120 Years of Olympic History

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INTRODUCTION

1. Meta Information:

The ‘modern Olympics’ comprises all the Games from Athens 1986 to Rio 2016. The Olympics is more than just a quadrennial multi-sport world championship. It is a lens through which to understand global history, including shifting geopolitical power dynamics, women’s empowerment, and the evolving values of society.

This is a historical dataset on the modern Olympic Games, including all the Games from Athens 1896 to Rio 2016. The data is being used to study how many countries participated in each year, total medals won by each country, average age of players, number of teams sent by each country in all of the Olympics and their performance.

The Olympic data on www.sports-reference.com is the result of an incredible amount of research by a group of Olympic history enthusiasts and self-proclaimed 'statisticians'.

Source : www.sports-reference.com

Data Description

The data contains 271116 rows and 15 columns. Each row corresponds to an individual athlete competing in an individual Olympic event (athlete-events). The columns are:

1. **ID** - Unique number for each athlete
2. **Name** - Athlete's name
3. **Sex** - M or F
4. **Age** - Integer
5. **Height** - In centimeters
6. **Weight** - In kilograms
7. **Team** - Team name
8. **NOC** - National Olympic Committee 3-letter code
9. **Games** - Year and season
10. **Year** - Integer
11. **Season** - Summer or Winter
12. **City** - Host city
13. **Sport** - Sport
14. **Event** - Event
15. **Medal** - Gold, Silver, Bronze, or NA

Data Quality

- Noise – No such external object, value or data is shown that would modify the dataset.
- Duplicate Data – Some duplicate data are present in the dataset.
- Missing Values – There are few missing values in the dataset.

Data Preprocessing

Importing libraries: -

```
#for converting the given csv file into pandas data frame in order to do preprocessing
import pandas as pd
#for handling arrays
```

```
import numpy as np
#for graph plots
import seaborn as sns
#import of various modules within Matplotlib
%pylab inline
```

```
Populating the interactive namespace from numpy and matplotlib
```

Importing Dataset: -

In [44]:

```
dataset = pd.read_csv('C:\Users\Dheeraj\Desktop/athlete_events.csv')
dataset.head()
```

Out[44]:

	ID	Name	Sex	Age	Height	Weight	Team	NOC	Games	Year	Season	City	Sport	Event	Medal
0	1	A Dijiang	M	24.0	180.0	80.0	China	CHN	1992 Summer	1992	Summer	Barcelona	Basketball	Basketball Men's Basketball	NaN
1	2	A Lamusi	M	23.0	170.0	60.0	China	CHN	2012 Summer	2012	Summer	London	Judo	Judo Men's Extra-Lightweight	NaN
2	3	Gunnar Nielsen Aaby	M	24.0	NaN	NaN	Denmark	DEN	1920 Summer	1920	Summer	Antwerpen	Football	Football Men's Football	NaN
3	4	Edgar Lindenau Aabye	M	34.0	NaN	NaN	Denmark/Sweden	DEN	1900 Summer	1900	Summer	Paris	Tug-Of-War	Tug-Of-War Men's Tug-Of-War	Gold
4	5	Christine Jacoba Aaftink	F	21.0	185.0	82.0	Netherlands	NED	1988 Winter	1988	Winter	Calgary	Speed Skating	Speed Skating Women's 500 metres	NaN

- For finding the number of missing values in each column.

In [45]:

```
dataset.isnull().sum()
```

Out[45]:

```
ID             0
Name           0
Sex            0
Age         9474
Height     60171
Weight     62875
Team           0
NOC            0
Games          0
Year           0
Season         0
City           0
Sport          0
Event          0
Medal     231333
dtype:     int64
```

- Replacing ‘NA’ with ‘NP’ in the medal column as in the dataset ‘NA’ in medal column denotes no medals won instead of missing values.

In [46]:

```
dataset['Medal'].fillna('NP', inplace=True)
dataset.isnull().sum()
```

Out[46]:

```
ID            0
Name          0
Sex           0
Age        9474
Height    60171
Weight    62875
Team          0
NOC           0
Games         0
Year          0
Season        0
City          0
Sport         0
Event         0
Medal         0
dtype: int64
```

- Replacing the missing values in the age, height and weight column with their respective mean value for the sake of simplicity. Then finding the no of missing values in each column which should turn out to be 0 in each.

In [47]:

```
dataset['Age']=dataset['Age'].replace(np.NaN,dataset['Age'].mean())
dataset['Height']=dataset['Height'].replace(np.NaN,dataset['Height'].mean())
dataset['Weight']=dataset['Weight'].replace(np.NaN,dataset['Weight'].mean())
dataset.isnull().sum()
```

Out[47]:

```
ID        0
Name      0
```

```
Sex       0
Age       0
Height    0
Weight    0
Team      0
NOC       0
Games     0
Year      0
Season    0
City      0
Sport     0
Event     0
Medal     0
dtype: int64
```

- For finding duplicate values in dataset

In [48]:

```
dup = dataset[dataset.duplicated(subset = None, keep=False)]
dup
```

Out[48]:

	ID	Name	Sex	Age	Height	Weight	Team	NOC	Games	Year	Season	City	Sport	Event	Medal
1251	704	Dsir Antoine Acket	M	27.000000	175.33897	70.702393	Belgium	BEL	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP

1252	704	Dsir Antoine Acket	M	27.000000	175.33897	70.702393	Belgium	BEL	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
4281	2449	William Truman Aldrich	M	48.000000	175.33897	70.702393	United States	USA	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Drawings And ...	NP
4282	2449	William Truman Aldrich	M	48.000000	175.33897	70.702393	United States	USA	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Drawings And ...	NP
4283	2449	William Truman Aldrich	M	48.000000	175.33897	70.702393	United States	USA	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Drawings And ...	NP
4861	2777	Hermann Reinhard Alker	M	43.000000	175.33897	70.702393	Germany	GER	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Architecture, Designs F...	NP
4862	2777	Hermann Reinhard Alker	M	43.000000	175.33897	70.702393	Germany	GER	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Architecture, Designs F...	NP

4863	2777	Hermann Reinhard Alker	M	43.000000	175.33897	70.702393	Germany	GER	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Architecture, Architect...	NP
4864	2777	Hermann Reinhard Alker	M	43.000000	175.33897	70.702393	Germany	GER	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Architecture, Architect...	NP
4866	2777	Hermann Reinhard Alker	M	51.000000	175.33897	70.702393	Germany	GER	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Architecture, Unknown E...	NP
4867	2777	Hermann Reinhard Alker	M	51.000000	175.33897	70.702393	Germany	GER	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Architecture, Unknown E...	NP
5104	2903	Lucien Charles Edouard Alliot	M	46.000000	175.33897	70.702393	France	FRA	1924 Summer	1924	Summer	Paris	Art Competitions	Art Competitions Mixed Sculpturing	NP
5105	2903	Lucien Charles Edouard Alliot	M	46.000000	175.33897	70.702393	France	FRA	1924 Summer	1924	Summer	Paris	Art Competitions	Art Competitions Mixed Sculpturing	NP

5106	2903	Lucien Charles Edouard Alliot	M	46.000000	175.33897	70.702393	France	FRA	1924 Summer	1924	Summer	Paris	Art Competitions	Art Competitions Mixed Sculpturing	NP
7769	4319	Ludwig Angerer	M	41.000000	175.33897	70.702393	Germany	GER	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
7770	4319	Ludwig Angerer	M	41.000000	175.33897	70.702393	Germany	GER	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
7771	4319	Ludwig Angerer	M	41.000000	175.33897	70.702393	Germany	GER	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
7772	4319	Ludwig Angerer	M	41.000000	175.33897	70.702393	Germany	GER	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
7773	4319	Ludwig Angerer	M	45.000000	175.33897	70.702393	Germany	GER	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
7774	4319	Ludwig Angerer	M	45.000000	175.33897	70.702393	Germany	GER	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Painting,	NP

														Unknown Event	
9365	5146	George Denholm Armour	M	64.000000	175.33897	70.702393	Great Britain	GBR	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
9366	5146	George Denholm Armour	M	64.000000	175.33897	70.702393	Great Britain	GBR	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
9367	5146	George Denholm Armour	M	64.000000	175.33897	70.702393	Great Britain	GBR	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
9368	5146	George Denholm Armour	M	64.000000	175.33897	70.702393	Great Britain	GBR	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
9369	5146	George Denholm Armour	M	68.000000	175.33897	70.702393	Great Britain	GBR	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
9370	5146	George Denholm Armour	M	68.000000	175.33897	70.702393	Great Britain	GBR	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP

10281	5623	Konstantinos Aslanidis	M	25.556898	175.33897	70.702393	Greece	GRE	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Architecture, Unknown E...	NP
10282	5623	Konstantinos Aslanidis	M	25.556898	175.33897	70.702393	Greece	GRE	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Architecture, Unknown E...	NP
10294	5634	Axel Edvin "Ackeslund	M	50.000000	175.33897	70.702393	Sweden	SWE	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
10295	5634	Axel Edvin "Ackeslund	M	50.000000	175.33897	70.702393	Sweden	SWE	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
...	...	...	...	...	...	...	...	...	...	...	...	...	...	...	...
266300	133226	Mahonri Mackintosh Young	M	54.000000	175.33897	70.702393	United States	USA	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Sculpturing, Unknown Event	NP
267330	133749	Oldich "Olda" k	M	35.000000	175.33897	70.702393	Czechoslovakia	TCH	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Sculpturing,	NP

														Unknown Event	
267331	133749	Oldich "Olda" k	M	35.000000	175.33897	70.702393	Czechoslovakia	TCH	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Sculpturing, Unknown Event	NP
267332	133749	Oldich "Olda" k	M	35.000000	175.33897	70.702393	Czechoslovakia	TCH	1936 Summer	1936	Summer	Berlin	Art Competitions	Art Competitions Mixed Sculpturing, Unknown Event	NP
267928	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267929	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267930	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267931	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting,	NP

														Paintings	
267932	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267933	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267934	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267935	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267936	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267937	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP

267938	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267939	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267940	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267941	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267942	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
267943	134046	ngel Zrraga Argelles	M	41.000000	175.33897	70.702393	Mexico	MEX	1928 Summer	1928	Summer	Amsterdam	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
269992	135072	Anna Katrina Zinkeisen	F	46.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed	NP

		(-Heseltine)											Painting, Paintings	
269993	135072	Anna Katrina Zinkeisen (-Heseltine)	F	46.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
269994	135072	Anna Katrina Zinkeisen (-Heseltine)	F	46.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
269995	135072	Anna Katrina Zinkeisen (-Heseltine)	F	46.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Paintings	NP
269996	135072	Anna Katrina Zinkeisen (-Heseltine)	F	46.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
269997	135072	Anna Katrina Zinkeisen (-Heseltine)	F	46.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
269998	135073	Doris Clare Zinkeisen (-Johnstone)	F	49.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP

269999	135073	Doris Clare Zinkeisen (-Johnstone)	F	49.000000	175.33897	70.702393	Great Britain	GBR	1948 Summer	1948	Summer	London	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
270199	135173	Henri Achille Zo	M	58.000000	175.33897	70.702393	France	FRA	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP
270200	135173	Henri Achille Zo	M	58.000000	175.33897	70.702393	France	FRA	1932 Summer	1932	Summer	Los Angeles	Art Competitions	Art Competitions Mixed Painting, Unknown Event	NP

1997 rows × 15 columns

- For removing the duplicate values from the dataset and again finding the duplicate values which should be empty.

In [49]:

```
dataset.drop_duplicates(subset="Name", keep=False, inplace=True)
dup = dataset[dataset.duplicated(subset = None, keep=False)]
dup
```

Out[49]:

	ID	Name	Sex	Age	Height	Weight	Team	NOC	Games	Year	Season	City	Sport	Event	Medal

As the list turn out to be empty so now there are no duplicate values in the dataset.

Inferences: -

- For finding the country names with most gold medals and the number of teams that have won gold medals for their respective country.

In [50]:

```
most_gold = dataset[dataset['Medal'] == 'Gold']['Team'].value_counts().head()
gold = pd.DataFrame(most_gold)
gold.reset_index(inplace=True)
gold
```

Out[50]:

	index	Team
0	United States	770
1	Soviet Union	288
2	Canada	174
3	Great Britain	162
4	Germany	159

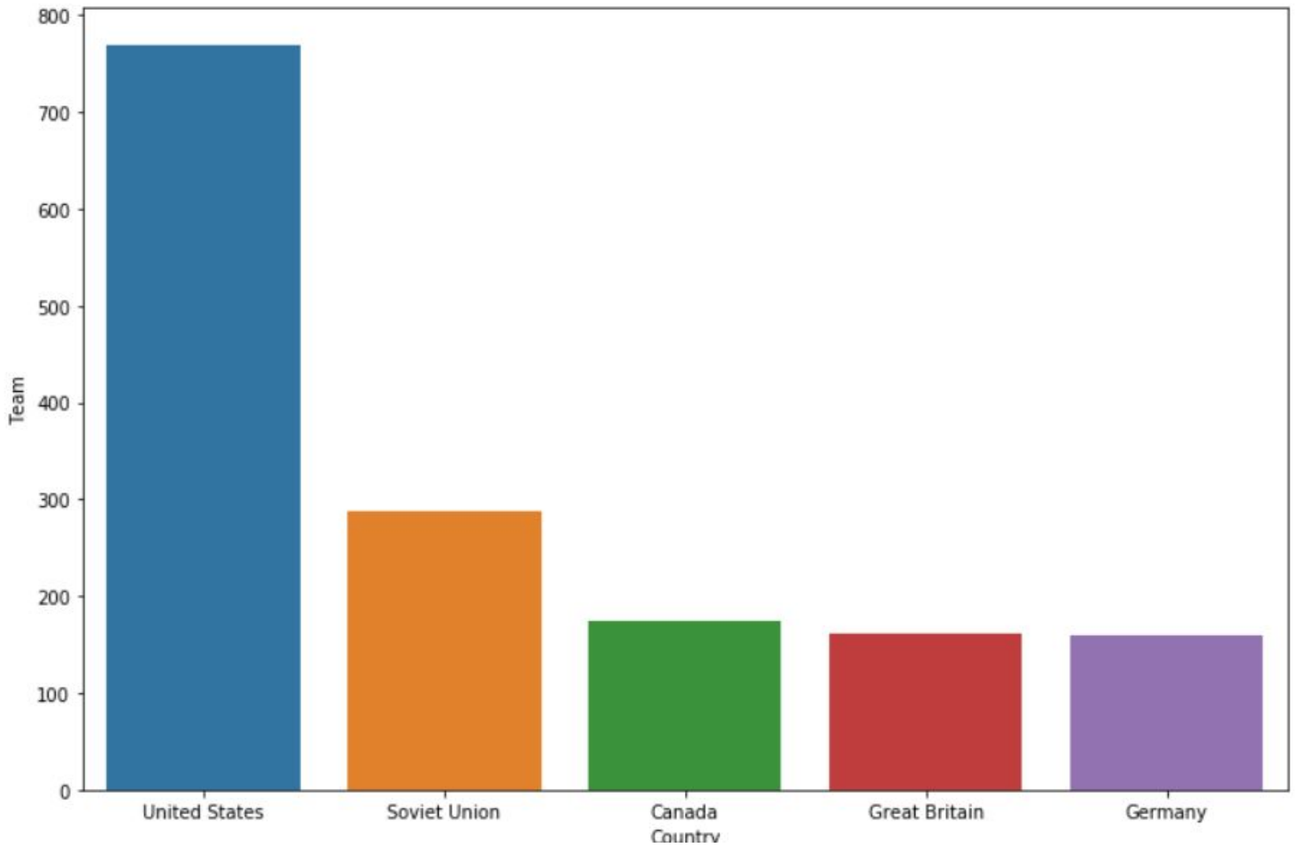
- For plotting a bar graph with top five countries with the number of gold medals on the x axis and number of teams on the y axis.

In [51]:

```
gold.rename(columns={'index':'Country'}, inplace=True)
plt.figure(figsize=(12,8))
sns.barplot(x='Country', y='Team', data=gold)
```

Out[51]:

```
<matplotlib.axes._subplots.AxesSubplot at 0xf3f4358>
```



USA is in the lead with a very high margin and next in the line is Soviet Unioun.

- Using describe function to find the summary of the dataset such as mean, different quartiles, here average or mean, max and min values of age, height and weight are the most relevant information. It is done for only the numeric information as we have included np.number.

In [55]:

```
dataset.describe(include=[np.number])
```

Out[55]:

	ID	Age	Height	Weight	Year
count	77009.000000	77009.000000	77009.000000	77009.000000	77009.000000

mean	67266.393590	25.092461	176.275986	71.892533	1976.867379
std	39188.417047	5.518379	8.765076	12.248978	31.156368
min	1.000000	10.000000	127.000000	28.000000	1896.000000
25%	33193.000000	22.000000	172.000000	66.000000	1956.000000
50%	67311.000000	24.000000	175.338970	70.702393	1984.000000
75%	101016.000000	27.000000	180.000000	76.000000	2004.000000
max	135569.000000	97.000000	223.000000	198.000000	2016.000000

- It is done for non-numeric information in the dataset. It gives us the count and unique values in respective columns.

In [57]:

```
dataset.describe(exclude=[np.number])
```

Out[57]:

	Name	Sex	Team	NOC	Games	Season	City	Sport	Event	Medal
count	77009	77009	77009	77009	77009	77009	77009	77009	77009	77009
unique	77009	2	892	229	51	2	42	66	661	4
top	Forrest Grady Towns	M	United States	USA	2016 Summer	Summer	London	Athletics	Football Men's Football	NP
freq	1	59529	5307	5721	6288	68883	7334	12300	5094	65517

Total 229 countries have participated in Olympics playing for 66 different sports for 661 events. USA has appeared the most, Athletics category has the maximum frequency among all the sports and Football Men's has the highest frequency in the event. 2016 Summer Olympics has the highest participation of athletes among all the tournaments which shows that more and more athletes are participating after every tournament.

- For finding the number of sports that were played in the respective years.

In [59]:

```
year = dataset.groupby('Year')['Sport'].nunique()
year = pd.DataFrame(year)
```

```
year.reset_index(inplace=True)
year.head()
```

Out[59]:

	Year	Sport
0	1896	8
1	1900	20
2	1904	18
3	1906	13
4	1908	24

Here it can be seen that initially the numbers of sports that were played in the initial years were very low and with each tournament, numbers of sports are increasing gradually.

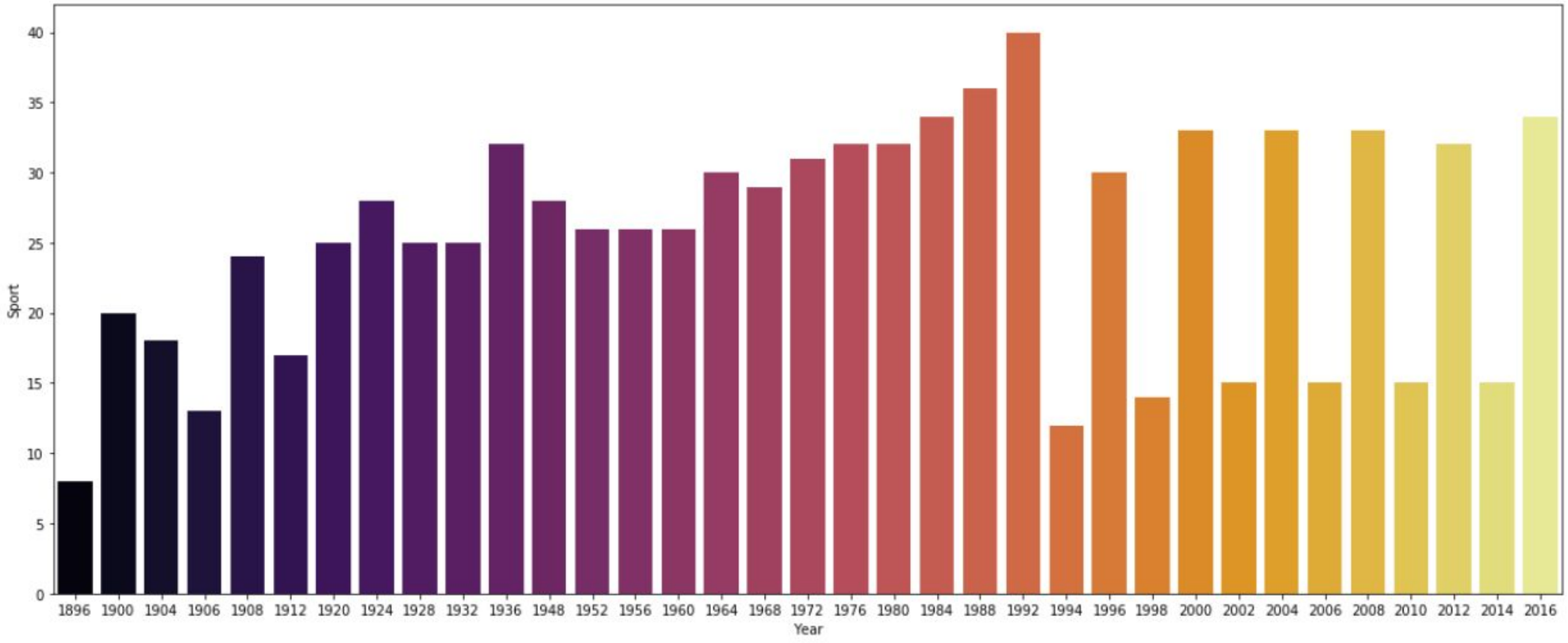
- For plotting the bar graph for the number of sports that are the part of Olympic tournament each year for both summer and winter Olympics.

In [60]:

```
plt.figure(figsize=(20,8))
sns.barplot(x='Year', y='Sport', data=year, palette='inferno')
```

Out[60]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x10f93d68>
```



After 2000 the number of sports is almost constant. 1992 Olympics held the max number of sports ever and 1896, the year in which Olympics began held the minimum. Winter Olympics started from the year 1994 and is also held after every 4 years. 2016 summer Olympics have highest participation instead of having less sports category than the year 1992.

- For total events in which different countries have participated in and are grouped by NOC.

In [61]:

```
dataset.groupby('NOC')['Medal'].count().head()
medal = dataset.groupby('NOC')['Medal'].count()
```

```
medal = pd.DataFrame(medal)
medal.reset_index(inplace=True)
medal.head()
```

Out[61]:

	NOC	Medal
0	AFG	82
1	AHO	37
2	ALB	26
3	ALG	251
4	AND	24

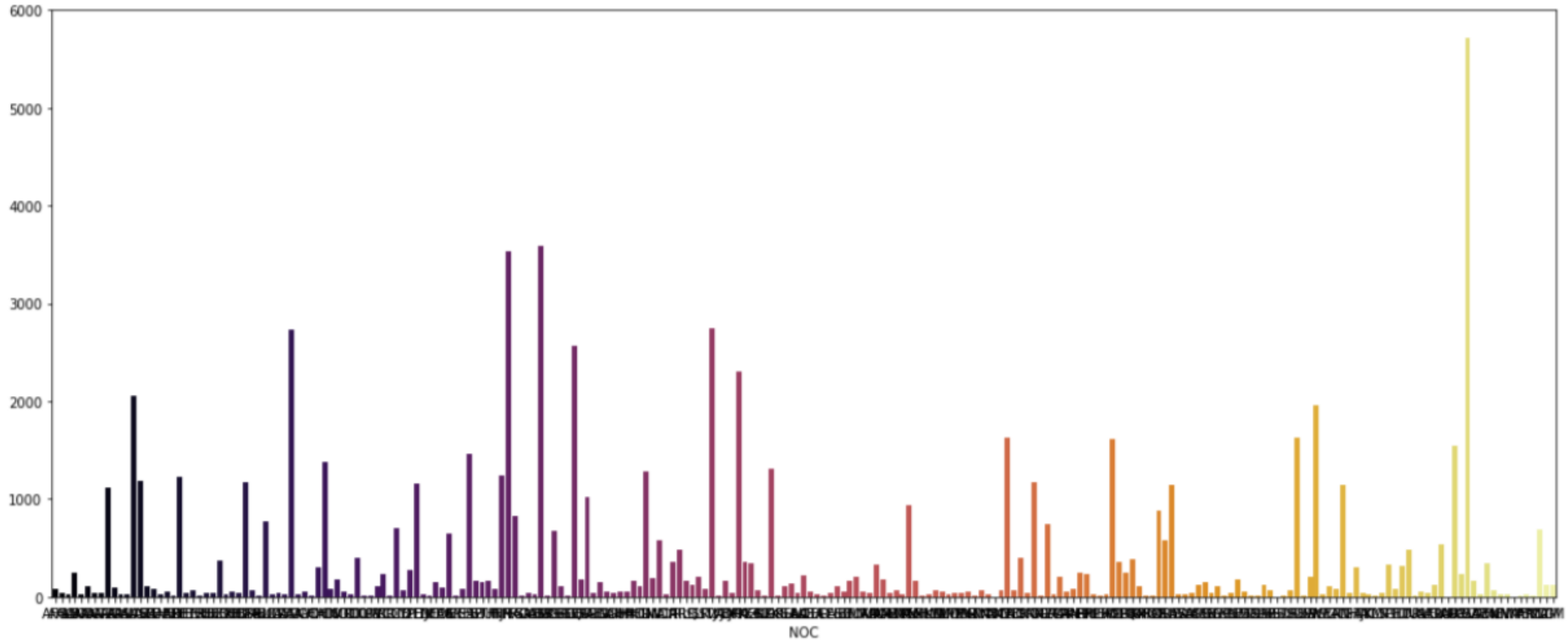
- For plotting the graph of total events countries participated in. NOC on the x axis and no of events participated in on the y axis.

In [62]:

```
plt.figure(figsize=(20,8))
sns.barplot(x='NOC', y='Medal', data=medal, palette='inferno')
```

Out[62]:

```
<matplotlib.axes._subplots.AxesSubplot at 0xf592cc0>
```



- For computing pairwise, correlation of columns.

In [63]:

```
dataset.corr()
```

Out[63]:

	ID	Age	Height	Weight	Year
ID	1.000000	0.002684	-0.000891	-0.001213	0.015169

Age	0.002684	1.000000	0.044235	0.111739	-0.112144
Height	-0.000891	0.044235	1.000000	0.751670	0.049869
Weight	-0.001213	0.111739	0.751670	1.000000	0.037631
Year	0.015169	-0.112144	0.049869	0.037631	1.000000

As correlation between year and age is negative it can be inferred that with every tournament count of young athletes are increasing.

- List of all the columns with datatype as strings.

In [72]:

```
categorical = list(dataset.select_dtypes(include=['object']).columns.values)
categorical
```

Out[72]:

```
['Name',
 'Sex',
 'Team',
 'NOC',
 'Games',
 'Season',
 'City',
 'Sport',
 'Event',
 'Medal']
```

- Encoding label with values form 0 to number of unique values -1.

In [74]:

```
from sklearn.preprocessing import LabelEncoder
le=LabelEncoder()
```

```
for i in range(0, len(categorical)):
    dataset[categorical[i]] = le.fit_transform(dataset[categorical[i]])
dataset.head()
```

Out[74]:

	ID	Name	Sex	Age	Height	Weight	Team	NOC	Games	Year	Season	City	Sport	Event	Medal
0	1	4	1	24.0	180.00000	80.000000	154	41	37	1992	0	5	8	133	2
1	2	5	1	23.0	170.00000	60.000000	154	41	48	2012	0	17	32	337	2
2	3	25337	1	24.0	175.33897	70.702393	207	55	6	1920	0	2	24	297	2
3	4	16828	1	34.0	175.33897	70.702393	210	55	1	1900	0	26	61	607	1
28	9	6381	1	26.0	186.00000	96.000000	264	68	43	2002	1	29	30	334	2

Here we have labelled all the categorical data as integers like Sex, ID, Medal, etc. starting from 0.

- Splitting arrays or matrices into random train and test subsets.

In [81]:

```
from sklearn.model_selection import train_test_split
x = dataset[['Age', 'Year', 'NOC', 'Event']]
y = dataset['Medal']
x_train, x_test, y_train, y_test = train_test_split(x,y, random_state=101, test_size=0.30)
```

- Applying Random Forest Classifier

In [82]:

```
from sklearn.ensemble import RandomForestClassifier
rcf = RandomForestClassifier()
rcf.fit(x_train, y_train)
```

Out[84]:

```
RandomForestClassifier(bootstrap=True, class_weight=None, criterion='gini',
            max_depth=None, max_features='auto', max_leaf_nodes=None,
            min_impurity_decrease=0.0, min_impurity_split=None,
            min_samples_leaf=1, min_samples_split=2,
            min_weight_fraction_leaf=0.0, n_estimators=10, n_jobs=1,
            oob_score=False, random_state=None, verbose=0,
            warm_start=False)
```

In [85]:

```
pred = rcf.predict(x_test)
```

In [86]:

```
from sklearn.metrics import classification_report
print(classification_report(y_test, pred))
```

```
             precision    recall  f1-score   support

          0       0.68      0.47      0.56      1253
          1       0.75      0.62      0.68      1132
          2       0.93      0.98      0.95     19556
          3       0.76      0.48      0.59      1162

avg / total       0.90      0.91      0.90     23103
```