Olympic Dataset Analysis (1896-2016)

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
```

Loading Dataset

In [2]:
```
data = pd.read_csv(r'D:\EDA\ML project\eda\Olympic eda\athlete_events.csv', er
```

Data description

In [3]:
```
data.head(2)
```

Out[3]:

	ID	Name	Sex	Age	Height	Weight	Team	NOC	Games	Year	Season	
0	1	A Dijiang	M	24.0	180.0	80.0	China	CHN	1992 Summer	1992	Summer	Ba
1	2	A Lamusi	M	23.0	170.0	60.0	China	CHN	2012 Summer	2012	Summer	

In [4]:
```
data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 271116 entries, 0 to 271115
Data columns (total 15 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   ID      271116 non-null  int64  
 1   Name    271116 non-null  object 
 2   Sex     271116 non-null  object 
 3   Age     261642 non-null  float64
 4   Height  210945 non-null  float64
 5   Weight  208241 non-null  float64
 6   Team    271116 non-null  object 
 7   NOC     271116 non-null  object 
 8   Games   271116 non-null  object 
 9   Year    271116 non-null  int64  
 10  Season  271116 non-null  object 
 11  City    271116 non-null  object 
 12  Sport   271116 non-null  object 
 13  Event   271116 non-null  object 
 14  Medal   39783 non-null   object 
dtypes: float64(3), int64(2), object(10)
memory usage: 31.0+ MB
```

In [5]:
```
data.describe()
```

Out[5]:

	ID	Age	Height	Weight	Ye
count	271116.000000	261642.000000	210945.000000	208241.000000	271116.0000
mean	68248.954396	25.556898	175.338970	70.702393	1978.3784
std	39022.286345	6.393561	10.518462	14.348020	29.8776
min	1.000000	10.000000	127.000000	25.000000	1896.0000
25%	34643.000000	21.000000	168.000000	60.000000	1960.0000
50%	68205.000000	24.000000	175.000000	70.000000	1988.0000
75%	102097.250000	28.000000	183.000000	79.000000	2002.0000
max	135571.000000	97.000000	226.000000	214.000000	2016.0000

In [6]:
```
# for describing object column

data.describe(include =['object'])
```

Out[6]:

	Name	Sex	Team	NOC	Games	Season	City	Sport	E
count	271116	271116	271116	271116	271116	271116	271116	271116	27
unique	134732	2	1184	230	51	2	42	66	
top	Robert Tait McKenzie	M	United States	USA	2000 Summer	Summer	London	Athletics	Fo Fo
freq	58	196594	17847	18853	13821	222552	22426	38624	

In [7]:
```
data.isna().sum()
```

Out[7]:
```
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
```

Cleaning duplicate Values

In [8]:
```
data.duplicated().sum()
```

Out[8]:
```
1385
```

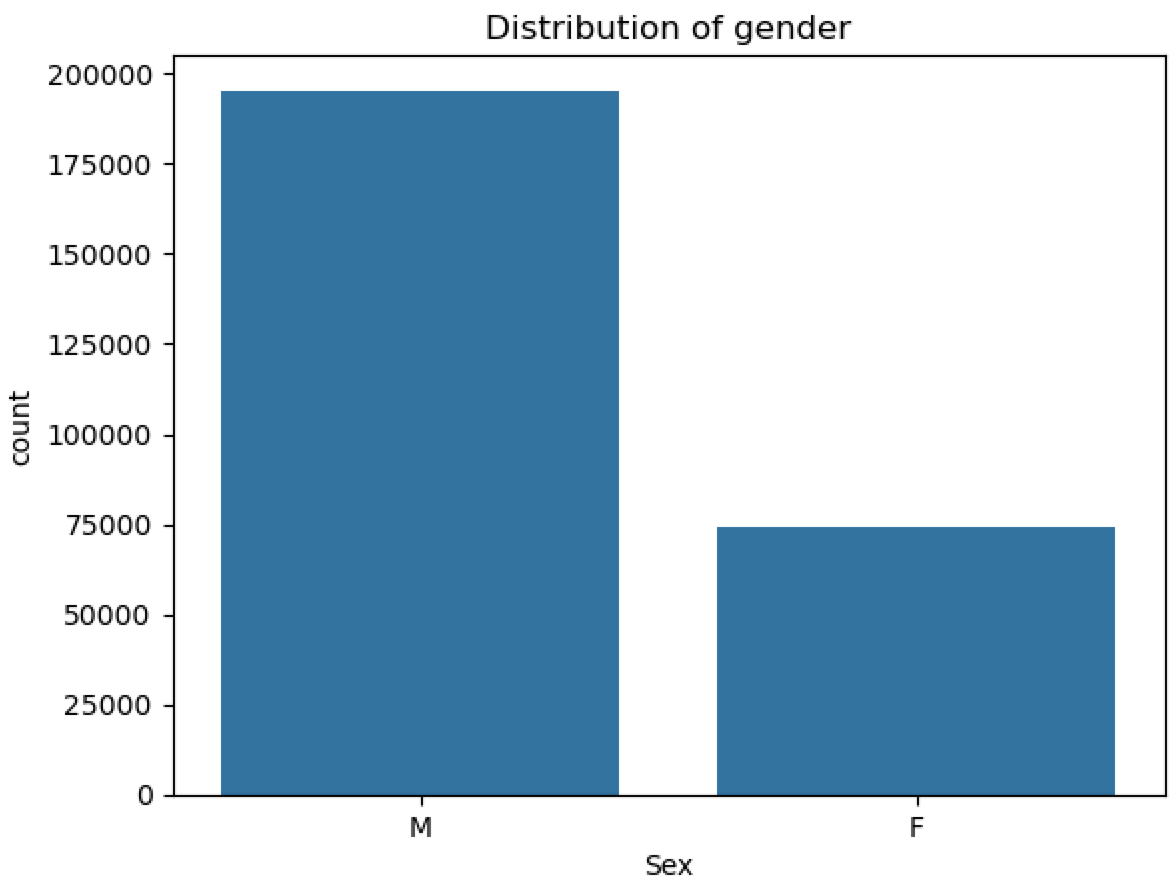
In [9]:
```
data.drop_duplicates(inplace = True)
```

In [10]:
```
data.duplicated().sum()
```

Out[10]:
```
0
```

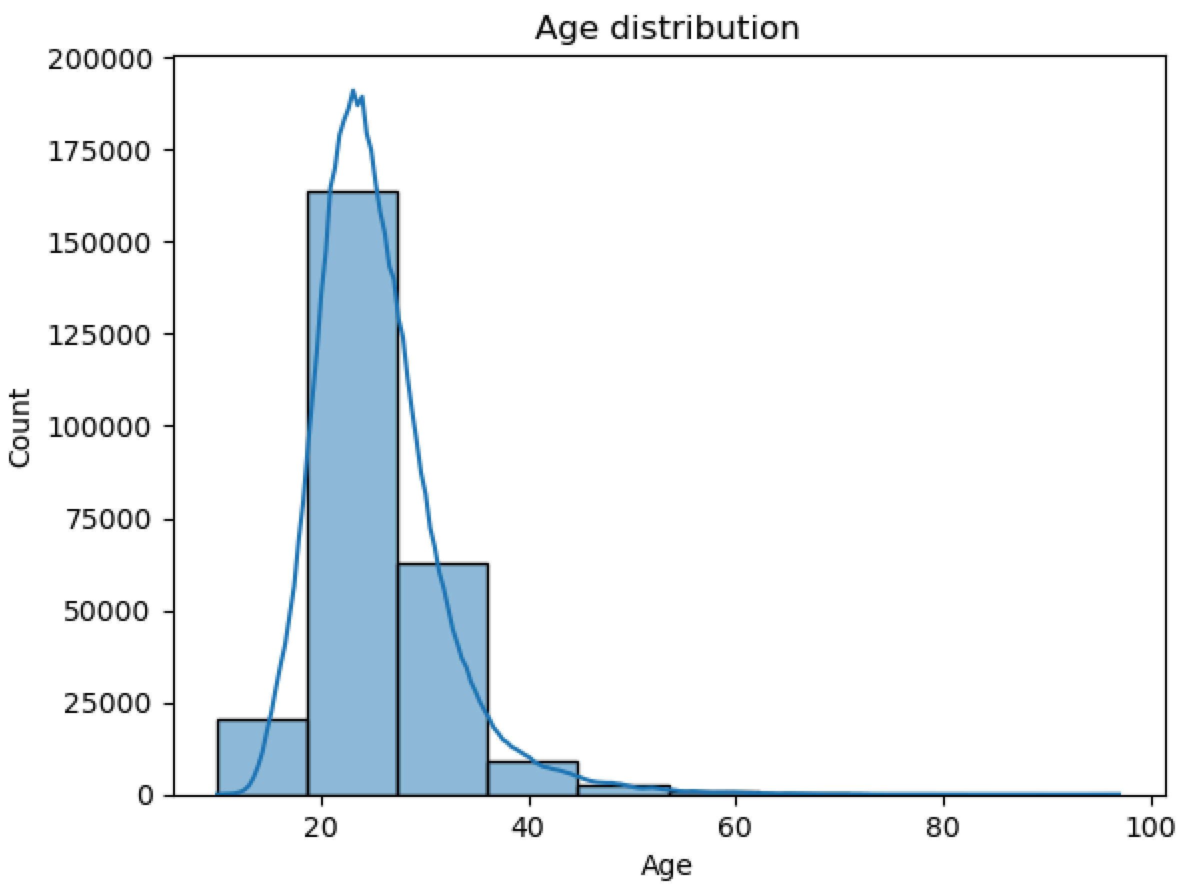
Visualization

In [11]:
```
sns.countplot(data = data, x = 'Sex')
plt.title('Distribution of gender')
plt.show()
```



Observation : Men atheletes are more participating in olympics rather than women.

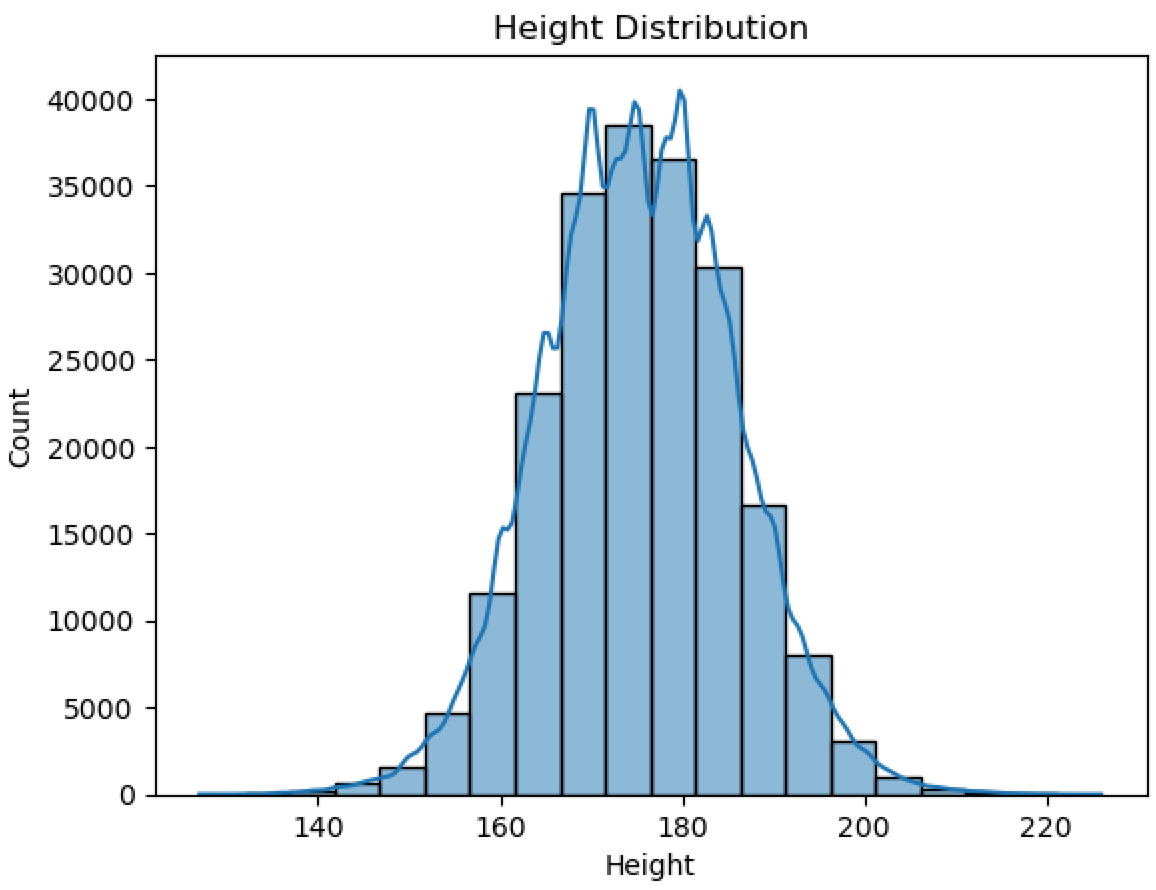
In [12]:
```
sns.histplot(data = data, x= 'Age', bins = 10, kde = True)
plt.title('Age distribution')
plt.show()
```



Observation : The maximum athelete are 20-30 years old.

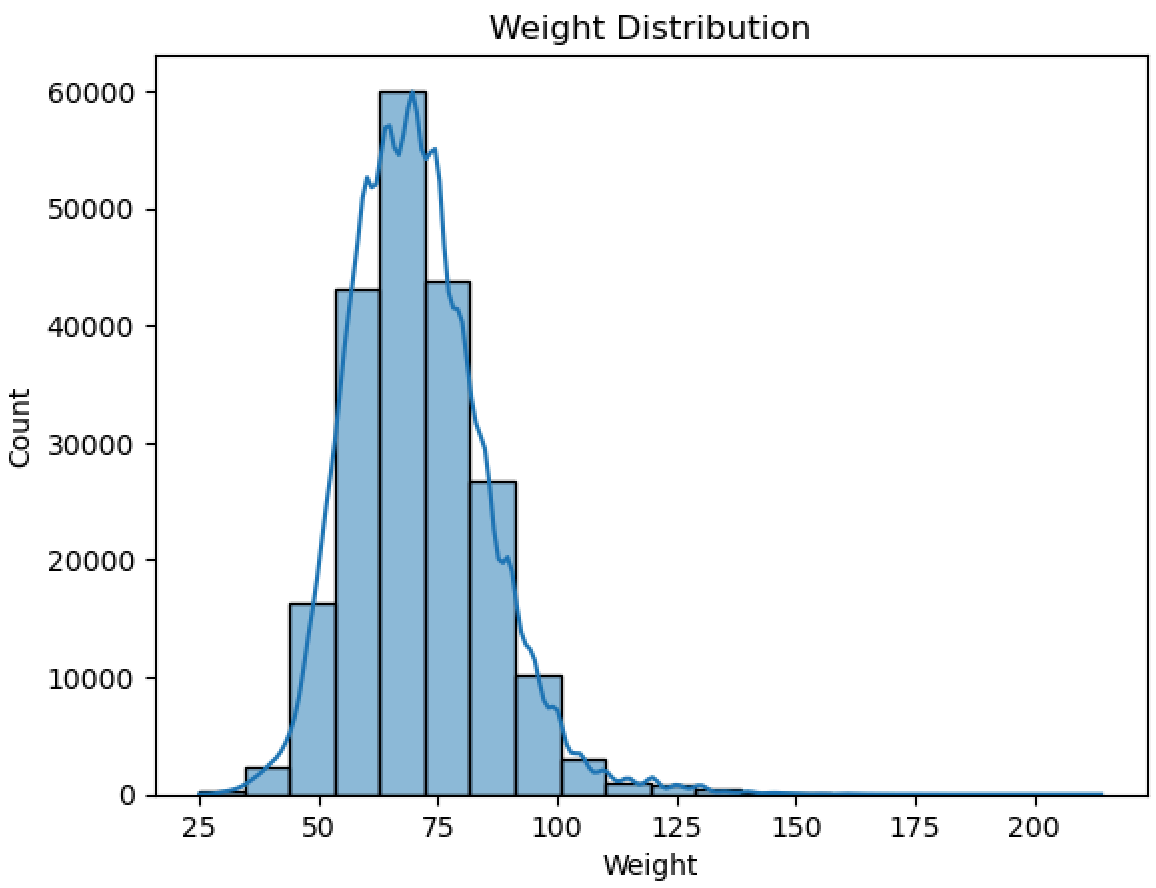
```
In [13]: sns.histplot(data = data, x = 'Height', bins =20, kde = True)
         plt.title('Height Distribution')
```

```
Out[13]: Text(0.5, 1.0, 'Height Distribution')
```



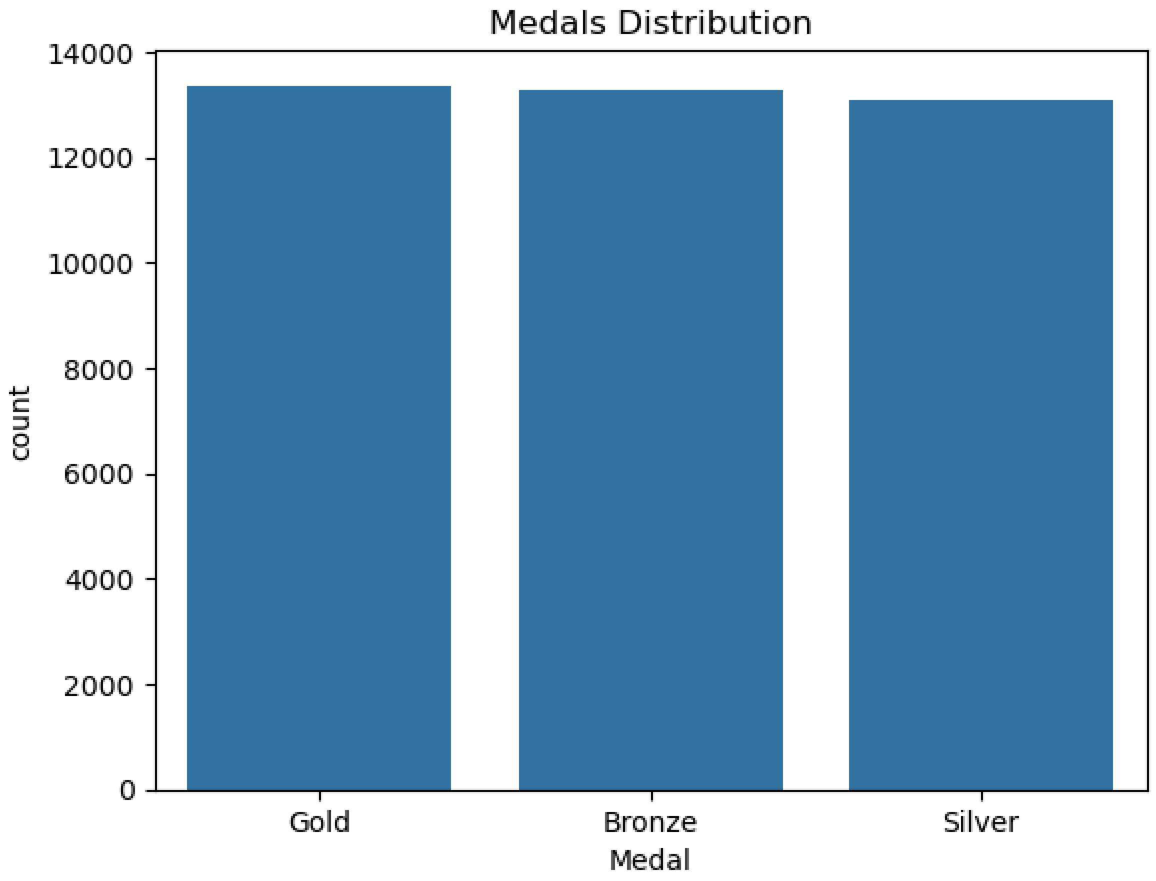
Observation : Most of the atheletes lies between 170 cm to 185 cm Height

In [14]:
```
sns.histplot( data = data, kde = True, x= "Weight", bins = 20)
plt.title('Weight Distribution')
plt.show()
```



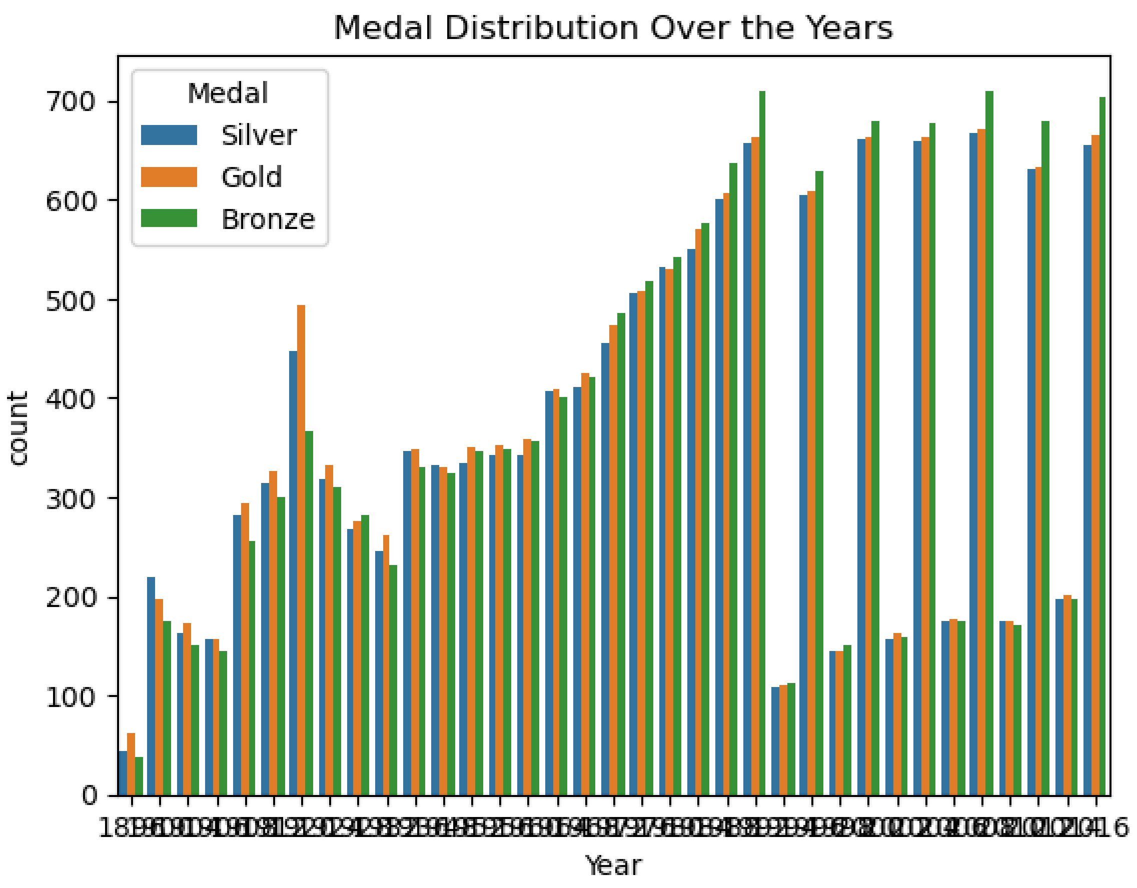
Observation : Most of the athelete are 70-75 kg

In [15]:
```
sns.countplot(data = data, x="Medal")
plt.title('Medals Distribution')
plt.show()
```



Observation : As we know there are 3 medals in olympics all the three are given to athelete but sometimes two athelete wins the same medal that's why the count is vary.

In [16]:
```
sns.countplot(data = data, x="Year", hue ="Medal")
plt.title('Medal Distribution Over the Years')
plt.show()
```



Groupby

```
In [17]: year_avg_age = data.groupby('Year')['Age'].mean().sort_values(ascending = Fals
         year_avg_age
```

```
Out[17]: Year
         1932    29.586783
         1920    29.290978
         1900    28.881206
         1948    28.386360
         1924    28.027535
         1928    27.855586
         1912    27.538620
         1906    27.125253
         1908    26.995888
         1936    26.952210
         1904    26.698150
         2016    26.207919
         1952    26.161546
         2010    26.124262
         2014    25.987324
         2012    25.961378
         2006    25.959151
         1956    25.926674
         2002    25.916281
         2008    25.734118
         2004    25.639515
         2000    25.422504
         1960    25.168848
         1998    25.163197
         1964    24.944397
         1996    24.915045
         1994    24.422103
         1992    24.318895
         1972    24.308607
         1968    24.248046
         1988    24.079432
         1984    23.898347
         1976    23.841818
         1980    23.694743
         1896    23.580645
         Name: Age, dtype: float64
```

```
In [18]: sport_median_height = data.groupby('Sport')['Height'].median().sort_values(asc
         sport_median_height.max()
```

```
Out[18]: 190.0
```

```
In [19]: sport_median_height[sport_median_height == 190.0]
```

```
Out[19]: Sport
         Basketball    190.0
         Name: Height, dtype: float64
```

```
In [20]: data.columns
```

```
Out[20]: Index(['ID', 'Name', 'Sex', 'Age', 'Height', 'Weight', 'Team', 'NOC', 'Game
         s',
                'Year', 'Season', 'City', 'Sport', 'Event', 'Medal'],
               dtype='object')
```

```
In [21]: data.Sex
```

```
Out[21]: 0          M
         1          M
         2          M
         3          M
         4          F
                   ..
         271111     M
         271112     M
         271113     M
         271114     M
         271115     M
         Name: Sex, Length: 269731, dtype: object
```

```
In [22]: data.NOC
```

```
Out[22]: 0          CHN
         1          CHN
         2          DEN
         3          DEN
         4          NED
                   ...
         271111     POL
         271112     POL
         271113     POL
         271114     POL
         271115     POL
         Name: NOC, Length: 269731, dtype: object
```

```
In [23]: country_gender_count = data.groupby(['NOC','Sex'])['ID'].count()
         country_gender_count
```

```
Out[23]: NOC  Sex
         AFG  F         5
              M       121
         AHO  F        12
              M        67
         ALB  F        27
                      ...
         YUG  M      2201
         ZAM  F        19
              M       164
         ZIM  F       113
              M       198
         Name: ID, Length: 452, dtype: int64
```

```
In [24]: most_medal_winning_country = data.groupby('Medal')['NOC'].max()
```

```
most_medal_winning_country
```

```
Out[24]: Medal
Bronze    ZIM
Gold      ZIM
Silver    ZIM
Name: NOC, dtype: object
```

```
In [25]: most_gold_winning_country = data[data['Medal']=='Gold'].groupby('NOC')['Medal'
most_gold_winning_country
```

```
Out[25]: NOC
ALG      5
ANZ     20
ARG     91
ARM      2
AUS    348
      ...
UZB     10
VEN      2
VIE      1
YUG    130
ZIM     17
Name: Medal, Length: 109, dtype: int64
```

```
In [26]: data.Year
```

```
Out[26]: 0         1992
1         2012
2         1920
3         1900
4         1988
          ...
271111    1976
271112    2014
271113    2014
271114    1998
271115    2002
Name: Year, Length: 269731, dtype: int64
```

```
In [27]: total_femal_winning_gold_year_wise = data[(data['Sex'] == 'F') & (data['Year']
total_femal_winning_gold_year_wise
```

```
Out[27]: Sex  Year
F    1992    691
Name: Medal, dtype: int64
```

```
In [28]: max_medal_femal_year_wise = data[data['Sex']=='F'].groupby('Year')['Medal'].cc
max_medal_femal_year_wise.head(3)
```

```
Out[28]: Year
2016    969
2008    932
2012    918
Name: Medal, dtype: int64
```

```
In [29]: country_gold_medals = data.groupby('NOC')['Medal'].count().sort_values(ascendi
country_gold_medals.head(3)
```

```
Out[29]: NOC
USA    5637
URS    2503
GER    2165
Name: Medal, dtype: int64
```

```
In [30]: highest_total_gold_winning_country_yearly = data[data['Medal'] == 'Gold'].grou
highest_total_gold_winning_country_yearly.head(3)
```

```
Out[30]: NOC  Year
URS  1980    205
USA  1984    190
URS  1988    174
Name: Medal, dtype: int64
```

```
In [31]: minimum_total_gold_winning_country_yearly = data[data['Medal'] == 'Gold'].grou
minimum_total_gold_winning_country_yearly.head(3)
```

```
Out[31]: NOC  Year
ALG  1992    1
IRL  2012    1
     1992    1
Name: Medal, dtype: int64
```

```
In [32]: female_winning_gold_country_yearly_maximum = data[(data['Medal'] == 'Gold') &
female_winning_gold_country_yearly_maximum.head(3)
```

```
Out[32]: NOC  Sex  Year
USA  F    2012    103
          1996    100
          2016     85
Name: Medal, dtype: int64
```

```
In [33]: male_winning_gold_country_yearly_maximum = data[(data['Medal'] == 'Gold') & (c
male_winning_gold_country_yearly_maximum.head(3)
```

```
Out[33]: NOC  Sex  Year
GBR  M    1908    142
URS  M    1980    137
          1988    133
Name: Medal, dtype: int64
```

```
In [34]: sport_gender_avg_wt = data.groupby(['Sport','Sex'])['Weight'].mean()
sport_gender_avg_wt
```

```
Out[34]: Sport          Sex
         Aeronautics    M            NaN
         Alpine Skiing  F      62.640307
                        M      78.626035
         Alpinism       F            NaN
                        M            NaN
                                  ...
         Water Polo     M      87.706172
         Weightlifting  F      67.724622
                        M      80.251796
         Wrestling      F      60.554455
                        M      76.400640
         Name: Weight, Length: 116, dtype: float64
```

```
In [35]: sport_gender_avg_wt['Wrestling']['F']
```

```
Out[35]: 60.554455445544555
```

```
In [36]: data.columns
```

```
Out[36]: Index(['ID', 'Name', 'Sex', 'Age', 'Height', 'Weight', 'Team', 'NOC', 'Game
         s',
                'Year', 'Season', 'City', 'Sport', 'Event', 'Medal'],
               dtype='object')
```

```
In [37]: sport_max_event_count = data.groupby('Sport')['Event'].count().sort_values(asc
         sport_max_event_count
```

```
Out[37]: Sport
         Athletics     38624
         Gymnastics    26707
         Swimming      23195
         Shooting      11448
         Cycling       10827
         Name: Event, dtype: int64
```

```
In [38]: sport_min_event_count = data.groupby('Sport')['Event'].count().sort_values(asc
         sport_min_event_count
```

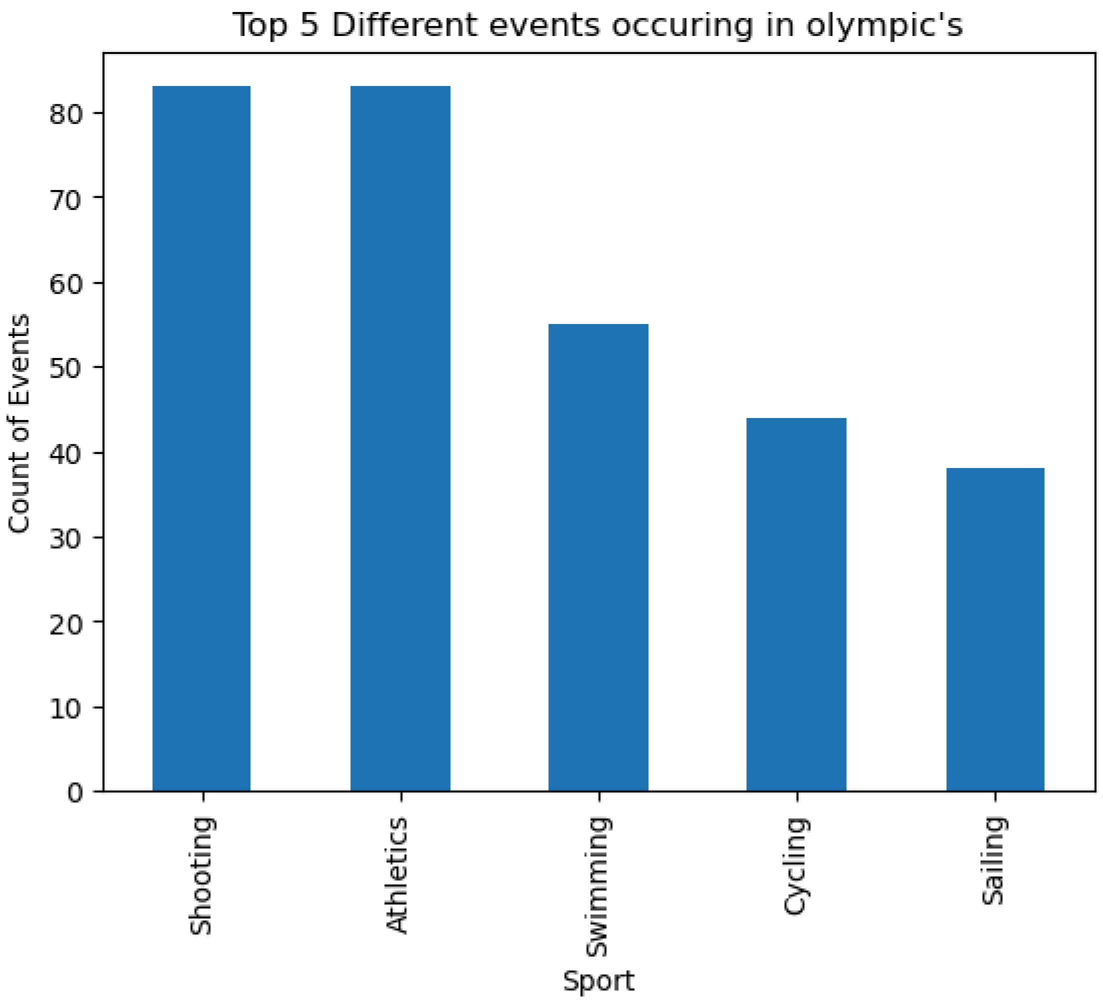
```
Out[38]: Sport
         Aeronautics       1
         Basque Pelota     2
         Roque             4
         Jeu De Paume     11
         Racquets         12
         Name: Event, dtype: int64
```

```
In [39]: silver_winner_country_sport_yearly = data[data['Medal']=='Silver'].groupby(['N
         silver_winner_country_sport_yearly.head()
```

```
Out[39]: NOC  Sport       Medal
         USA  Athletics   Silver    317
              Swimming    Silver    254
              Ice Hockey  Silver    189
         AUS  Swimming    Silver    162
         ITA  Fencing     Silver    136
         Name: Year, dtype: int64
```

```
In [40]: sport_max_event_count = data.groupby('Sport')['Event'].nunique().sort_values(a
         sport_max_event_count.plot(kind = 'bar' )
         plt.ylabel('Count of Events')
         plt.title("Top 5 Different events occuring in olympic's")
```

```
Out[40]: Text(0.5, 1.0, "Top 5 Different events occuring in olympic's")
```



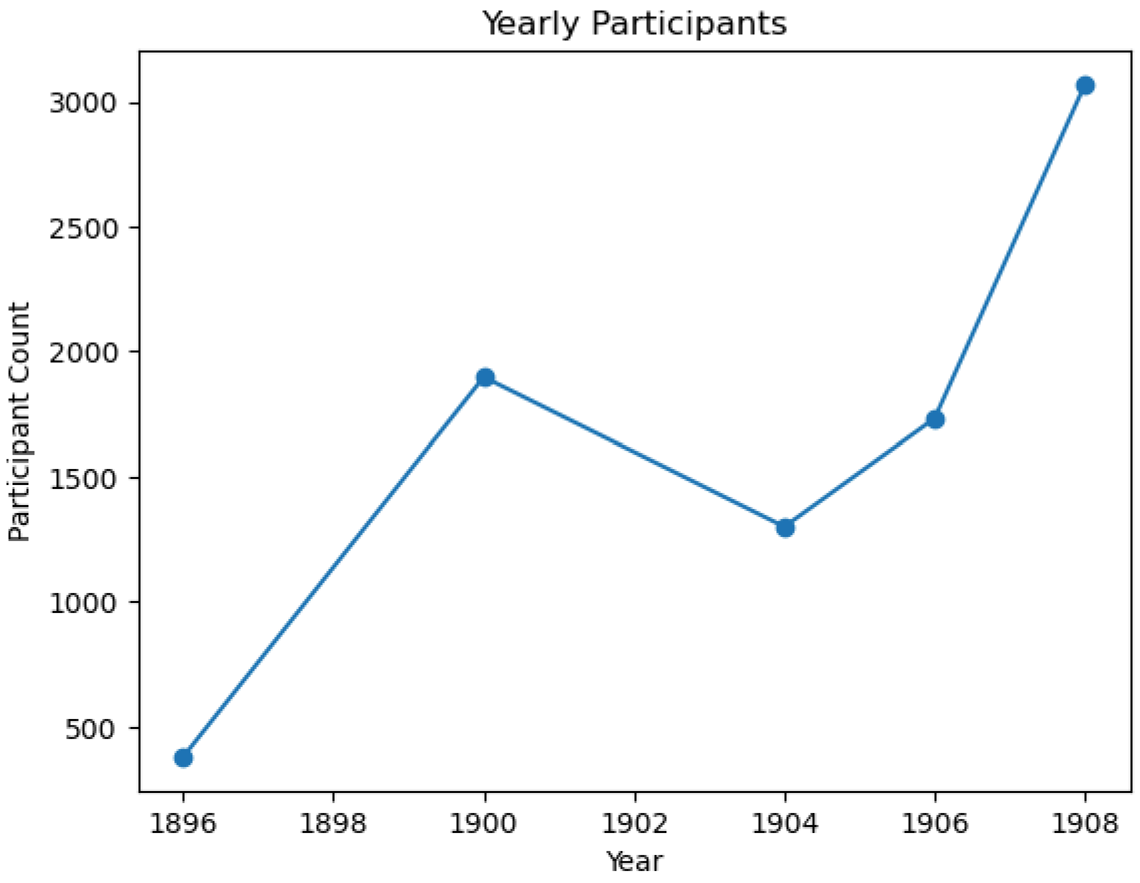
```
In [41]: data.columns
```

```
Out[41]: Index(['ID', 'Name', 'Sex', 'Age', 'Height', 'Weight', 'Team', 'NOC', 'Game
         s',
                'Year', 'Season', 'City', 'Sport', 'Event', 'Medal'],
               dtype='object')
```

```
In [42]: year_wise_participants = data.groupby('Year')['ID'].count().head()
```

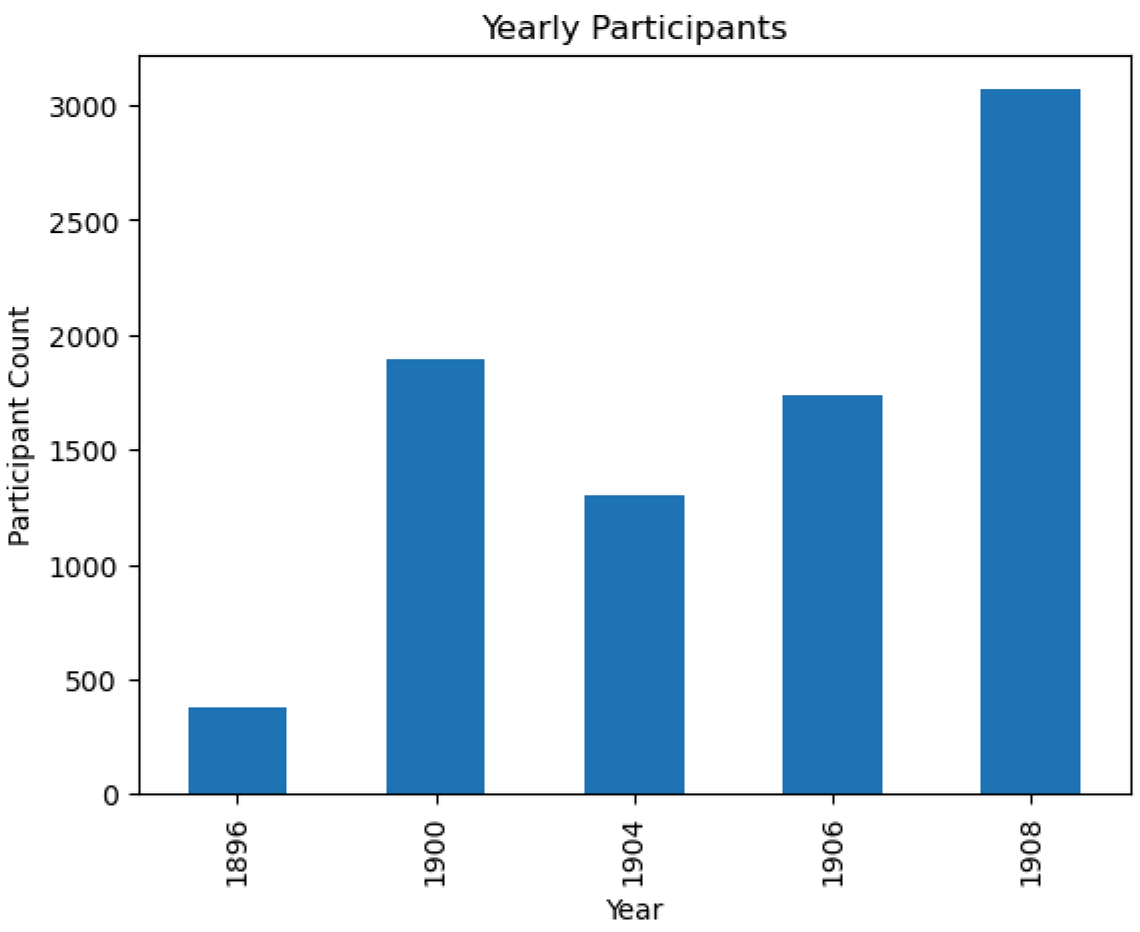
```
year_wise_participants.plot(kind = 'line', marker = 'o')
plt.title('Yearly Participants')
plt.xlabel('Year')
plt.ylabel('Participant Count')
```

```
Out[42]: Text(0, 0.5, 'Participant Count')
```



```
In [43]: year_wise_participants = data.groupby('Year')['ID'].count().head()
         year_wise_participants.plot(kind = 'bar' )
         plt.title('Yearly Participants')
         plt.xlabel('Year')
         plt.ylabel('Participant Count')
```

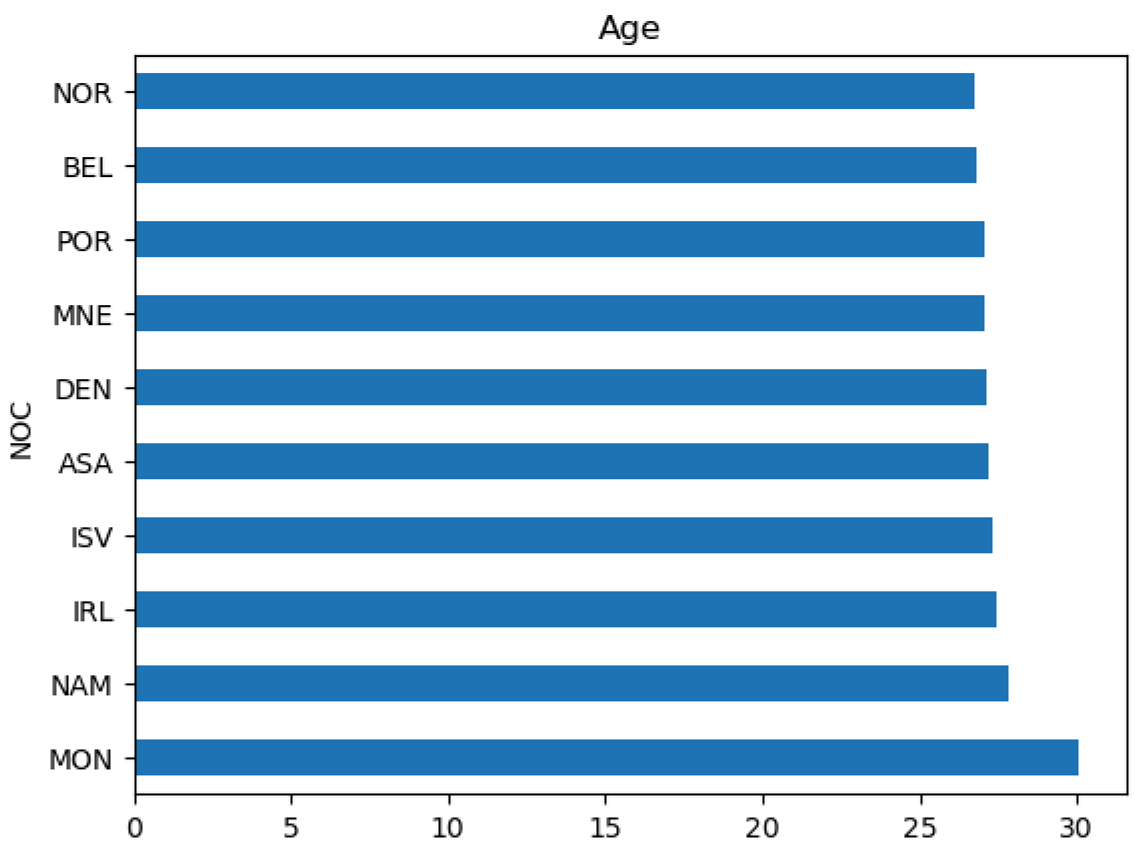
```
Out[43]: Text(0, 0.5, 'Participant Count')
```



```
In [44]: avg_age_of_participants = data.groupby('Age')['ID'].mean()
         avg_age_of_participants
```

```
Out[44]: Age
         10.0     71691.000000
         11.0     78636.384615
         12.0     61667.307692
         13.0     62002.556150
         14.0     68457.782974
                      ...
         81.0     98249.500000
         84.0      5146.000000
         88.0     31173.000000
         96.0     49663.000000
         97.0    128719.000000
         Name: ID, Length: 74, dtype: float64
```

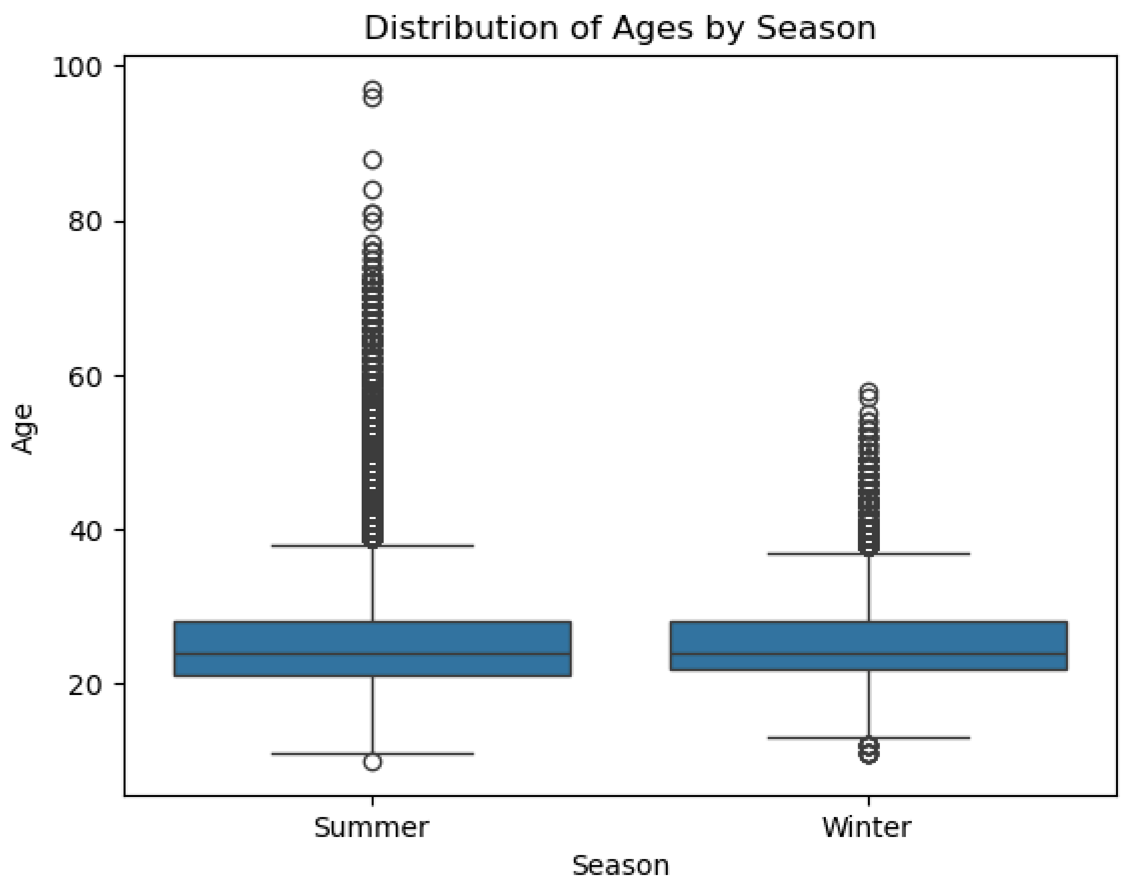
```
In [45]: country_avg_age = data.groupby('NOC')['Age'].mean().sort_values(ascending = Fa
         country_avg_age.head(10).plot(kind = 'barh')
         plt.title('Avg of age country wise')
         plt.title('Country')
         plt.title('Age')
         plt.show()
```



```
In [46]: data.columns
```

```
Out[46]: Index(['ID', 'Name', 'Sex', 'Age', 'Height', 'Weight', 'Team', 'NOC', 'Game
         s',
                'Year', 'Season', 'City', 'Sport', 'Event', 'Medal'],
               dtype='object')
```

```
In [47]: sns.boxplot(data = data, x= 'Season', y = 'Age')
         plt.title('Distribution of Ages by Season')
         plt.xlabel('Season')
         plt.ylabel('Age')
         plt.show()
```

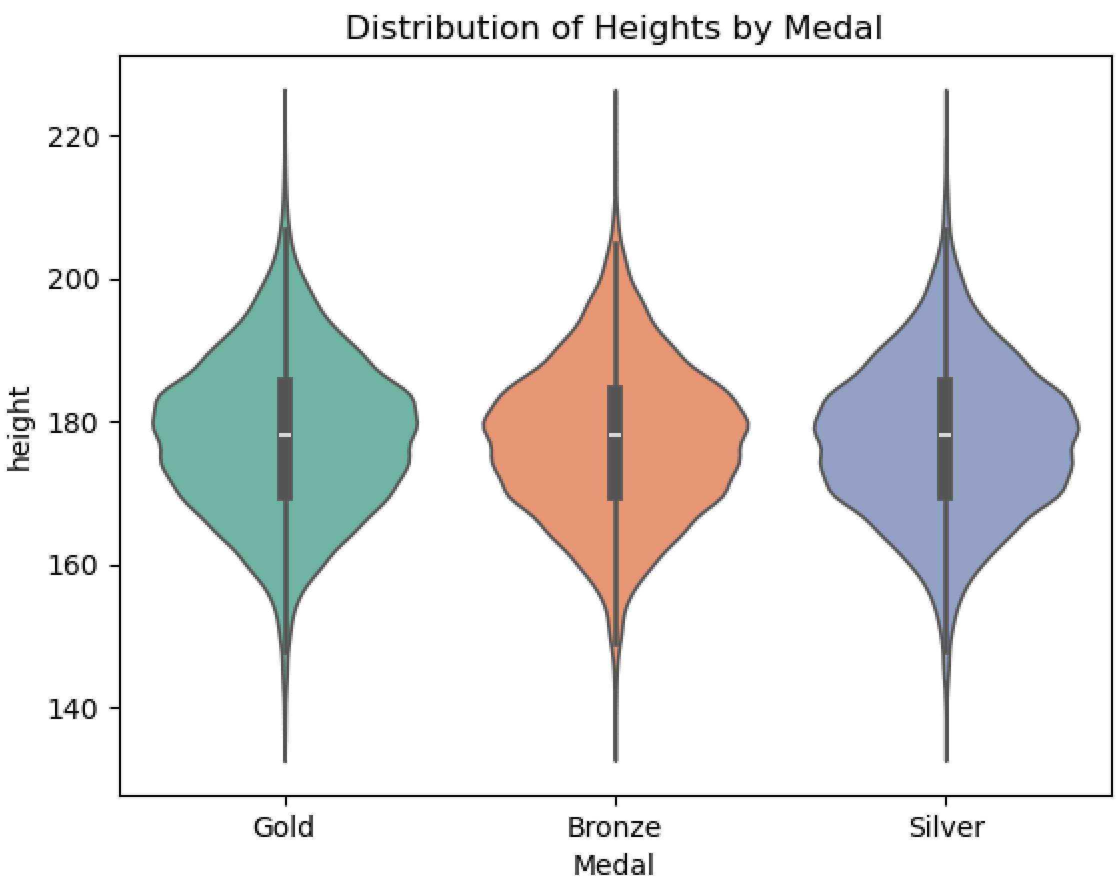


```
In [48]: sns.violinplot(data = data , x = 'Medal', y = 'Height', palette = 'Set2')
         plt.title('Distribution of Heights by Medal')
         plt.xlabel('Medal')
         plt.ylabel('height')
         plt.show()
```

```
C:\Users\shast\AppData\Local\Temp\ipykernel_12368\2290039475.py:1: FutureWarnin
g:

Passing `palette` without assigning `hue` is deprecated and will be removed in
v0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same e
ffect.

  sns.violinplot(data = data , x = 'Medal', y = 'Height', palette = 'Set2')
```



```
In [49]: most_medals_country = data['NOC'].value_counts().idxmax()
         print("Most medal winning country:", most_medals_country)
```

```
Most medal winning country: USA
```

```
In [50]: most_medal_country = data.groupby('NOC')['Medal'].count().sort_values(ascendir
         most_medal_country
```

```
Out[50]: NOC
         USA    5637
         Name: Medal, dtype: int64
```

```
In [51]: tallest_athelete = data.groupby('NOC')['Height'].max().sort_values(ascending =
         tallest_athelete
```

```
Out[51]: NOC
         CHN    226.0
         Name: Height, dtype: float64
```

```
In [52]: tallest_athelete1 = data[data['Height'] == data['Height'].max()]
         tallest_athelete1
```

Out[52]:

	ID	Name	Sex	Age	Height	Weight	Team	NOC	Games	Year	S
265040	132627	Yao Ming	M	20.0	226.0	141.0	China	CHN	2000 Summer	2000	S
265041	132627	Yao Ming	M	23.0	226.0	141.0	China	CHN	2004 Summer	2004	S
265042	132627	Yao Ming	M	27.0	226.0	141.0	China	CHN	2008 Summer	2008	S

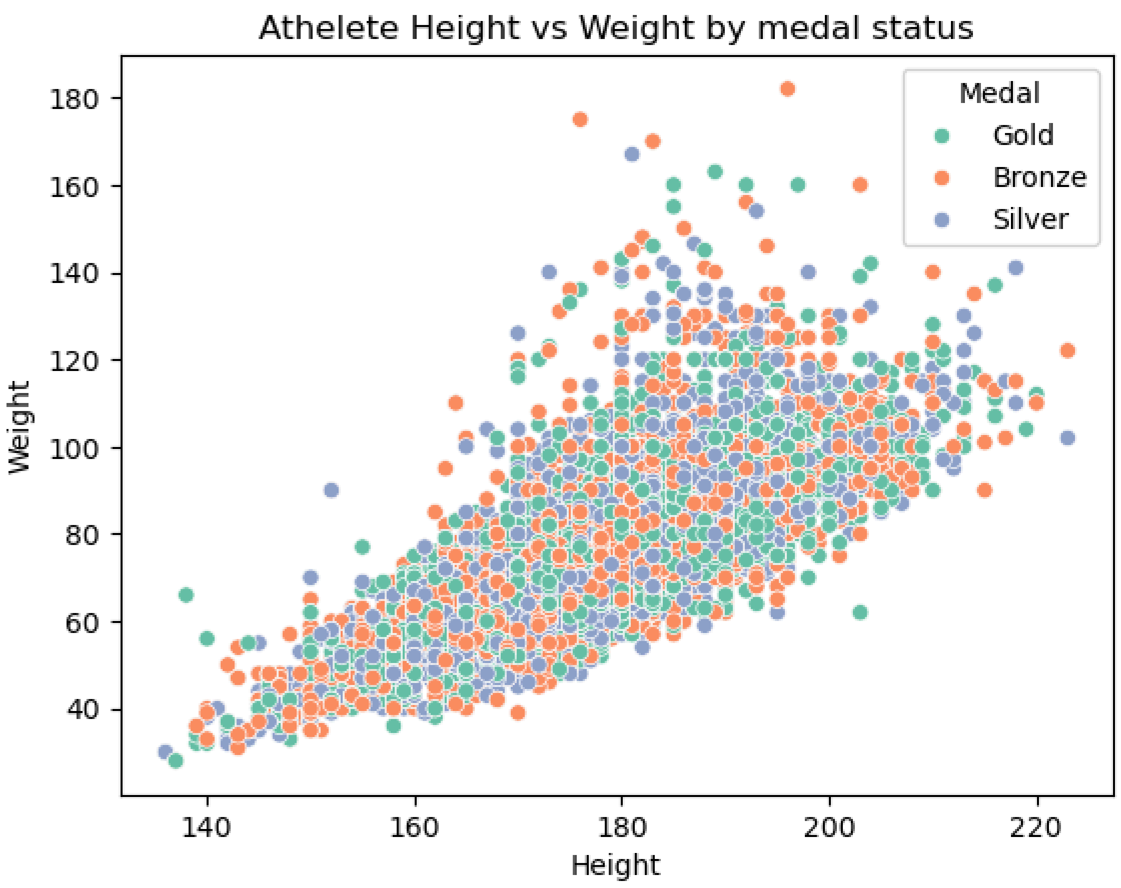
In [53]:
```
print(tallest_athelete1[['ID','Name','Height','Sport']])
```
```
            ID       Name  Height       Sport
265040  132627  Yao Ming   226.0  Basketball
265041  132627  Yao Ming   226.0  Basketball
265042  132627  Yao Ming   226.0  Basketball
```

In [54]:
```
athelete_highest_wt = data.groupby('Name')['Weight'].max().sort_values(ascendi
athelete_highest_wt
```

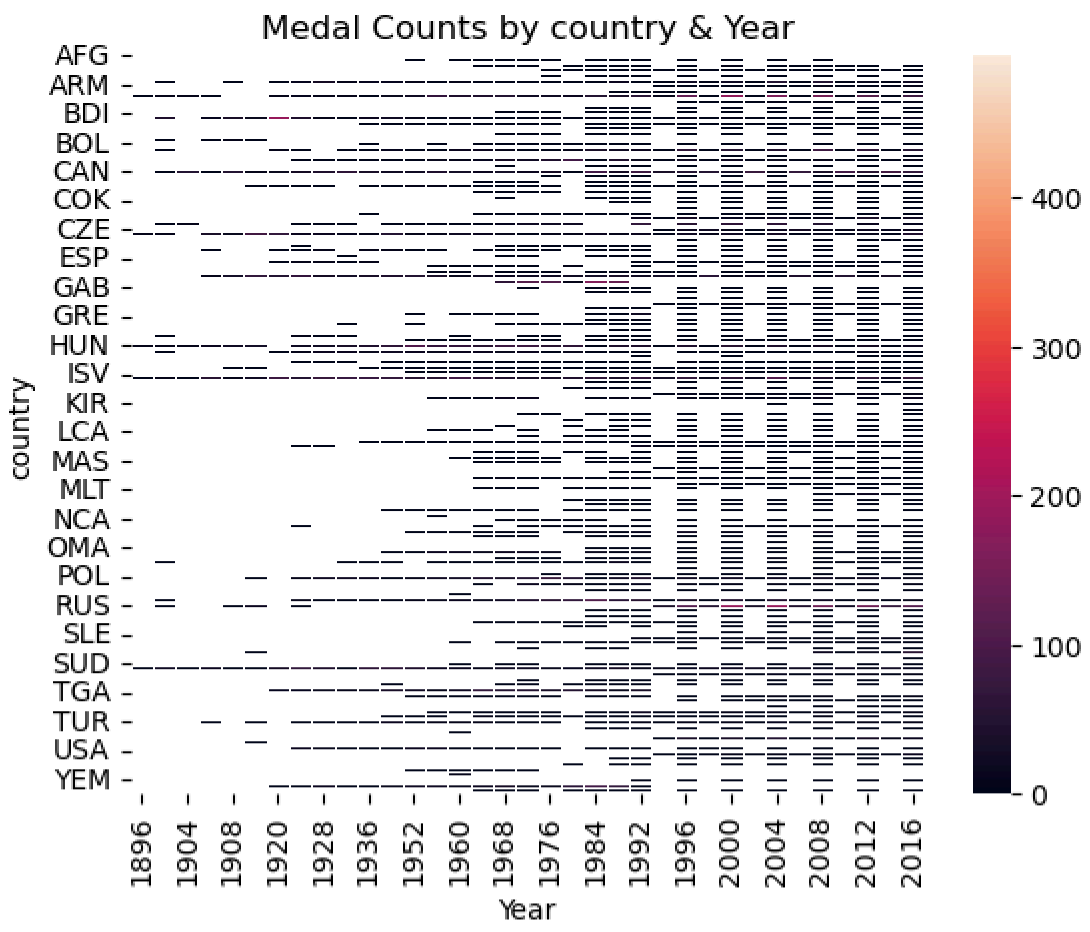
Out[54]:
```
Name
Ricardo Blas, Jr.    214.0
Name: Weight, dtype: float64
```

In [55]:
```
heaviest_athelete = data[data['Weight'] == data['Weight'].max()]
print(heaviest_athelete[['ID','Name','Sex',"Sport",'Medal']])
```
```
          ID               Name Sex Sport Medal
23155  12177  Ricardo Blas, Jr.   M  Judo   NaN
23156  12177  Ricardo Blas, Jr.   M  Judo   NaN
```

In [56]:
```
sns.scatterplot(data = data, x = 'Height', y = 'Weight', hue = 'Medal', palett
plt.title('Athelete Height vs Weight by medal status')
plt.xlabel('Height')
plt.ylabel('Weight')
plt.show()
```



```
In [57]: medals_by_country_year = data.pivot_table(index = 'NOC', columns = 'Year', val
         sns.heatmap(medals_by_country_year, linewidths = 0.5)
         plt.title('Medal Counts by country & Year')
         plt.xlabel('Year')
         plt.ylabel('country')
         plt.show()
```



```
In [58]: data.columns
```

```
Out[58]: Index(['ID', 'Name', 'Sex', 'Age', 'Height', 'Weight', 'Team', 'NOC', 'Game
         s',
                'Year', 'Season', 'City', 'Sport', 'Event', 'Medal'],
               dtype='object')
```

```
In [60]: data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Index: 269731 entries, 0 to 271115
Data columns (total 15 columns):
 #   Column  Non-Null Count   Dtype  
---  ------  --------------   -----  
 0   ID      269731 non-null  int64  
 1   Name    269731 non-null  object 
 2   Sex     269731 non-null  object 
 3   Age     260416 non-null  float64
 4   Height  210917 non-null  float64
 5   Weight  208204 non-null  float64
 6   Team    269731 non-null  object 
 7   NOC     269731 non-null  object 
 8   Games   269731 non-null  object 
 9   Year    269731 non-null  int64  
 10  Season  269731 non-null  object 
 11  City    269731 non-null  object 
 12  Sport   269731 non-null  object 
 13  Event   269731 non-null  object 
 14  Medal   39772 non-null   object 
dtypes: float64(3), int64(2), object(10)
memory usage: 32.9+ MB
```

In [71]:
```
data.Year.unique()
```

Out[71]:
```
array([1992, 2012, 1920, 1900, 1988, 1994, 1932, 2002, 1952, 1980, 2000,
       1996, 1912, 1924, 2014, 1948, 1998, 2006, 2008, 2016, 2004, 1960,
       1964, 1984, 1968, 1972, 1936, 1956, 1928, 1976, 2010, 1906, 1904,
       1908, 1896], dtype=int64)
```

In [ ]:
```
female_counts = data[
    (data['Sex'] == 'F') & (data['Year'].isin([2012, 2016]))
].groupby('Year')['Sex'].count()

count_2012 = female_counts.loc[2012]
count_2016 = female_counts.loc[2016]

absolute_growth = count_2016 - count_2012
percentage_growth = (absolute_growth / count_2012) * 100

print(f"Absolute Growth: {absolute_growth}")
print(f"Percentage Growth: {percentage_growth:.2f}%")
```

```
Absolute Growth: 408
Percentage Growth: 7.02%
```

In [87]:
```
youngest_athelete = data.groupby(['Name','Height'])['Height'].max().head(1)
youngest_athelete
```

Out[87]:
```
Name                                        Height
Gabrielle Marie "Gabby" Adcock (White-)    167.0     167.0
Name: Height, dtype: float64
```

In [100…
```
youngest_athelete = data[data['Age'] == data['Age'].min()][:1]
```

```
print(youngest_athelete[['Name','Sex','Age','Sport']])
```

```
                        Name Sex   Age       Sport
142882  Dimitrios Loundras   M  10.0  Gymnastics
```

```
In [ ]:
```