

▼ Importing Libraries and loading the dataset

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

```
df=pd.read_csv('Summer-Olympic-medals-1976-to-2008 (1).csv', delimiter=',', encoding='latin-1')
df.head()
```

	City	Year	Sport	Discipline	Event	Athlete	Gender	Country_Code	Country	Event_gender	Medal
0	Montreal	1976.0	Aquatics	Diving	3m springboard	KÖHLER, Christa	Women	GDR	East Germany	W	Silver
1	Montreal	1976.0	Aquatics	Diving	3m springboard	KOSENKOVA, Aleksandr	Men	URS	Soviet Union	M	Bronze
2	Montreal	1976.0	Aquatics	Diving	3m springboard	BOGGS, Philip George	Men	USA	United States	M	Gold

```
df.shape
```

```
(15433, 11)
```

```
df.columns.tolist()
```

```
['City',
 'Year',
 'Sport',
 'Discipline',
 'Event',
 'Athlete',
 'Gender',
 'Country_Code',
 'Country',
 'Event_gender',
 'Medal']
```

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15433 entries, 0 to 15432
Data columns (total 11 columns):
 #   Column      Non-Null Count  Dtype  
 --- 
 0   City        15316 non-null   object 
 1   Year         15316 non-null   float64
 2   Sport        15316 non-null   object 
 3   Discipline   15316 non-null   object 
 4   Event        15316 non-null   object 
 5   Athlete      15316 non-null   object 
 6   Gender        15316 non-null   object 
 7   Country_Code 15316 non-null   object 
 8   Country      15316 non-null   object 
 9   Event_gender 15316 non-null   object 
 10  Medal        15316 non-null   object 
dtypes: float64(1), object(10)
memory usage: 1.3+ MB
```

```
df.isnull().sum()
df=df.dropna(how='all')
print(df.isnull().sum())
```

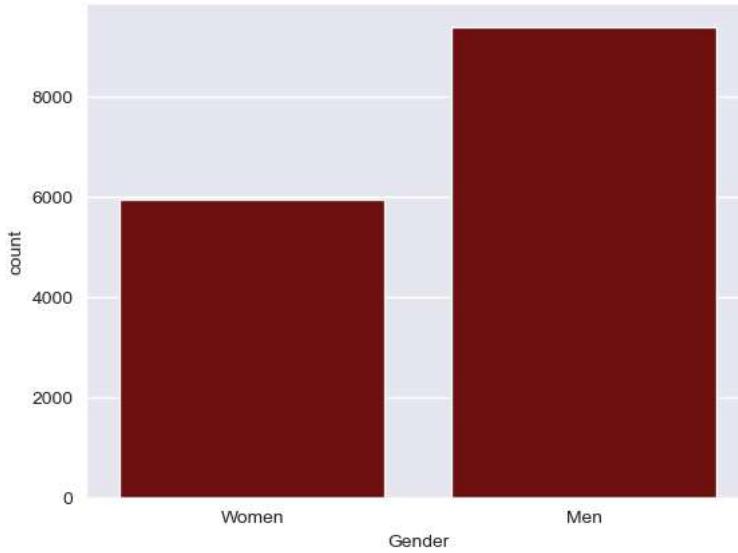
```
City          0
Year          0
Sport         0
Discipline    0
Event         0
Athlete       0
Gender        0
Country_Code  0
Country       0
Event_gender   0
```

```
Medal      0
dtype: int64
```

```
df=df.astype({'Year':'int'})
```

▼ Gender Ratio:

```
sns.set_style('darkgrid')
sns.set_palette(['maroon'])
sns.countplot(x='Gender',data=df)
plt.show()
```



▼ Insights:

- Men have significantly more participation than female in Olympics.

```
## Gender-wise medal counts in the top 10 countries.
gender_medal_count=df.groupby(['Country','Gender']).size().reset_index(name='Medals')
country_totals=gender_medal_count.groupby('Country')['Medals'].sum().sort_values(ascending=False).index
top_10_countries=country_totals[:10]
gender_medal_count_top_10=gender_medal_count[gender_medal_count['Country'].isin(top_10_countries)]
gender_medal_count_top_10['Country']=pd.Categorical(gender_medal_count_top_10['Country'],categories=top_10_countries,ordered=True)
gender_medal_count_top_10=gender_medal_count_top_10.sort_values('Country')
```

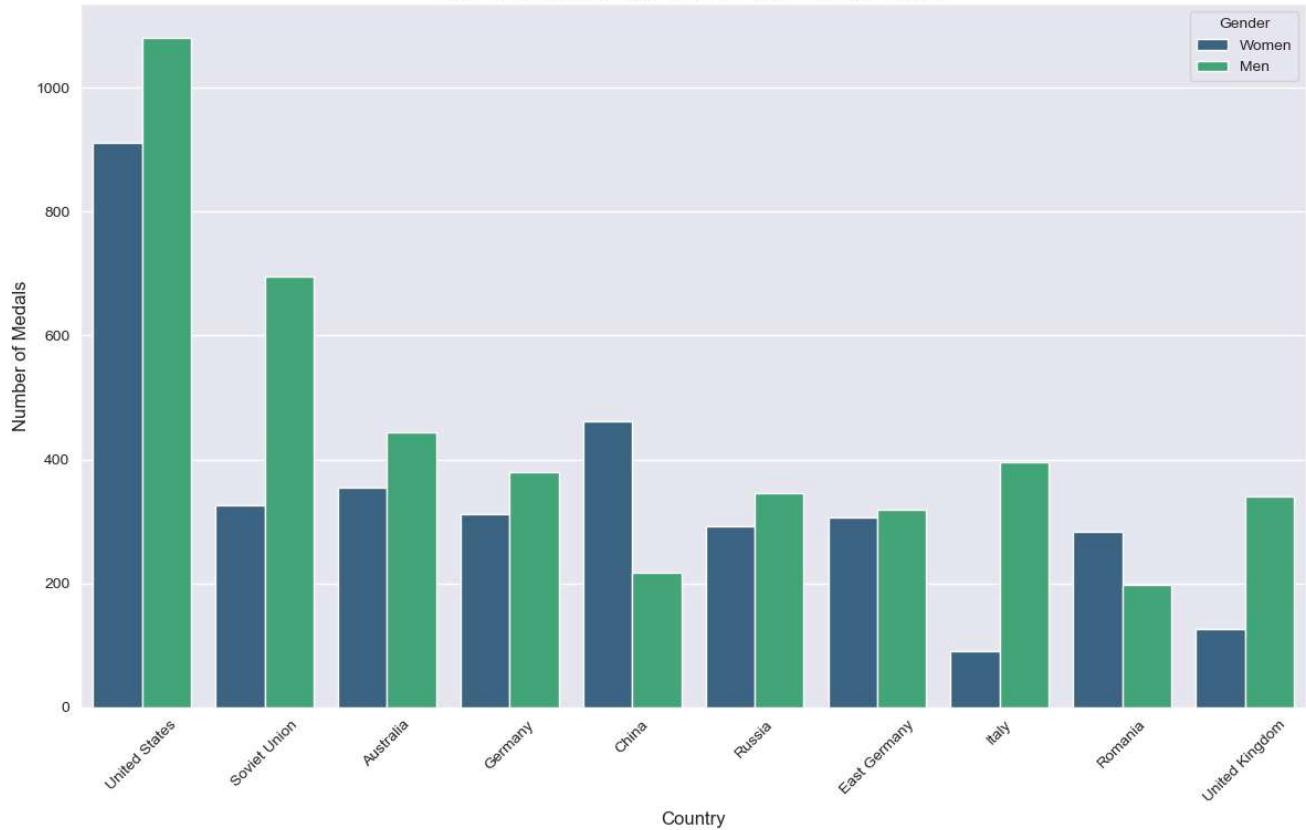
C:\Users\VAISHNAVI\AppData\Local\Temp\ipykernel_14928\664997919.py:6: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
gender_medal_count_top_10['Country']=pd.Categorical(gender_medal_count_top_10['Country'],categories=top_10_countries,ordered=True)

```
plt.figure(figsize=(12,8))
sns.barplot(data=gender_medal_count_top_10,
            x='Country',
            y='Medals',
            hue='Gender',
            palette='viridis')

plt.title('Top 10 Countries by Gender-wise Medal Count', fontsize=16)
plt.xlabel('Country', fontsize=12)
plt.ylabel('Number of Medals', fontsize=12)
plt.xticks(rotation=45)
plt.legend(title='Gender')
plt.tight_layout()
plt.show()
```

Top 10 Countries by Gender-wise Medal Count



▼ Insights:

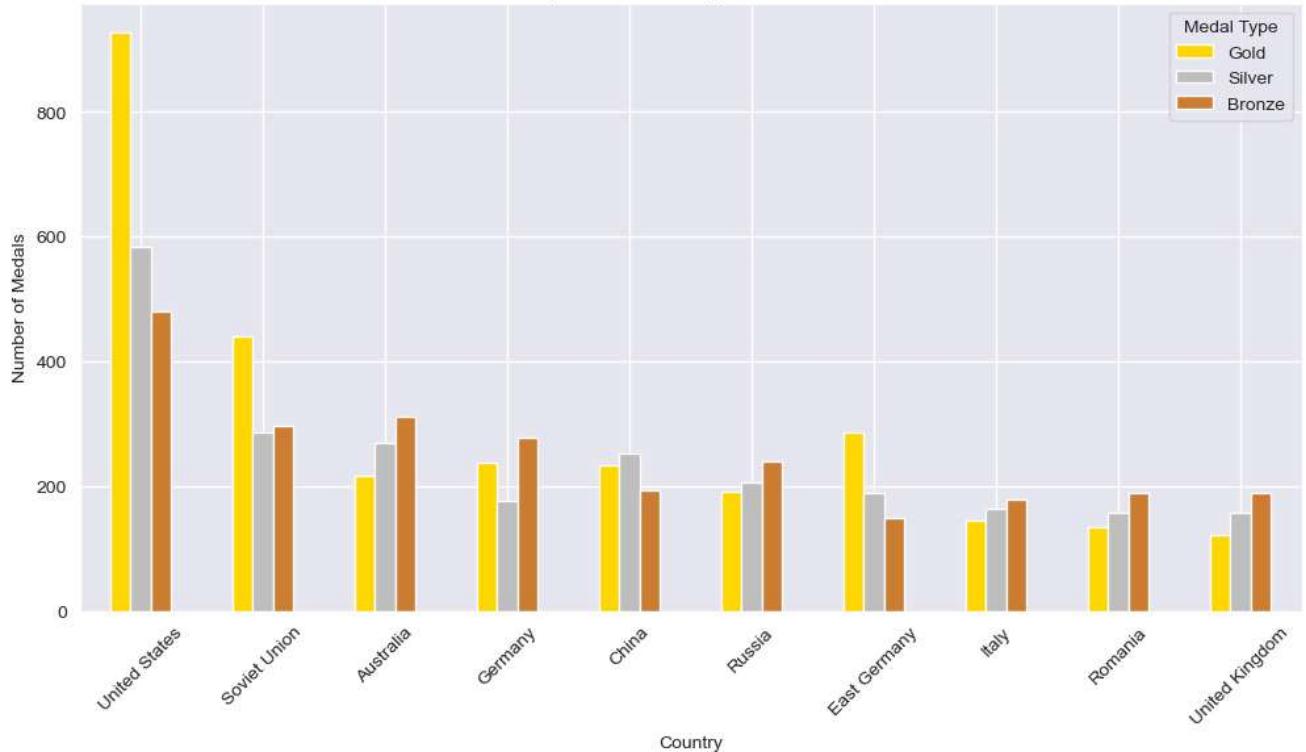
- Some countries like China, Romania have more women count who have won medals for their country.
- Other countries have more male athletes winning, US being the top 1 in the list.

```

## Count of Gold, Silver and Bronze medals. Top countries by total no. of medals.
medals=df.groupby(['Country','Medal']).size().reset_index(name='Count')
medals_pivot=medals.pivot(index='Country',columns='Medal',values='Count').fillna(0)
medals_pivot['Total']=medals_pivot.sum(axis=1)
top_10=medals_pivot.sort_values('Total',ascending=False).head(10)
top_10[["Gold", "Silver", "Bronze"]].plot(
    kind="bar", figsize=(12,6),
    color=[ "#FFD700", "#C0C0C0", "#CD7F32"]
)
plt.title("Top 10 Countries by Total Medals")
plt.ylabel("Number of Medals")
plt.xlabel("Country")
plt.xticks(rotation=45)
plt.legend(title="Medal Type")
plt.show()

```

Top 10 Countries by Total Medals



```
## Medalists who won medals in more than one sports.
df_clean = df.drop_duplicates(
    subset=['Athlete', 'Country_Code', 'Year', 'Event', 'Medal']
)
athlete_versatility=df.groupby(['Athlete','Country_Code']).agg(
    Unique_Sports=('Sport','nunique'),
    Total_Medals=('Medal','count')).reset_index()
multi_sport_medalists=(athlete_versatility[athlete_versatility['Unique_Sports']>1].sort_values(by=['Unique_Sports','Total_Medal
print('Multi_Sport Medalists (Medals in 2 or more Unique Sports)')
print(multi_sport_medalists.head(10).to_markdown(numalign='left',stralign='left'))
# Check the maximum number of unique sports any athlete has medaled in
max_versatility = athlete_versatility['Unique_Sports'].max()

print(f"The maximum number of unique sports an athlete medaled in is: {max_versatility}")
```

	Athlete	Country_Code	Unique_Sports	Total_Medals
11198	YANG, Wei	CHN	2	5
1536	CHEN, Jing	CHN	2	3
5243	KOVACS, Istvan	HUN	2	3
5793	LI, Na	CHN	2	3
2228	DIMITROV, Stefan	BUL	2	2
5108	KOLESNIKOV, Nikolai	URS	2	2
5640	LEE, Eun Kyung	KOR	2	2
5801	LI, Ting	CHN	2	2
8554	ROMERO, Rebecca	GBR	2	2
10159	TOMA, Sanda	ROU	2	2

The maximum number of unique sports an athlete medaled in is: 2

```
## Sports in which the top medalists won the medal.
if not multi_sport_medalists.empty:
    top_athlete=multi_sport_medalists.iloc[0]['Athlete']
    top_country=multi_sport_medalists.iloc[0]['Country_Code']
    athlete_details=df[(df['Athlete']==top_athlete) & (df['Country_Code']==top_country)]
    sports_list=athlete_details['Sport'].unique()
    print(f'Sports won by most versatile athlete: {top_athlete} ({top_country})')
    print(sports_list)
```

Sports won by most versatile athlete: YANG, Wei (CHN)
['Badminton' 'Gymnastics']

Calculates efficiency of the medals (gold-to-total-ratio) of a country.

- It might happen that a country having more medals but not gold and some other country having less medal but more gold medals. Here the analysis will help us in distinguishing between quantity and efficiency of success.

```

medal_counts=df.pivot_table(
    index='Country',
    columns='Medal',
    values='Athlete',
    aggfunc='count',
    fill_value=0)

required_medals=['Gold','Silver','Bronze']
for medal in required_medals:
    if medal not in medal_counts.columns:
        medal_counts[medal]=0

medal_counts['Total Medals']=medal_counts['Gold']+medal_counts['Silver']+medal_counts['Bronze']
medal_counts['Medal Efficiency']=(medal_counts['Gold']/medal_counts['Total Medals']).replace(0,1)
min_medals_threshold=10
efficient_countries=(medal_counts[medal_counts['Total Medals']]>=min_medals_threshold).sort_values(by='Medal Efficiency',ascending=False)[['Gold','Silver','Bronze','Total Medals','Medal Efficiency']]
print('Top Countries by Medal Efficiency (Min 10 Total Medals)')
print('\n')
print(efficient_countries.head(10).to_markdown(numalign='left',stralign='left',floatfmt='.3f'))

```

Top Countries by Medal Efficiency (Min 10 Total Medals)

Country	Gold	Silver	Bronze	Total Medals	Medal Efficiency
Cameroon	20.000	0.000	1.000	21.000	0.952
Zimbabwe	18.000	4.000	1.000	23.000	0.783
India	17.000	1.000	4.000	22.000	0.773
Denmark	78.000	20.000	50.000	148.000	0.527
Ethiopia	15.000	5.000	12.000	32.000	0.469
United States	928.000	583.000	481.000	1992.000	0.466
East Germany	286.000	190.000	150.000	626.000	0.457
Cuba	152.000	109.000	88.000	349.000	0.436
Soviet Union	439.000	285.000	297.000	1021.000	0.430
Unified team	92.000	65.000	66.000	223.000	0.413

Result:

Although from above results we know that the top country by the total no. of medals is United States but the top country in terms of efficiency is Cameroon with a medal efficiency of 0.952 followed by Zimbabwe and India.

```

# Group by Gender and Discipline to calculate total medals and unique athletes.
gender_comparision=df.groupby(['Discipline','Gender']).agg(Total_Medals=('Medal','count'), Unique_Athletes=('Athlete','nunique'))
print('Intermediate Data (Total Medals and Unique Athlete):\n',gender_comparision.head())

Intermediate Data (Total Medals and Unique Athlete):
   Discipline Gender  Total_Medals  Unique_Athletes
0      Archery   Men         81           57
1      Archery  Women         81           56
2  Artistic G.   Men        366          189
3  Artistic G.  Women        306          163
4   Athletics   Men        831          646

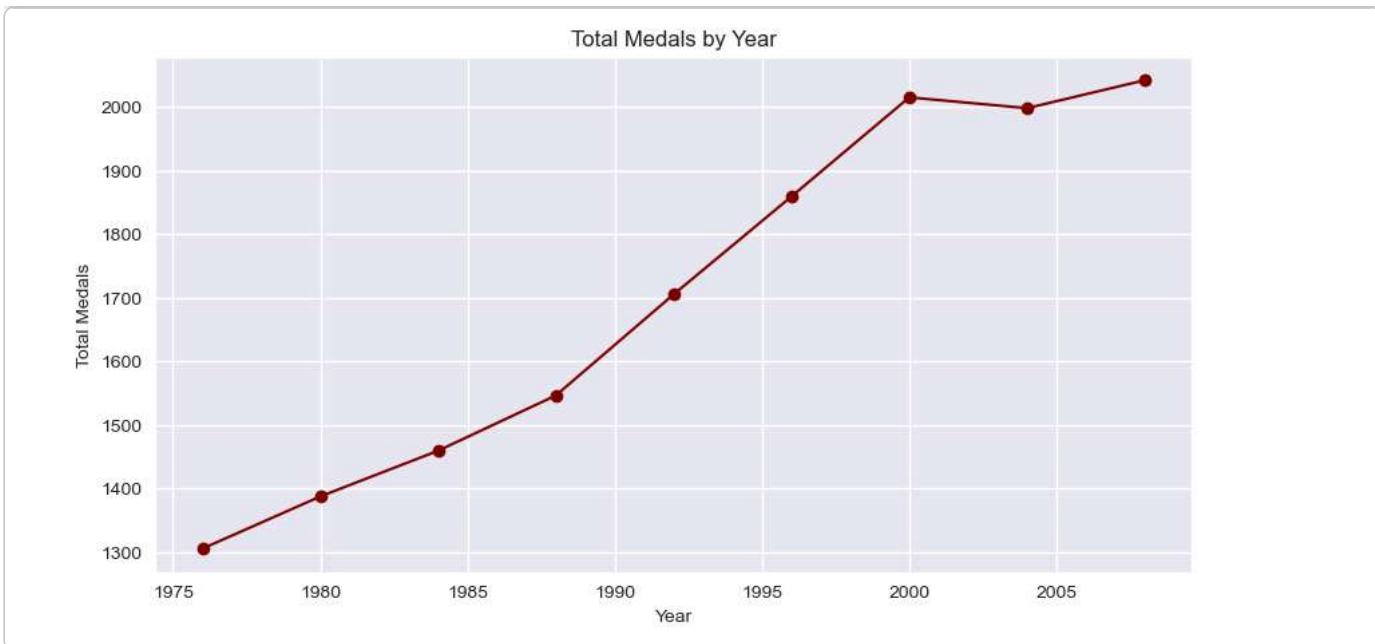
```

```

# Total Medals by Year
medals_by_year = df.groupby("Year")["Medal"].count().reset_index()

plt.figure(figsize=(10,5))
plt.plot(medals_by_year["Year"], medals_by_year["Medal"], marker="o")
plt.title("Total Medals by Year")
plt.xlabel("Year")
plt.ylabel("Total Medals")
plt.grid(True)
plt.show()

```

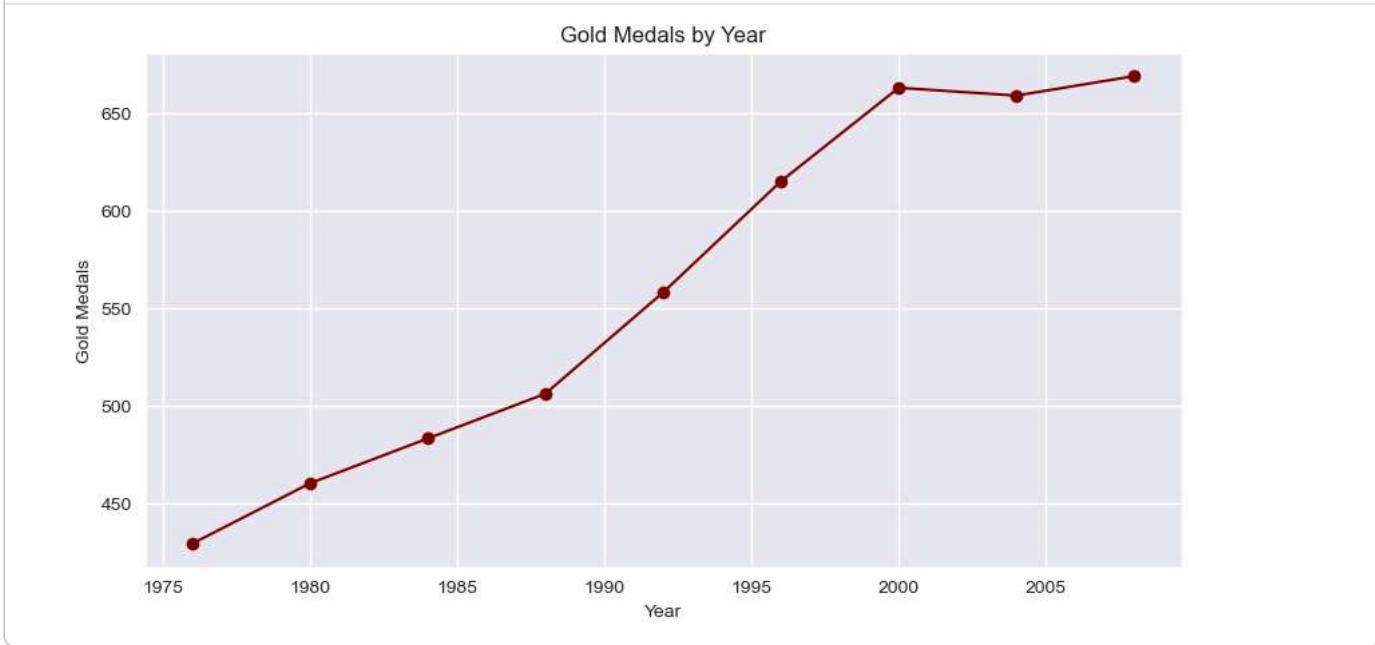


▼ Insights:

- Total no. of medals awarded has strong upward trend in all those years.
- No. of Total medals awarded almost doubled between 1976 (approx 1300) and 2000 (approx. 2000).

```
# Gold Medals by Year
gold_by_year = df[df["Medal"] == "Gold"].groupby("Year")["Medal"].count().reset_index()

plt.figure(figsize=(10,5))
plt.plot(gold_by_year["Year"], gold_by_year["Medal"], marker="o")
plt.title("Gold Medals by Year")
plt.xlabel("Year")
plt.ylabel("Gold Medals")
plt.grid(True)
plt.show()
```



▼ Insights:

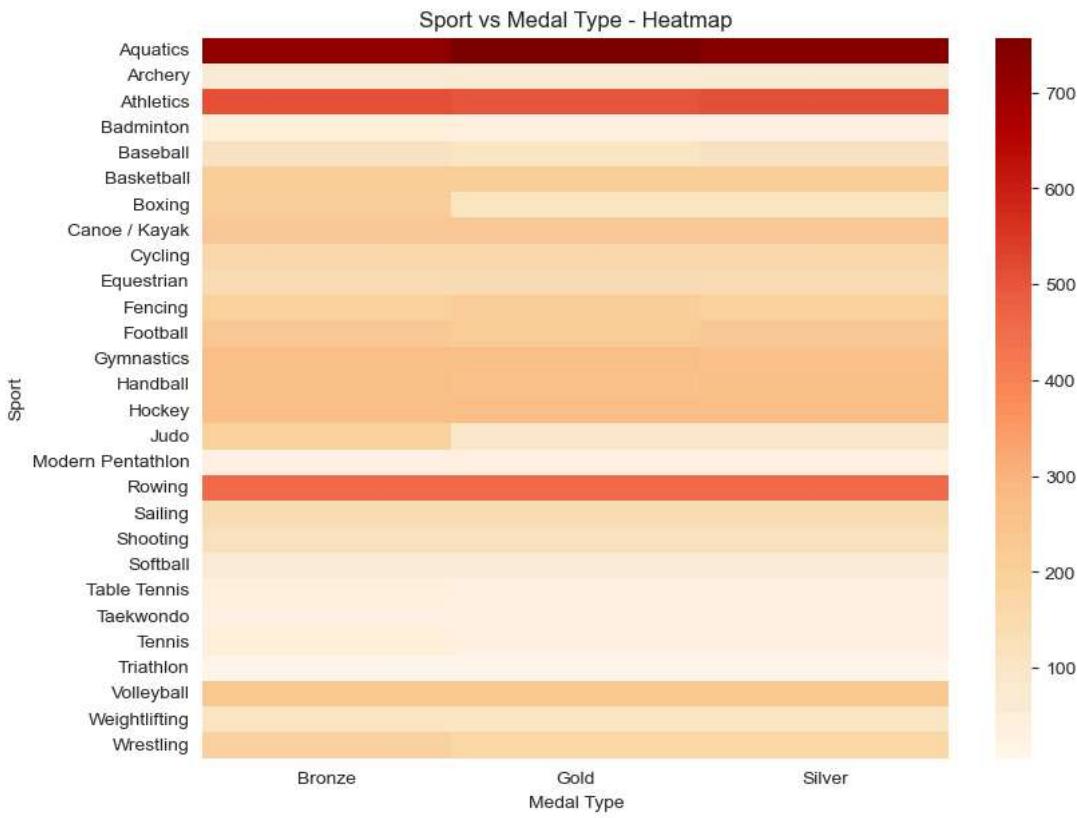
- There's a strong increasing trend in gold medal from 1976 to 2008.

- Period between 1990 to 2000 shows the steepest increase.

```
# Sport vs Medal Count Heatmap

sport_medal = df.pivot_table(
    index="Sport",
    columns="Medal",
    values="Athlete",
    aggfunc="count",
    fill_value=0
)

plt.figure(figsize=(9,7))
sns.heatmap(sport_medal, cmap="OrRd")
plt.title("Sport vs Medal Type - Heatmap")
plt.xlabel("Medal Type")
plt.ylabel("Sport")
plt.show()
```



Insights:

- Aquatics is the clear leader with highest no. of medals across the board.
- Many sports like Archery and Fencing have significantly lower medal counts.

✓ Summary:

- USA is the top overall performer
- China improved sharply after 2000
- Athletics & Swimming offer the highest medal opportunities
- Female participation increased over the years
- Some countries have high efficiency despite fewer medals

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