SQL_CAPSTONE_PROJECT

September 25, 2021

1 My Proposal:

1.0.1 Which Dataset did you select and why?

I selected Olympics dataset because I think it contains numeric data which will help me to analyze and find patterns easily.

1.0.2 Describe the steps you took to import and clean the data.

Importing Module:

[1]:
```
import pandas as pd
import psycopg2 as ps4

from sqlalchemy import create_engine


import matplotlib.pyplot as plt
import seaborn as sns
```

[2]:
```
sns.set(style = 'darkgrid')

%matplotlib inline
```

Setting Connection with DataBase:

[3]:
```
cnxn_string = ("postgresql+psycopg2://{username}:{pswd}"
               "@{host}:{port}/{database}")
print(cnxn_string)
```

```
postgresql+psycopg2://{username}:{pswd}@{host}:{port}/{database}
```

[4]:
```
engine = create_engine(cnxn_string.format(
    username="postgres",
    pswd="[redacted]",
    host="localhost",
    port=5432,
    database="CapStone"))
```

Importing Data:

[5]:
```
na_vals = ['NA','Missing']
athlete_events = pd.read_csv("D:\\Dataset_ash\\SQL Case Study\\athlete_events.
 ↪csv",na_values = na_vals)
noc_regions =    pd.read_csv("D:\\Dataset_ash\\SQL Case Study\\noc_regions.csv")
```

[6]:
```
athlete_events.head(5)
```

[6]:

	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

[7]:
```
noc_regions.head(5)
```

[7]:

	NOC	region	notes
0	AFG	Afghanistan	NaN
1	AHO	Curacao	Netherlands Antilles
2	ALB	Albania	NaN
3	ALG	Algeria	NaN
4	AND	Andorra	NaN

[8]:
```
athlete_events.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
```

[9]:
```
noc_regions.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 230 entries, 0 to 229
Data columns (total 3 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   NOC     230 non-null    object
 1   region  227 non-null    object
 2   notes   21 non-null     object
dtypes: object(3)
memory usage: 5.5+ KB
```

[10]:
```
#checking the dimension of athlete dataset:
athlete_events.shape
```

[10]:
```
(271116, 15)
```

[11]:
```
#checking the dimension of noc regeions:
noc_regions.shape
```

[11]:
```
(230, 3)
```

Cleaning Data Process

[12]:
```
#checking null percentage for athlete events:
athlete_events.isnull().sum()/athlete_events.shape[0]*100
```

[12]:
```
ID         0.000000
Name       0.000000
Sex        0.000000
Age        3.494445
Height    22.193821
Weight    23.191180
Team       0.000000
```

```
NOC         0.000000
Games       0.000000
Year        0.000000
Season      0.000000
City        0.000000
Sport       0.000000
Event       0.000000
Medal      85.326207
dtype: float64
```

[13]:
```
#checking null percentage for noc regions:
noc_regions.isnull().sum()/noc_regions.shape[0]*100
```

[13]:
```
NOC         0.000000
region      1.304348
notes      90.869565
dtype: float64
```

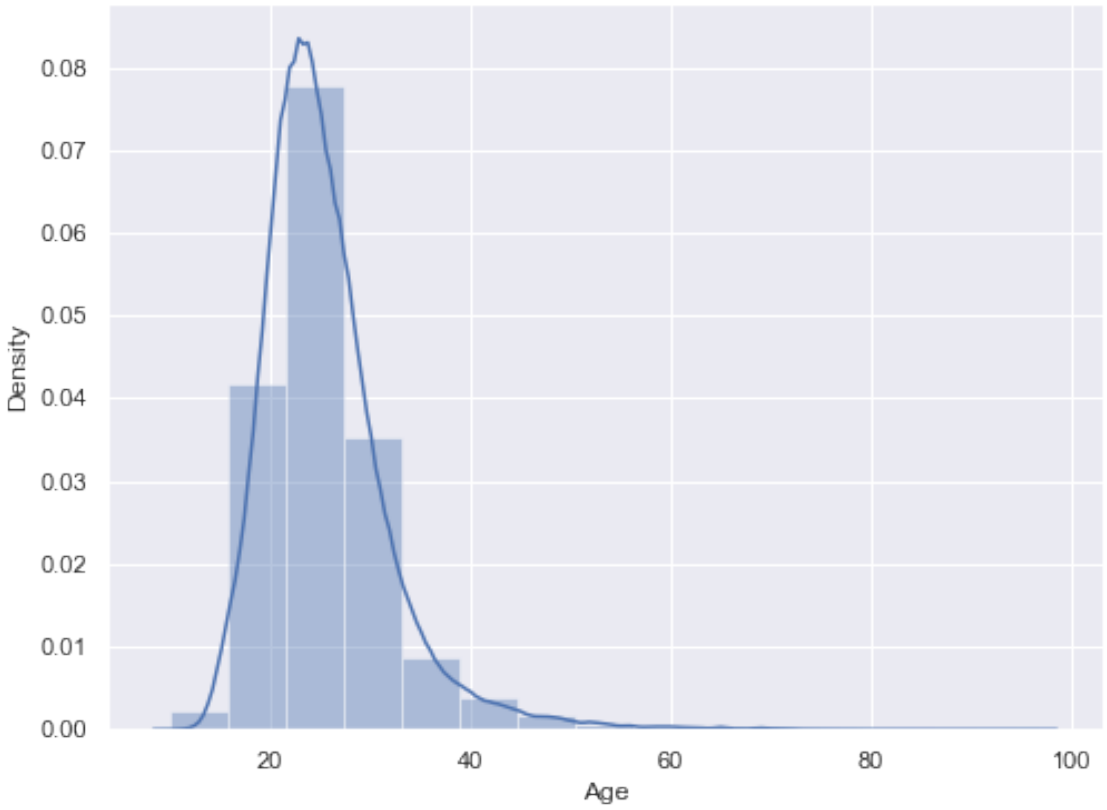
My assumption regarding cleaning + Not cleaning duplicate rows because participants can participate in diffent season and years. + 85% data is missing in Medal column but i think deleting missing values from this column can lead to misleading result. + In **Age** column *3%* data is missing, i will delete those rows, it will not impact in our result. + In **Height** and **Weight** columns *22%* and *23%* data is missing I will those fill missing value by taking an average of both columns.

Histogram of Age columns before cleaning:

[14]:
```
plt.figure(figsize=(8,6))
sns.distplot(athlete_events['Age'],bins = 15)
```

```
C:\Users\thapa\anaconda3\lib\site-packages\seaborn\distributions.py:2551:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
  warnings.warn(msg, FutureWarning)
```

[14]:
```
<AxesSubplot:xlabel='Age', ylabel='Density'>
```



[15]:
```
#fill nan values as No medal.
athlete_events['Medal'].fillna('No Medal',inplace = True)
```

[16]:
```
#removing 3% missing data from age columns:
athlete_events.dropna(axis = 'index', how = 'any' , subset = ['Age'],inplace =␣
↪True)
```

[17]:
```
athlete_events['Age'].isnull().sum()
```

[17]: 0

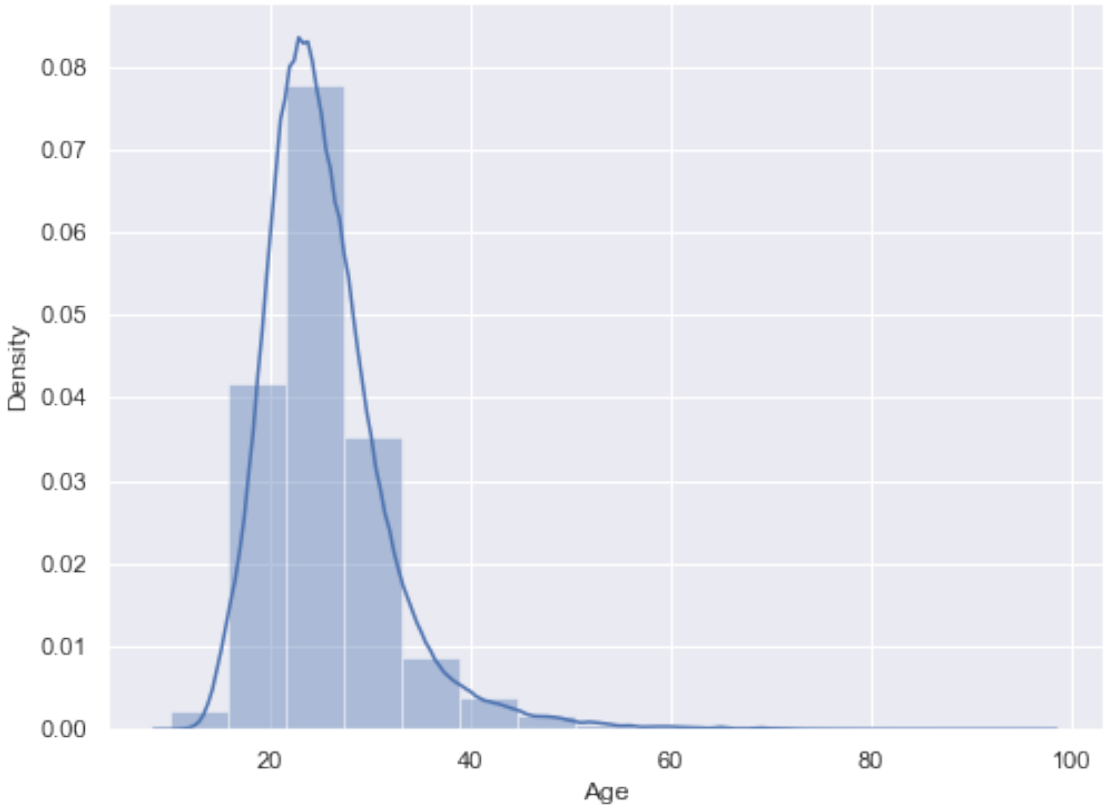
Histogram of age column after cleaning:

[18]:
```
#no significant impact in result:
plt.figure(figsize=(8,6))
sns.distplot(athlete_events['Age'],bins=15)
```

```
C:\Users\thapa\anaconda3\lib\site-packages\seaborn\distributions.py:2551:
FutureWarning: `distplot` is a deprecated function and will be removed in a
future version. Please adapt your code to use either `displot` (a figure-level
function with similar flexibility) or `histplot` (an axes-level function for
histograms).
```

```
  warnings.warn(msg, FutureWarning)
```

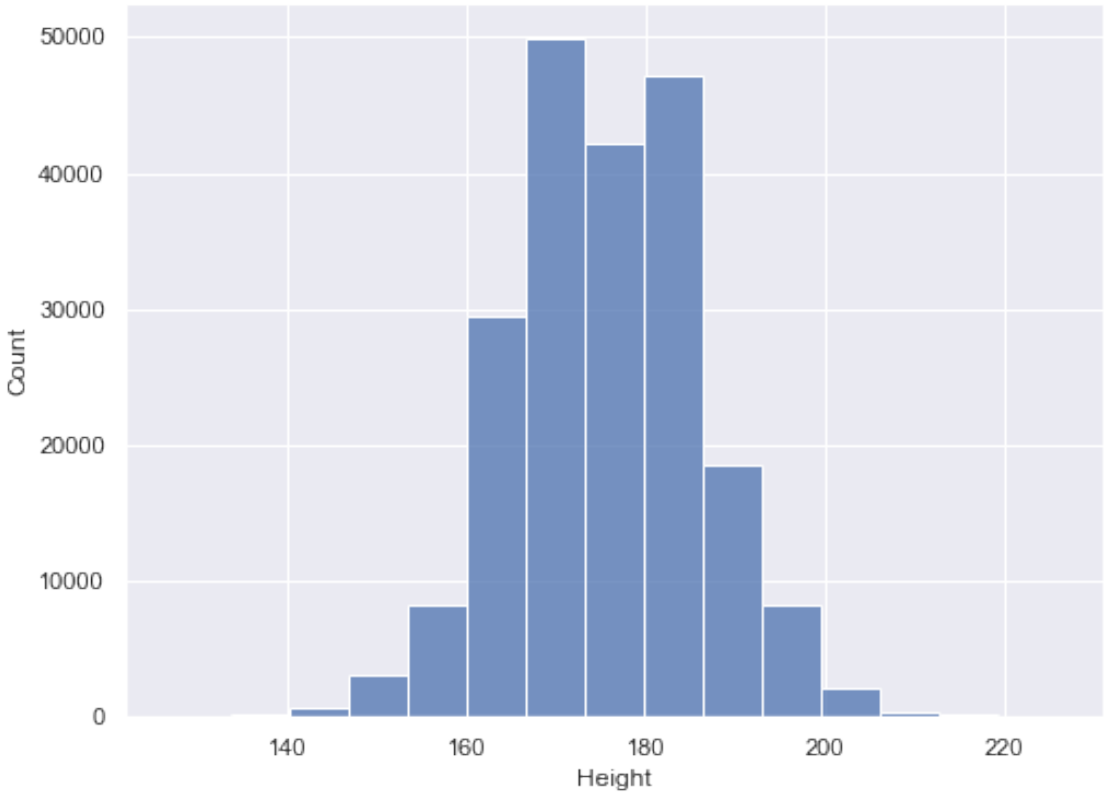
[18]: `<AxesSubplot:xlabel='Age', ylabel='Density'>`



Histogram of height column before filling nan values:

[19]:
```
plt.figure(figsize=(8,6))
sns.histplot(athlete_events['Height'],bins=15)
```

[19]: `<AxesSubplot:xlabel='Height', ylabel='Count'>`



[20]:
```
height_avg = athlete_events['Height'].mean()
height_avg
```

[20]: 175.3513671763429

[21]:
```
height_median = athlete_events['Height'].median()
height_median
```

[21]: 175.0

[22]:
```
height_mode = athlete_events['Height'].mode()
height_mode
```

[22]:
```
0    180.0
dtype: float64
```

[23]:
```
#i am taking height_median to fill those missing value:
athlete_events['Height'].fillna(height_median,inplace= True)
```

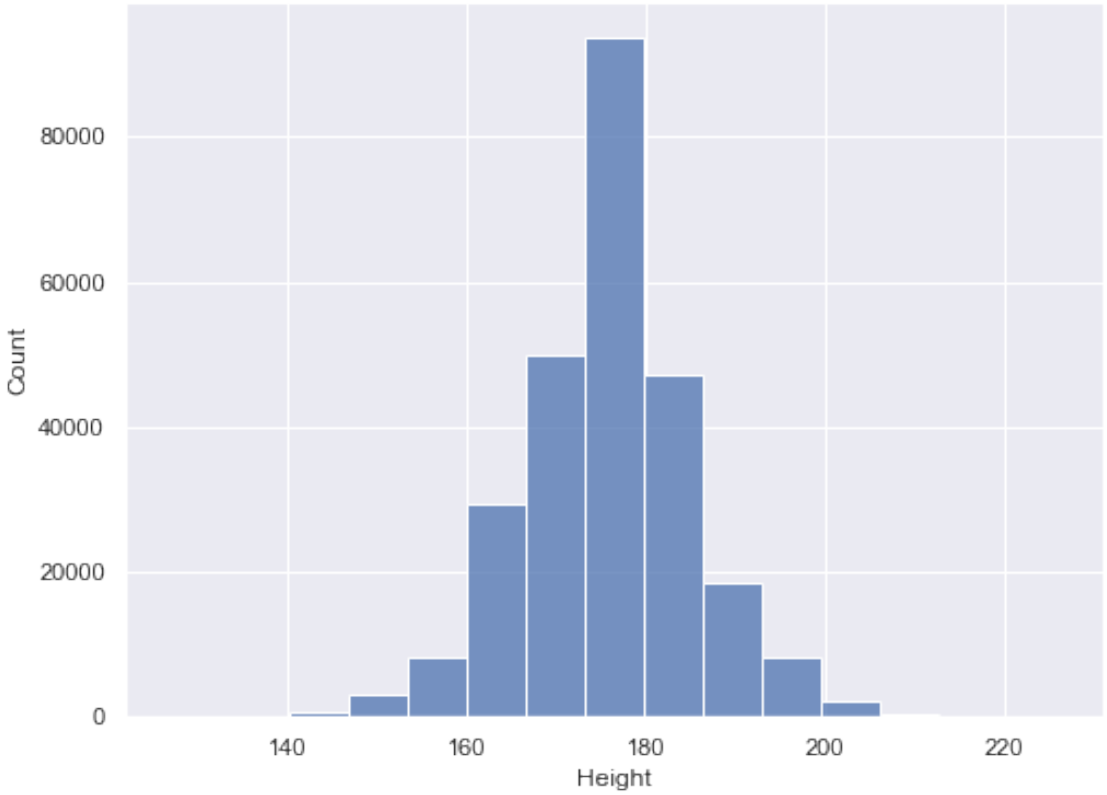
[24]:
```
athlete_events['Height'].isnull().sum()
```

[24]: 0

Histogram after filling all nan values:

[25]:
```
plt.figure(figsize=(8,6))
sns.histplot(athlete_events['Height'],bins = 15)
```

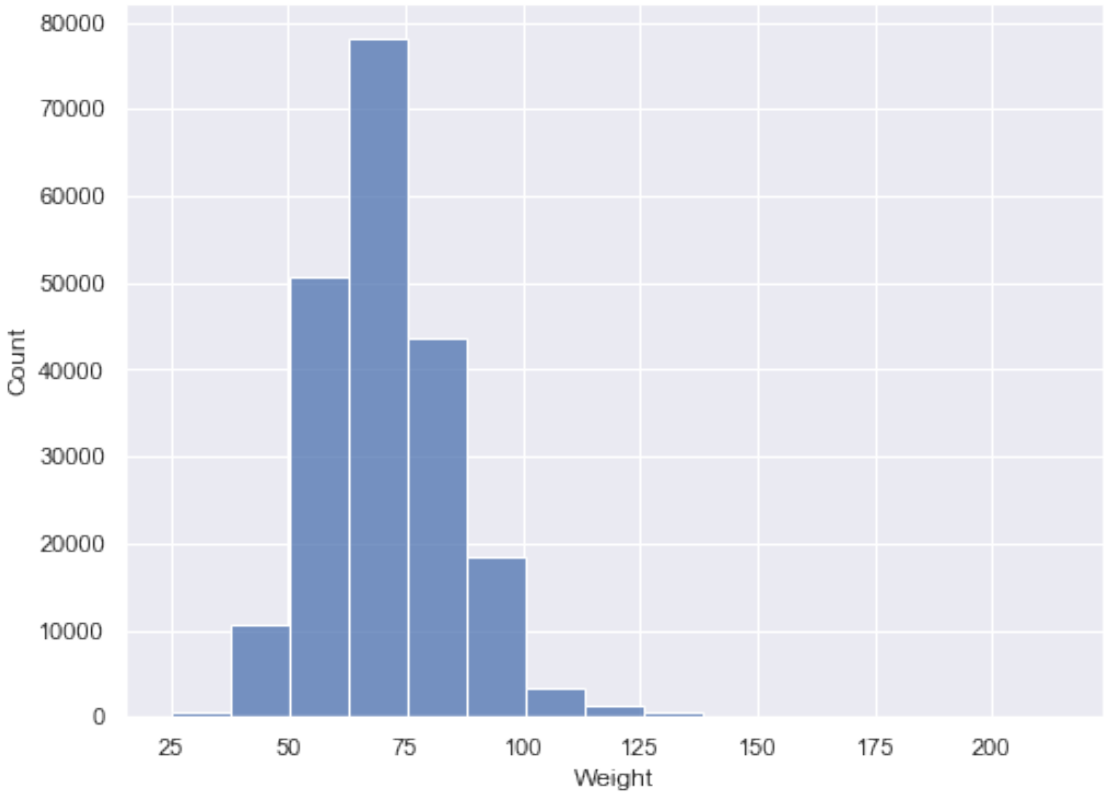
[25]:
```
<AxesSubplot:xlabel='Height', ylabel='Count'>
```



Histogram of weight columns before filling nan value:

[26]:
```
plt.figure(figsize=(8,6))
sns.histplot(athlete_events['Weight'],bins = 15)
```

[26]:
```
<AxesSubplot:xlabel='Weight', ylabel='Count'>
```



[27]:
```
weight_mean = athlete_events['Weight'].mean()
weight_mean
```

[27]: 70.7126034940857

[28]:
```
weight_median = athlete_events['Weight'].median()
weight_median
```

[28]: 70.0

[29]:
```
weight_mode = athlete_events['Weight'].mode()
weight_mode
```

[29]:
```
0    70.0
dtype: float64
```

[30]:
```
# i am taking median to fill all those weight columns:
athlete_events['Weight'].fillna(weight_median,inplace = True)
```

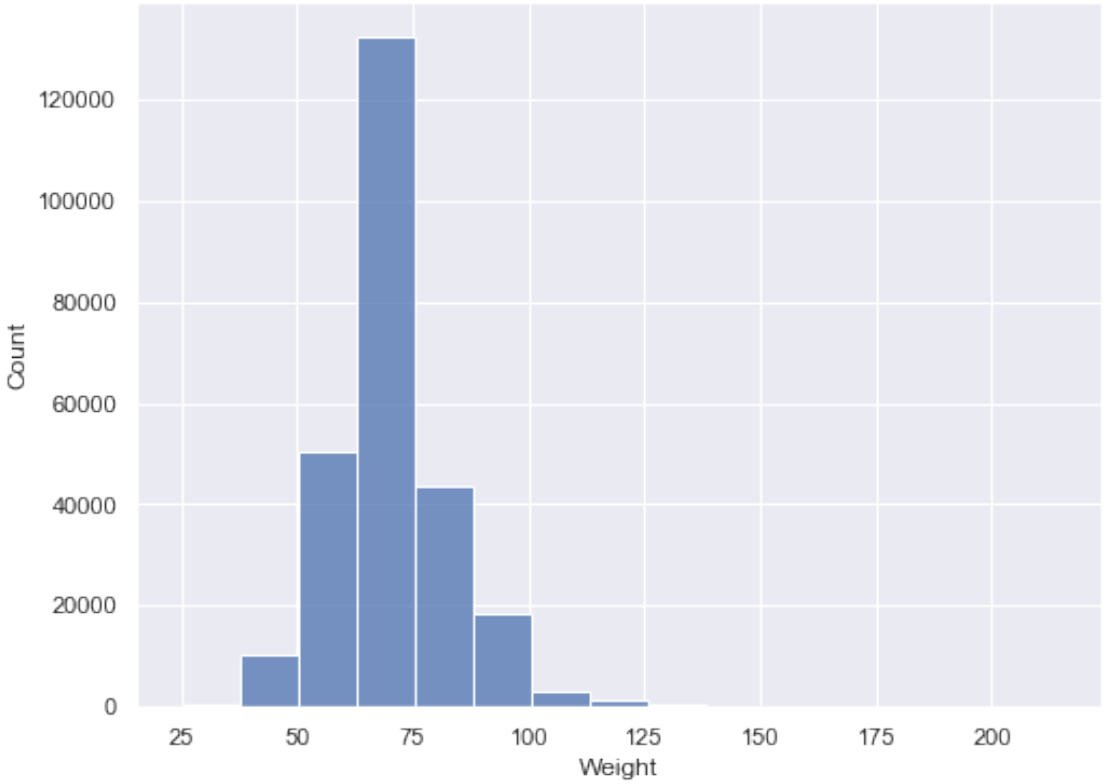
[31]:
```
athlete_events['Weight'].isnull().sum()
```

[31]: 0

Histogram after filling nan value:

[32]:
```
plt.figure(figsize=(8,6))
sns.histplot(athlete_events['Weight'],bins =15)
```

[32]:
```
<AxesSubplot:xlabel='Weight', ylabel='Count'>
```



[33]:
```
#checking null values:
athlete_events.isnull().sum()
```

[33]:
```
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
```

1.0.3 Performing Initial exploration of data:

Athlete by each region:

[34]:
```
query_1 = """
select
    ng.region as "REGION",
    count(distinct ae."ID") as number_of_players
from
    athlete_events as ae
Left Outer Join
    noc_regions ng
on ae."NOC" = ng."NOC"
group by 1
order by 2 desc;
"""
```

[35]:
```
athlete_by_country = pd.read_sql_query(query_1,engine)
athlete_by_country.head()
```

[35]:

	REGION	number_of_players
0	USA	9499
1	Germany	7475
2	UK	5789
3	Russia	5462
4	France	5200

Medal by Country:

[36]:
```
query_2 = """
select
    ng.region as REGION,
    ae."Medal" as Medal,
    count("ID") as number_of_medals
from
    athlete_events as ae
Left Outer Join
    noc_regions ng
on ae."NOC" = ng."NOC"
WHERE "Medal" != 'No Medal'
group by 1 ,2
order by 3 desc;
"""
```

[37]:
```
medal_by_country = pd.read_sql_query(query_2,engine)
medal_by_country.head()
```

[37]:

	region	medal	number_of_medals
0	USA	Gold	2627
1	USA	Silver	1619
2	Russia	Gold	1599
3	USA	Bronze	1346
4	Germany	Gold	1293

Athlete with more than 1 medal:

[38]:
```
query_3 = """
select
    distinct ae."ID",
    ae."Name",
    ng.region as REGION,
    count(ae."Medal") as number_of_medals
from
    athlete_events as ae
Left Outer Join
    noc_regions ng
on ae."NOC" = ng."NOC"
WHERE "Medal" != 'No Medal'
group by 1,2,3
having count(ae."Medal") > 1
order by 4 desc;
"""
```

[39]:
```
athlete_medal = pd.read_sql_query(query_3,engine)
athlete_medal.head()
```

[39]:

	ID	Name	region	number_of_medals
0	94406	Michael Fred Phelps, II	USA	28
1	67046	Larysa Semenivna Latynina (Diriy-)	Russia	18
2	4198	Nikolay Yefimovich Andrianov	Russia	15
3	11951	Ole Einar Bjrndalen	Norway	13
4	74420	Edoardo Mangiarotti	Italy	13

Male and Female participants and medal proportion:

[40]:
```
query_4 = """
select
    "Sex",
    count("ID") as Number_of_players,
    count( Case when "Medal" in ('Gold','Silver','Bronze') then "Medal"
                else NULL
           end) as medals
from
```

```
    athlete_events

group by 1
order by 2 desc
"""
```

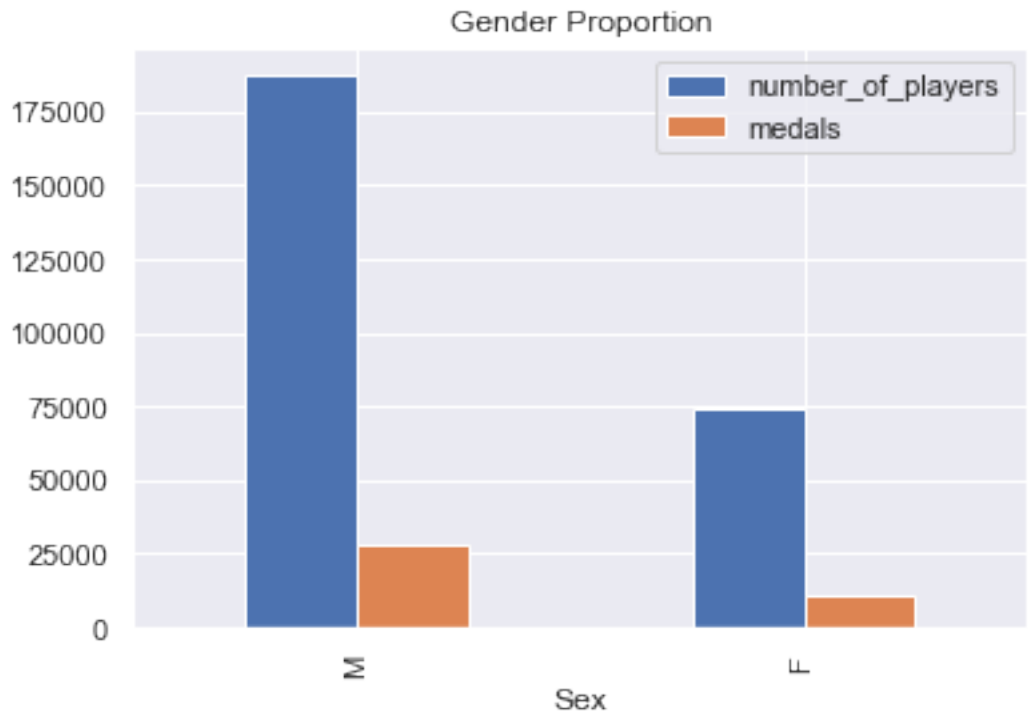
[41]:
```
gender_obs = pd.read_sql_query(query_4 , engine)
gender_obs
```

[41]:

	Sex	number_of_players	medals
0	M	187544	27815
1	F	74098	11236

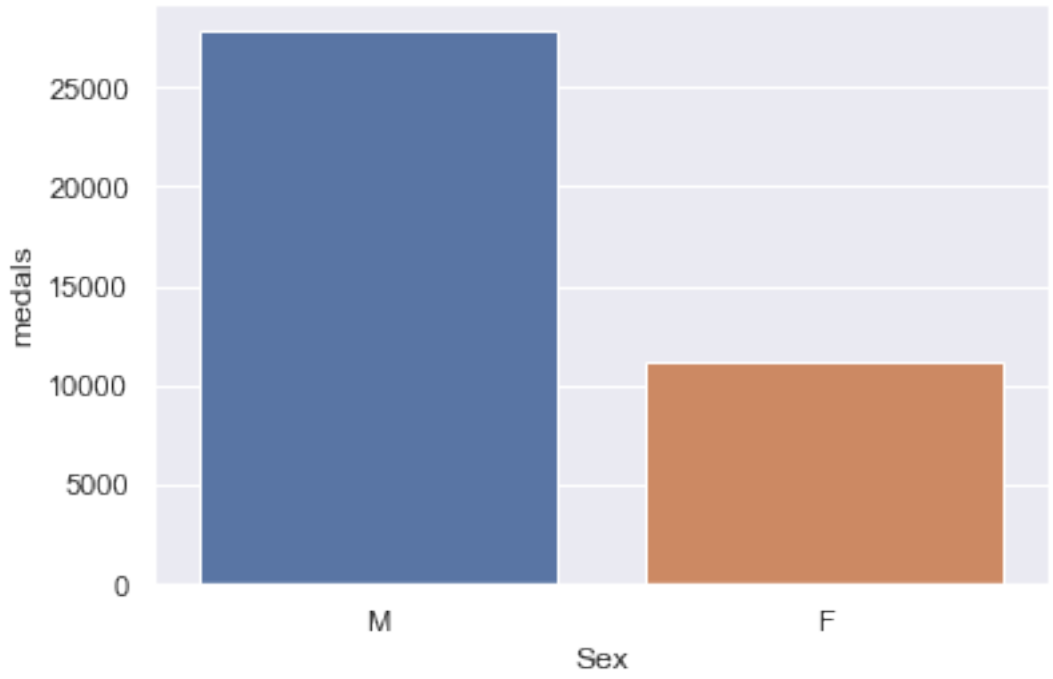
[42]:
```
gender_obs.plot.bar('Sex',y=['number_of_players','medals'],title = 'Gender␣
↪Proportion')
```

[42]: <AxesSubplot:title={'center':'Gender Proportion'}, xlabel='Sex'>



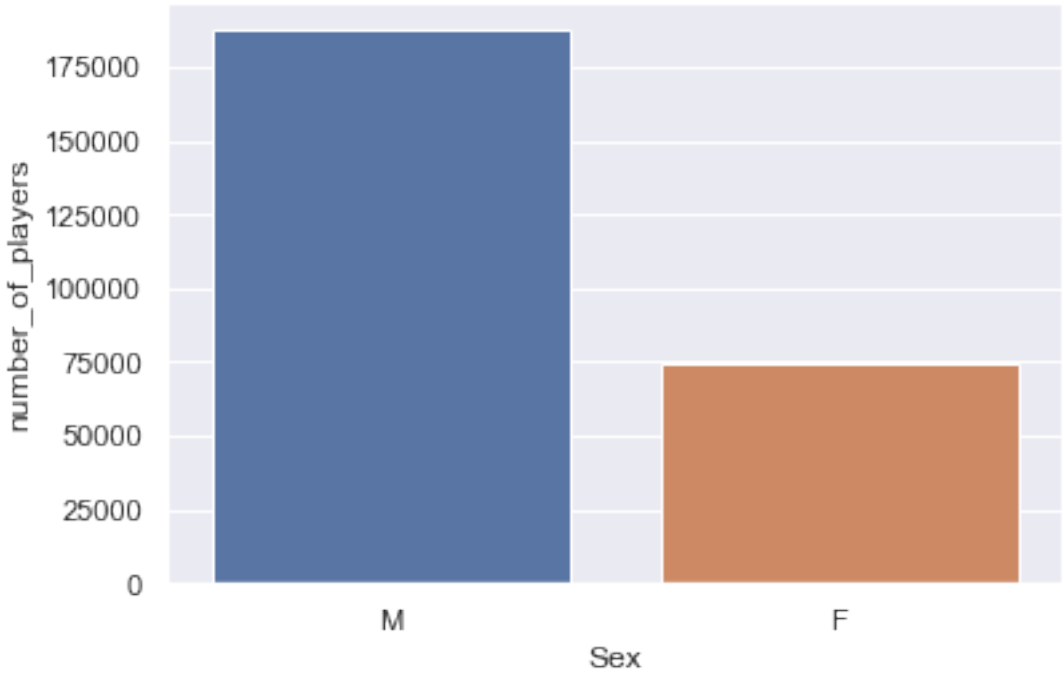
[43]:
```
sns.barplot(x = gender_obs['Sex'], y = gender_obs['medals'])
```

[43]: <AxesSubplot:xlabel='Sex', ylabel='medals'>



[44]:
```
sns.barplot(x = gender_obs['Sex'], y = gender_obs['number_of_players'])
```

[44]: <AxesSubplot:xlabel='Sex', ylabel='number_of_players'>



Games with more observation:

[45]:
```
query_5 = """
select
    distinct("Games"),
    "City",
    count("ID")
from
    athlete_events
group by 1,2
order by 3 desc
"""
```

[46]:
```
game_obs = pd.read_sql_query(query_5,engine)
game_obs.head()
```

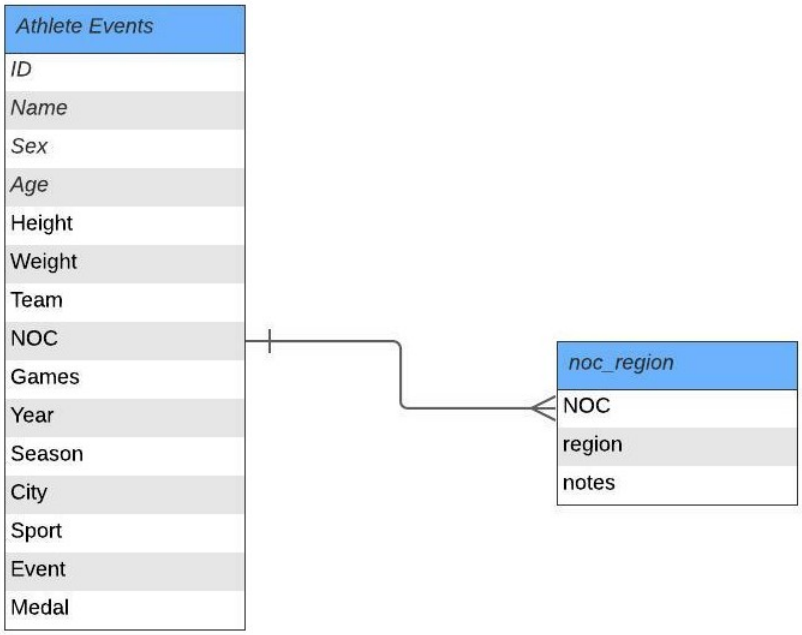
[46]:

	Games	City	count
0	2000 Summer	Sydney	13820
1	1996 Summer	Atlanta	13772
2	2016 Summer	Rio de Janeiro	13688
3	2008 Summer	Beijing	13600
4	2004 Summer	Athina	13443

1.0.4 Proposed ERD to show the relationship of the data.

[47]:
```
from IPython import display
display.Image("C:\\Users\\thapa\\Pictures\\Blank diagram - ERD with colored␣
↪entities (UML notation).jpeg")
```

[47]:



2 Develop Project Proposal:

2.0.1 Description

My project's purpose is to learn more about the results of the Olympic Games (medals). To help me understand the data, I'm hoping to gather evidence regarding the nation, gender, sex, and years.

Journalists, trainers, and countries (governments) who want to know what's going on in the world. would be interested in my findings in order to publish them in the Olympics Games over the years.improve results (journalists) or obtain information (journalists) (coaches and countries).

2.0.2 Questions

- **What has been the demographics of Olympics?**
- **Which country has been winning the most medals?**
- **Which country has been encouraging female participation in sports over the years?**

2.0.3 Hypothesis:

- The age group 20-25 is the most represented.
- US is the most regular country along the years (measure: number of participants and medals).
- Women in developed countries participate more and get better results (won more medals).

[ ]: