Importing various Libraries

```
#importing various libralies

import requests
from bs4 import BeautifulSoup
import pandas as pd
import sqlite3
import json
import matplotlib.pyplot as plt
import seaborn as sns
```

Creating a Database to store the Data

```
#creating a connection to a database
conn=sqlite3.connect('movies.db')
cur=conn.cursor()
```

1. Getting Data and cleaning it

Getting data from the various websites

```
# Scraping Data from Box Office Mojo

listofyrs=range(1977,2025,1)     #List of year for the available data
frames=[]                        #Collection fo all dataframes

for year in listofyrs:           #looping through the years

    # url2='https://www.boxofficemojo.com/year/world/' + str(2024) + '/'
    url2='https://www.boxofficemojo.com/year/world/' + str(year) + '/'
    html2=requests.get(url2)
    soup=BeautifulSoup(html2.content,'html.parser')
    # soup.prettify


    allrows=soup.findAll('tr')
    allrows=allrows[1:]
    # allrows[0].findAll('td')[0].text

    row=[]  #collection for each row
    rows=[] #collection for all rows
    for i in range(len(allrows)):
        for cell in allrows[i].findAll('td'):
            row.append(cell.text)
        row.insert(0,year)
        rows.append(row)
        row=[]

    df=pd.DataFrame(rows)
    df=df.reset_index(drop=True)

    frames.append(df)
df = pd.concat(frames)
print(html2)
df.head()
```

```
<Response [200]>
```

	0	1	2	3	4	5	6	7
0	1977	1	Star Wars: Episode IV - A New Hope	$307,263,857	$307,263,857	100%	-	-
1	1977	2	Smokey and the Bandit	$126,737,428	$126,737,428	100%	-	-
2	1977	3	Close Encounters of the Third Kind	$116,395,460	$116,395,460	100%	-	-
3	1977	4	Saturday Night Fever	$94,213,184	$94,213,184	100%	-	-
4	1977	5	A Bridge Too Far	$50,750,000	$50,750,000	100%	-	-

Next steps: Generate code with df | View recommended plots

```
# Checking the number of movie titles scrapped
len(df)
```

```
8840
```

There are 8840 movie titles from the boxofficemojo website

Cleaning the data and inserting the column headers

```
# inserting columns to the data frame
moviesmaintable=soup.find('table',class_="a-bordered a-horizontal-stripes a-size-base a-span12 mojo-body-table mojo-table-annotated")
allcolumns=moviesmaintable.findAll('th')
columns=[]
for column in allcolumns:
    columns.append(column.text.strip())
columns.insert(0,'Year')
columns[-1]='ForeignPer'
columns[-3]='DomesticPer'
df.columns=columns

# Cleaning the data to remove various string characters
df['Domestic']=df['Domestic'].str.replace('$','').str.replace(',','').str.replace('-','0').str.replace('<','')
df['Worldwide']=df['Worldwide'].str.replace('$','').str.replace(',','').str.replace('-','0').str.replace('<','')
df['Foreign']=df['Foreign'].str.replace('$','').str.replace(',','').str.replace('-','0').str.replace('<','')
df['DomesticPer']=df['DomesticPer'].str.replace('%','').str.replace('-','0').str.replace('<','')
df['ForeignPer']=df['ForeignPer'].str.replace('%','').str.replace('-','0').str.replace('<','')

# Converting the colums to the right data type
df['Domestic']=df['Domestic'].astype(float)
df['Worldwide']=df['Worldwide'].astype(float)
df['Foreign']=df['Foreign'].astype(float)
df['DomesticPer']=df['DomesticPer'].astype(float)
df['ForeignPer']=df['ForeignPer'].astype(float)
df['Year']=df['Year'].astype(str)

df.head()
```

```
<ipython-input-5-d307a81bb527>:13: FutureWarning: The default value of regex will chang
  df['Domestic']=df['Domestic'].str.replace('$','').str.replace(',','').str.replace('-'
<ipython-input-5-d307a81bb527>:14: FutureWarning: The default value of regex will chang
  df['Worldwide']=df['Worldwide'].str.replace('$','').str.replace(',','').str.replace('
<ipython-input-5-d307a81bb527>:15: FutureWarning: The default value of regex will chang
  df['Foreign']=df['Foreign'].str.replace('$','').str.replace(',','').str.replace('-','
```

	Year	Rank	Release Group	Worldwide	Domestic	DomesticPer	Foreign	ForeignPer
0	1977	1	Star Wars: Episode IV - A New Hope	307263857.0	307263857.0	100.0	0.0	0.0
1	1977	2	Smokey and the Bandit	126737428.0	126737428.0	100.0	0.0	0.0

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```
# Exploring the numerical columns in the data
df.describe()
```

	Worldwide	Domestic	DomesticPer	Foreign	ForeignPer
count	8.840000e+03	8.840000e+03	8840.000000	8.840000e+03	8840.000000
mean	7.698463e+07	3.471478e+07	62.072624	4.226802e+07	37.926776
std	1.594010e+08	6.267812e+07	39.563880	1.063673e+08	39.562313
min	7.850000e+02	0.000000e+00	0.000000	0.000000e+00	0.000000
25%	9.548621e+06	1.534337e+06	29.075000	0.000000e+00	0.000000
50%	2.772454e+07	1.331412e+07	70.100000	6.332458e+06	29.900000
75%	7.152339e+07	4.038419e+07	100.000000	3.643684e+07	70.925000
max	2.799439e+09	9.366622e+08	100.000000	1.993811e+09	100.000000

```
# exploring the colums and their datatype.
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 8840 entries, 0 to 199
Data columns (total 8 columns):
 #   Column         Non-Null Count  Dtype  
---  ------         --------------  -----  
 0   Year           8840 non-null   object 
 1   Rank           8840 non-null   object 
 2   Release Group  8840 non-null   object 
 3   Worldwide      8840 non-null   float64
 4   Domestic       8840 non-null   float64
 5   DomesticPer    8840 non-null   float64
 6   Foreign        8840 non-null   float64
 7   ForeignPer     8840 non-null   float64
dtypes: float64(5), object(3)
memory usage: 879.6+ KB
```

```
# checking for duplicate
df.duplicated().sum()
```

```
0
```

There are no duplicated rows

```
# Checking for duplicates based on the movie tile column
df['Release Group'].duplicated().sum()
```

```
202
```

```
df['Release Group'].duplicated()
```

```
0      False
1      False
2      False
3      False
4      False
       ...  
195    False
196    False
197    False
198    False
199    False
Name: Release Group, Length: 8840, dtype: bool
```

Finding:- The are 202 titles with the same name.

Action:- Drop the Earlier movie and Keep the latest.

```
df.drop_duplicates(subset=['Release Group'], keep='last')
```

	Year	Rank	Release Group	Worldwide	Domestic	DomesticPer	Foreign	ForeignPer
0	1977	1	Star Wars: Episode IV - A New Hope	307263857.0	307263857.0	100.0	0.0	0.0
1	1977	2	Smokey and the Bandit	126737428.0	126737428.0	100.0	0.0	0.0
2	1977	3	Close Encounters of the Third Kind	116395460.0	116395460.0	100.0	0.0	0.0
3	1977	4	Saturday Night Fever	94213184.0	94213184.0	100.0	0.0	0.0
4	1977	5	A Bridge Too Far	50750000.0	50750000.0	100.0	0.0	0.0

```
# inserting the mojosmovies dataframe to the sql database
df.to_sql('mojosmovies',conn,if_exists='replace',index=False)
```

```
8840
```

```
#Testing if the data is in the database
pd.read_sql('select * from mojosmovies',conn).head()
```

	Year	Rank	Release Group	Worldwide	Domestic	DomesticPer	Foreign	ForeignPer
0	1977	1	Star Wars: Episode IV - A New Hope	307263857.0	307263857.0	100.0	0.0	0.0
1	1977	2	Smokey and the	126737428.0	126737428.0	100.0	0.0	0.0

```
### Reading the Movies from The Movies DB from a CSV File
```

```
data = pd.read_csv('tmdb.movies.csv')
data
```

	Unnamed: 0	genre_ids	id	original_language	original_title	popularity	rel
0	0	[12, 14, 10751]	12444	en	Harry Potter and the Deathly Hallows: Part 1	33.533	2
1	1	[14, 12, 16, 10751]	10191	en	How to Train Your Dragon	28.734	2
2	2	[12, 28, 878]	10138	en	Iron Man 2	28.515	2
3	3	[16, 35, 10751]	862	en	Toy Story	28.005	1
4	4	[28, 878, 12]	27205	en	Inception	27.920	2
...	...	...	...	...	...	...	
26512	26512	[27, 18]	488143	en	Laboratory Conditions	0.600	2
26513	26513	[18, 53]	485975	en	_EXHIBIT_84xxx_	0.600	2
26514	26514	[14, 28,	381231	en	The Last One	0.600	2

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```
# Removing the unnamed column fro the data frame
data=data[['genre_ids','id','original_language','original_title','popularity','release_date','title','vote_average','vote_count']]
data.head()
```

	genre_ids	id	original_language	original_title	popularity	release_date	tit
0	[12, 14, 10751]	12444	en	Harry Potter and the Deathly Hallows: Part 1	33.533	2010-11-19	Ha Pot and t Deatl Hallov Par
	[14, 12			How to Train			How Tr

Next steps: Generate code with data View recommended plots

```
# checking for duplicates
data.duplicated().sum()
```

```
1020
```

```
# Removing the duplicates
data.drop_duplicates(keep='first',inplace=True)
```

```
<ipython-input-31-69cc3ed7e394>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-c
  data.drop_duplicates(keep='first',inplace=True)
```

```
data.shape
```

```
(25497, 9)
```

There are 25497 Unique row

```
# Checking for duplicates based on the Movie title
data['title'].duplicated().sum()
```

```
809
```

There are 809 similar titles.

```
# Droping the rows with similar tile and keeping the last
data=data.drop_duplicates(subset=['title'], keep='last')
data.shape
```

```
(24688, 9)
```

```
# storing the data in an sql database
data.to_sql('tmdbmovies',conn,index=False,if_exists='replace')
```

```
24688
```

Merging the various datasets

```
df=pd.read_sql("""select * from tmdbmovies as tm inner join mojosmovies as mj on mj.'Release Group'=tm.original_title """,conn)
df.tail()
```

	genre_ids	id	original_language	original_title	popularity	release_date	t
1622	[99, 99]	474464	en	The Judge	0.6	2018-04-13	J
1623	[18]	514410	en	Ice	0.6	2018-03-26	
1624	[27]	536404	en	Wolf	0.6	2018-07-15	
1625	[10402]	509306	en	The Box	0.6	2018-03-04	
1626	[]	552957	pt	Point of No Return	0.6	2018-09-19	R

Getting the genre data for the movies using an API

```
with open('key.json') as f:
    key=json.load(f)['key']

genre=requests.get(f'https://api.themoviedb.org/3/genre/movie/list?api_key={key}')
genres=genre.json()['genres']
genres
# genres=pd.DataFrame(genre.json()['genres'])
```

```
[{'id': 28, 'name': 'Action'},
 {'id': 12, 'name': 'Adventure'},
 {'id': 16, 'name': 'Animation'},
 {'id': 35, 'name': 'Comedy'},
 {'id': 80, 'name': 'Crime'},
 {'id': 99, 'name': 'Documentary'},
 {'id': 18, 'name': 'Drama'},
 {'id': 10751, 'name': 'Family'},
 {'id': 14, 'name': 'Fantasy'},
 {'id': 36, 'name': 'History'},
 {'id': 27, 'name': 'Horror'},
 {'id': 10402, 'name': 'Music'},
 {'id': 9648, 'name': 'Mystery'},
 {'id': 10749, 'name': 'Romance'},
 {'id': 878, 'name': 'Science Fiction'},
 {'id': 10770, 'name': 'TV Movie'},
 {'id': 53, 'name': 'Thriller'},
 {'id': 10752, 'name': 'War'},
 {'id': 37, 'name': 'Western'}]
```

```
# Getting the name of the various genre combinations
genreswithMappedNames=[]

for item in df['genre_ids']: #[0].replace('[','').replace(']','').split(','):
    inneritemsstring=[]
    while True:
        if item.strip() =='[]':
            genre=''
            inneritemsstring.append(' ')
        else:
            genre=''

            items=item.replace('[','').replace(']','').split(',')
            for inneritem in items:
                inneritem=inneritem.strip()
                # inneritemsstring.append(inneritem)
                for obj in genres:
                    if int(inneritem)==obj['id']:
                        # print(obj['name'])
                        inneritemsstring.append(obj['name'])
                        break

            # print(inneritemsstring)
        genreswithMappedNames.append(str(inneritemsstring))

        break
genreswithMappedNames[0:5]
```

```
     ["['Adventure', 'Fantasy', 'Family']",
      "['Fantasy', 'Adventure', 'Animation', 'Family']",
      "['Adventure', 'Action', 'Science Fiction']",
      "['Animation', 'Comedy', 'Family']",
      "['Action', 'Science Fiction', 'Adventure']"]
```

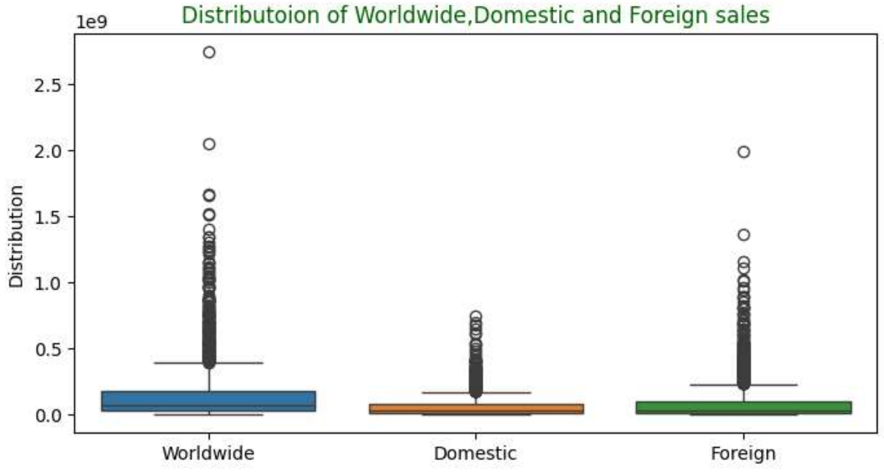
Adding the various genre names to the data frame

```
df['Genre_names']=genreswithMappedNames
df.head()
```

riginal_language	original_title	popularity	release_date	title	vote_average	vote_
en	Harry Potter and the Deathly Hallows: Part 1	33.533	2010-11-19	Harry Potter and the Deathly Hallows: Part 1	7.7	
en	How to Train Your Dragon	28.734	2010-03-26	How to Train Your Dragon	7.7	
en	Iron Man 2	28.515	2010-05-07	Iron Man 2	6.8	
en	Toy Story	28.005	1995-11-22	Toy Story	7.9	
en	Inception	27.920	2010-07-16	Inception	8.3	

Next steps: Generate code with df   View recommended plots

```
plt.figure(figsize=(8,4))
sns.boxplot(df[['Worldwide','Domestic','Foreign']],)
plt.ylabel('Distribution')
plt.title('Distributoion of Worldwide,Domestic and Foreign sales',color='darkgreen');
```



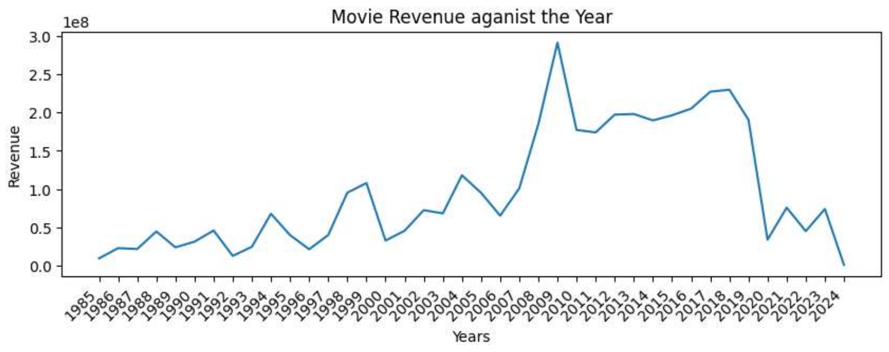
Though the data has outliers it is not necessary to remove them because the represent the sales value for differnt movies.

Popular or highly anticipated movies are likely to have high sales compared with the others

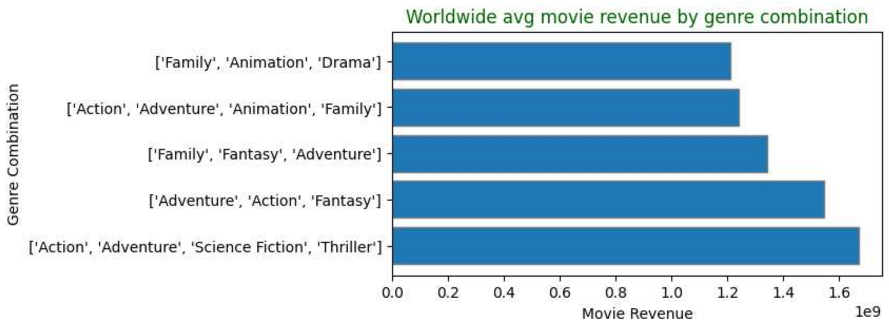
2. Visualizing the data

```
# Revenue over the years
x=df.groupby('Year')['Worldwide'].mean()
x=x.sort_index(ascending=True).tail(40)
fig, ax = plt.subplots(figsize=(10,3))
sns.lineplot(x=x.index,y=x.values)
plt.title('Movie Revenue aganist the Year')
plt.xlabel('Years')
plt.ylabel('Revenue')
ax.set_xticklabels(labels=x.index, rotation=45, ha='right');
```

```
<ipython-input-143-9376c72e8aaf>:8: UserWarning: FixedFormatter should only be used tog
  ax.set_xticklabels(labels=x.index, rotation=45, ha='right');
```

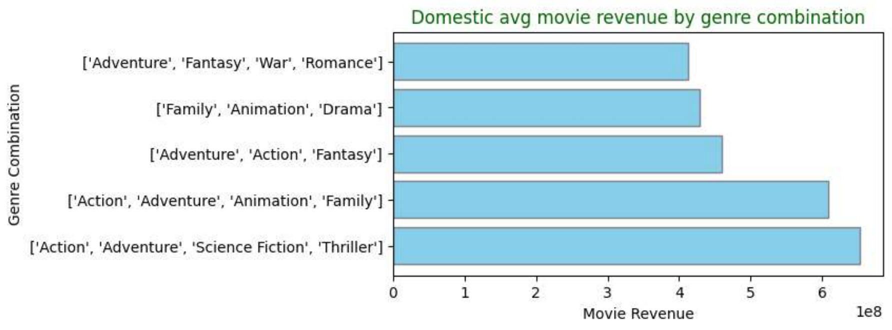


```
# Bar chart for the Top 5 genre combination and revenue generated by the Movies Worldwide
plt.figure(figsize=(6,3))
x=df.groupby('Genre_names')['Worldwide'].mean()
x=x.sort_values(ascending=False).head(5)
plt.barh( x.index,x.values,edgecolor='grey')
plt.title('Worldwide avg movie revenue by genre combination',color='darkgreen')
plt.xlabel('Movie Revenue')
plt.ylabel('Genre Combination');
```



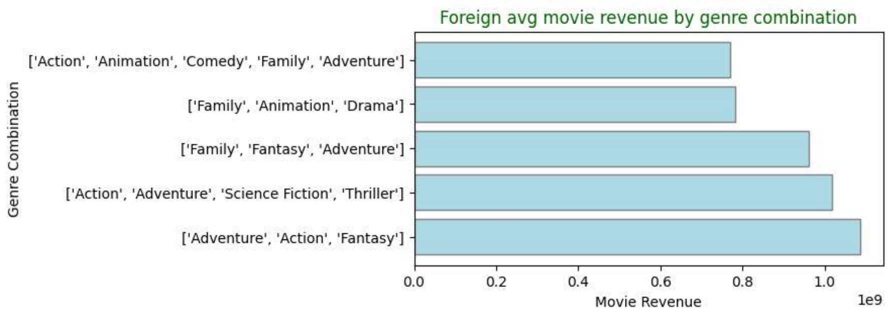
Movies that are a combination of Action,Adventure,science Fiction and Thriller have the highest average sales world wide

```
# Bar chart for the Top 5 genre combination and revenue generated by the Movies Domestic market
x=df.groupby('Genre_names')['Domestic'].mean()
x=x.sort_values(ascending=False).head(5)

plt.figure(figsize=(6,3))
plt.barh( x.index,x.values, color='skyblue',edgecolor='grey')
plt.title('Domestic avg movie revenue by genre combination',color='darkgreen')
plt.xlabel('Movie Revenue')
plt.ylabel('Genre Combination');
```



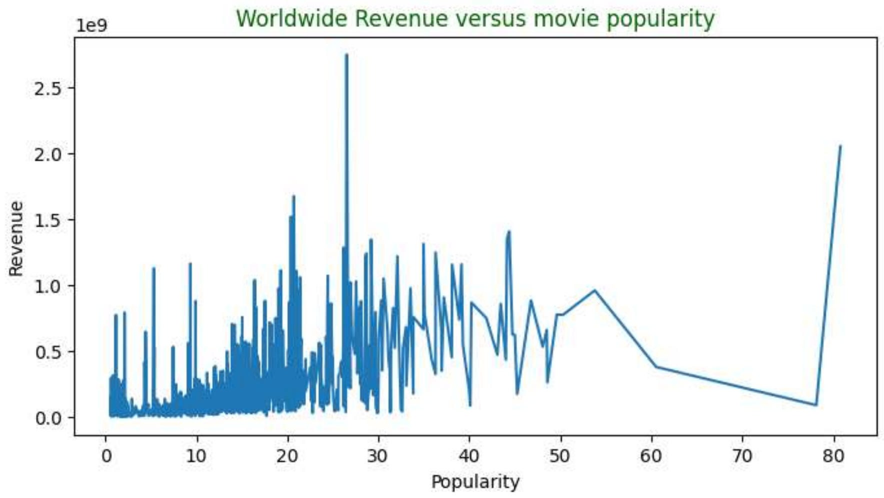
- Movies that are a combination of Action,Adventure,science Fiction and Thriller have the highest average sales in the Domestic market.

```
# Bar chart for the Top 5 genre combination and revenue generated by the Movies Foreign market
y=df.groupby('Genre_names')['Foreign'].mean()
y=y.sort_values(ascending=False).head(5)

plt.figure(figsize=(6,3))
plt.barh( y.index,y.values, color='lightblue',edgecolor='grey')
plt.title('Foreign avg movie revenue by genre combination',color='darkgreen')
plt.xlabel('Movie Revenue')
plt.ylabel('Genre Combination');
```

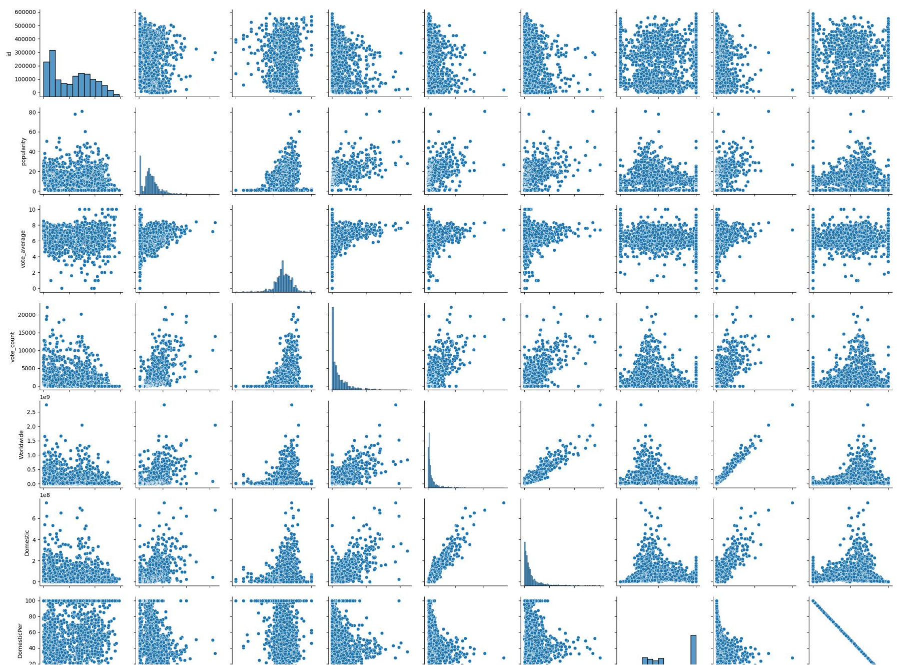


Movies that are a combination of Adventure,Action and Fantasy have the highest average sales in the foreign market

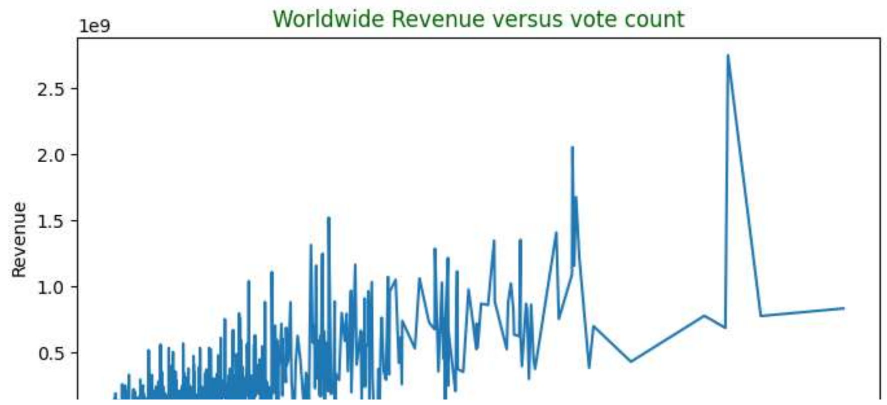
```
# Line graph showing the revenue aganist movie popularity
y=df.groupby('popularity')['Worldwide'].mean()
plt.figure(figsize=(8,4))
plt.title('Worldwide Revenue versus movie popularity',color='darkgreen')
plt.xlabel('Popularity')
plt.ylabel('Revenue')
plt.plot( y.index,y.values);
```



```
sns.pairplot(df);
```



```
# worldwide revenue aganist movie vote count
y=df.groupby('vote_count')['Worldwide'].mean()
plt.figure(figsize=(8,4))
plt.title('Worldwide Revenue versus vote count',color='darkgreen')
plt.xlabel('Votes count')
plt.ylabel('Revenue')
plt.plot( y.index,y.values);
```


Worldwide Revenue versus vote count
1e9
Revenue