```

In [78]:
```
data3[data3['JP_Sales']<-0.045].shape
```

Out[78]:
```
(0, 15)
```

In [79]:
```
data4=data3[data3['JP_Sales']<0.075].reset_index().drop('index',axis=1)
data4          #اد رکوردهای بیشتر از حد بالا زیاد بود ، به همین خاطر از متمم استفاده میکنیم
```

Out[79]:

	EU_Sales	JP_Sales	Global_Sales	Genre_Action	Genre_Adventure	Genre_Fighting	Genre_
0	0.26	0.01	5.23	0	0	0	
1	0.01	0.01	4.98	0	0	0	
2	0.26	0.01	4.91	0	0	0	
3	0.26	0.01	4.53	0	0	0	
4	0.24	0.00	4.50	0	0	0	
...	...	...	...	...	...	...	
12143	0.00	0.00	0.01	0	0	0	
12144	0.00	0.00	0.01	0	0	0	
12145	0.00	0.00	0.01	0	0	0	
12146	0.01	0.00	0.01	0	0	0	
12147	0.00	0.00	0.01	0	0	0	

12148 rows × 15 columns

In [60]:
```
#Global_Sales
Q1=data2.iloc[:,2].quantile(0.25)
Q3=data2.iloc[:,2].quantile(0.75)
LB=Q1-1.5*(Q3-Q1)
UB=Q3+1.5*(Q3-Q1)
print(LB,UB)
```

```
-0.5549999999999999 1.085
```

In [80]:
```
data4[data4['Global_Sales']<-0.5549999999999999].shape
```

Out[80]:
```
(0, 15)
```

In [83]:
```
data5=data4[data4['Global_Sales']<1.085].reset_index().drop('index',axis=1)
data5   #تعداد رکوردهای بیشتر از حد بالا زیاد بود ، به همین خاطر از متمم استفاده میکنیم
```

Out[83]:

	EU_Sales	JP_Sales	Global_Sales	Genre_Action	Genre_Adventure	Genre_Fighting	Genre_I
0	0.12	0.00	1.08	0	0	0	
1	0.00	0.00	1.08	1	0	0	
2	0.06	0.00	1.08	0	0	0	
3	0.18	0.03	1.08	0	0	1	
4	0.00	0.00	1.07	0	0	0	
...	...	...	...	...	...	...	
11911	0.00	0.00	0.01	0	0	0	
11912	0.00	0.00	0.01	0	0	0	
11913	0.00	0.00	0.01	0	0	0	
11914	0.01	0.00	0.01	0	0	0	
11915	0.00	0.00	0.01	0	0	0	

11916 rows × 15 columns

handle duplicated value

In [84]:
```
data5.duplicated().sum()
```

Out[84]: 7388

feature scaling

z_score

In [132]:
```
x=data5.iloc[:,[0,1,2]]
binary=data5.iloc[:,3:]
```

In [136]:
```
from sklearn.preprocessing import StandardScaler
ss=StandardScaler()
x_ss=ss.fit_transform(x)
```

In [137]:
```
df_ss=pd.DataFrame(x_ss,columns=x.columns)
```

In [138]:
```
data6=pd.concat([df_ss,binary] , axis=1)
data6
```

Out[138]:

	EU_Sales	JP_Sales	Global_Sales	Genre_Action	Genre_Adventure	Genre_Fighting	Genre_
0	1.247038	-0.447170	4.539257	0	0	0	
1	-0.720961	-0.447170	4.539257	1	0	0	
2	0.263038	-0.447170	4.539257	0	0	0	
3	2.231037	1.401497	4.539257	0	0	1	
4	-0.720961	-0.447170	4.488586	0	0	0	
...	...	...	...	...	...	...	
11911	-0.720961	-0.447170	-0.882506	0	0	0	
11912	-0.720961	-0.447170	-0.882506	0	0	0	
11913	-0.720961	-0.447170	-0.882506	0	0	0	
11914	-0.556961	-0.447170	-0.882506	0	0	0	
11915	-0.720961	-0.447170	-0.882506	0	0	0	

11916 rows × 15 columns

min_max

In [139]:
```
x=data5.iloc[:,[0,1,2]]
binary=data5.iloc[:,3:]
```

In [140]:
```
from sklearn.preprocessing import MinMaxScaler
mm=MinMaxScaler()
x_mm=mm.fit_transform(x)
```

In [141]:
```
df_mm=pd.DataFrame(x_mm,columns=x.columns)
```

In [142]:
```
data7=pd.concat([df_mm,binary] , axis=1)
data7
```

Out[142]:

	EU_Sales	JP_Sales	Global_Sales	Genre_Action	Genre_Adventure	Genre_Fighting	Genre_I
0	0.444444	0.000000	1.000000	0	0	0	
1	0.000000	0.000000	1.000000	1	0	0	
2	0.222222	0.000000	1.000000	0	0	0	
3	0.666667	0.428571	1.000000	0	0	1	
4	0.000000	0.000000	0.990654	0	0	0	
...	...	...	...	...	...	...	
11911	0.000000	0.000000	0.000000	0	0	0	
11912	0.000000	0.000000	0.000000	0	0	0	
11913	0.000000	0.000000	0.000000	0	0	0	
11914	0.037037	0.000000	0.000000	0	0	0	
11915	0.000000	0.000000	0.000000	0	0	0	

11916 rows × 15 columns

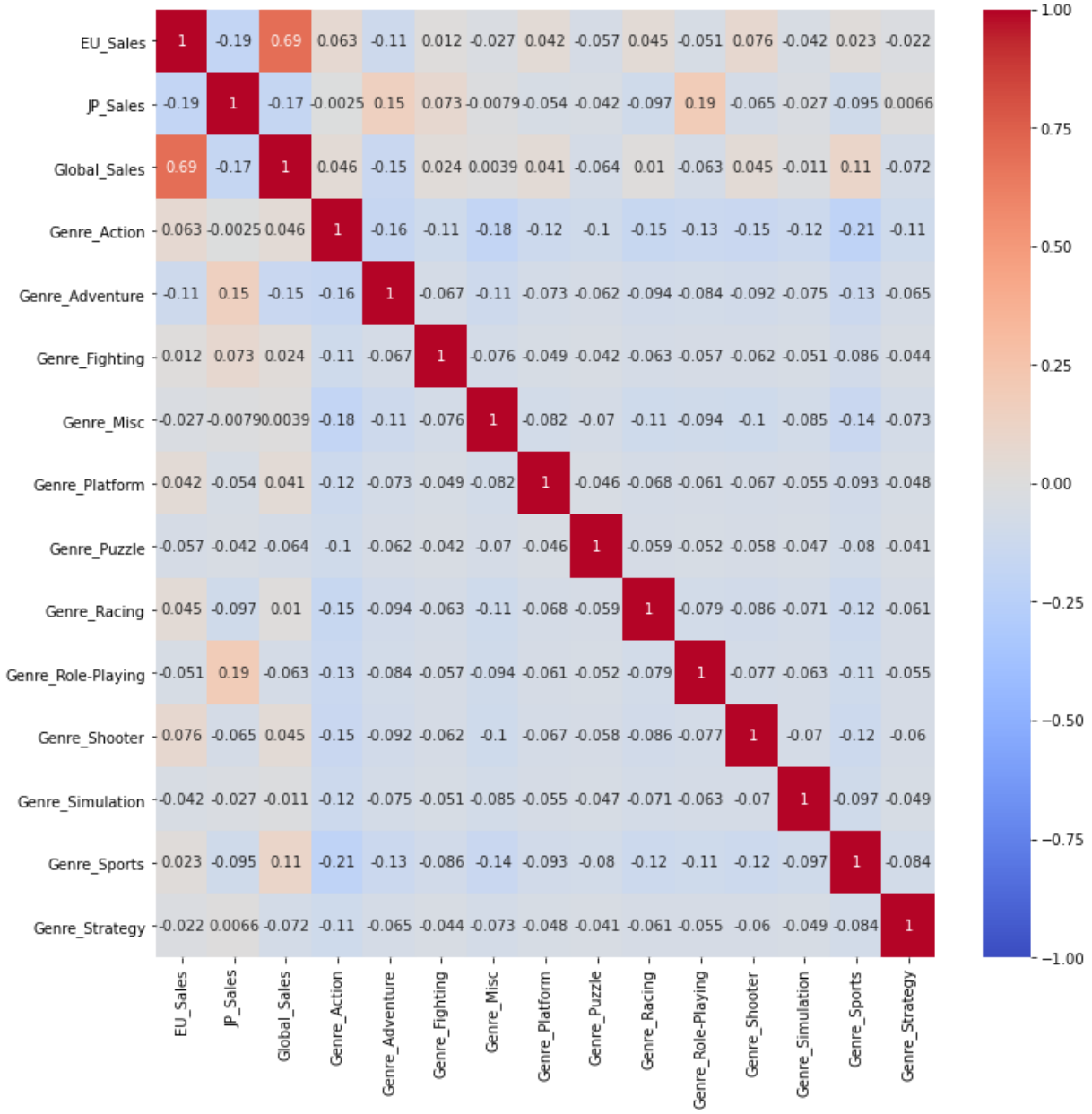
feature selection

brute_force

In [144]:
```
import seaborn as sns
import matplotlib.pyplot as plt
#فورس بیشتر برای مدل های پیشبینی استفاده میشود ولی برای مدل های توصیفی نیز مجاز است
```

In [145]:
```
fig = plt.figure(figsize = (12,12))
sns.heatmap(data5.corr(), vmin = -1, vmax = 1, annot = True, cmap = "coolwarm")
```

Out[145]: <matplotlib.axes._subplots.AxesSubplot at 0x20a70dc9f10>



filter method

#چون مدل توصیفی است نمیتوانیم از روش خی دو استفاده کنیم

Principal Component Analysis (PCA)

In [123]:
```
from sklearn.decomposition import PCA
#از روش مینیمم ماکسیمم مقیاس سازی رو انجام میدهیم چون دیگر داده منفی نخواهیم داشت
```

In [150]:
```
model = PCA(n_components = 3).fit(x_mm)
X_pca = model.transform(x_mm)
n_pca = model.components_.shape[0]
most_important = [np.abs(model.components_[i]).argmax() for i in range(n_pca)]
feature_names_t = data7.columns
most_important_names = [feature_names_t[most_important[i]] for i in range(n_pca)]
most_important_names
df = pd.DataFrame(most_important_names)
df
```

Out[150]:

	0
0	EU_Sales
1	JP_Sales
2	Global_Sales