1. Impoting Dependencies :

In [ ]:
```
import numpy as np
import pandas as pd
import seaborn as sns
from sklearn.model_selection import train_test_split
import matplotlib.pyplot as plt
from xgboost import XGBRegressor
from sklearn import metrics
```

2. Data Collcetion and Analysis:

A- Loading dataset :

In [ ]:
```
data_calories = pd.read_csv("C:/Machine_learning Python/projets/calorrieBurned/c
data_exercices = pd.read_csv("C:/Machine_learning Python/projets/calorrieBurned/
```

B- Head of the datas

In [ ]:
```
data_calories.head()
```

Out[ ]:

	User_ID	Calories
0	14733363	231.0
1	14861698	66.0
2	11179863	26.0
3	16180408	71.0
4	17771927	35.0

In [ ]:
```
data_exercices.head()
```

Out[ ]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
0	14733363	male	68	190.0	94.0	29.0	105.0	40.8
1	14861698	female	20	166.0	60.0	14.0	94.0	40.3
2	11179863	male	69	179.0	79.0	5.0	88.0	38.7
3	16180408	female	34	179.0	71.0	13.0	100.0	40.5
4	17771927	female	27	154.0	58.0	10.0	81.0	39.8

C- Combining the data into one data:

In [ ]:
```
data_caloriesBurned = pd.concat( [data_exercices, data_calories["Calories"] ] ,
```

In [ ]:
```
data_caloriesBurned.head()
```

Out[ ]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calorie
0	14733363	male	68	190.0	94.0	29.0	105.0	40.8	231.
1	14861698	female	20	166.0	60.0	14.0	94.0	40.3	66.
2	11179863	male	69	179.0	79.0	5.0	88.0	38.7	26.
3	16180408	female	34	179.0	71.0	13.0	100.0	40.5	71.
4	17771927	female	27	154.0	58.0	10.0	81.0	39.8	35.

D-Number of row & columns:

In [ ]:
```
data_caloriesBurned.shape
```

Out[ ]:
```
(15000, 9)
```

2. Statisctical measures :

A- General Statistic:

In [ ]:
```
data_caloriesBurned.describe()
```

Out[ ]:

	User_ID	Age	Height	Weight	Duration	Heart_I
count	1.500000e+04	15000.000000	15000.000000	15000.000000	15000.000000	15000.000
mean	1.497736e+07	42.789800	174.465133	74.966867	15.530600	95.518
std	2.872851e+06	16.980264	14.258114	15.035657	8.319203	9.583
min	1.000116e+07	20.000000	123.000000	36.000000	1.000000	67.000
25%	1.247419e+07	28.000000	164.000000	63.000000	8.000000	88.000
50%	1.499728e+07	39.000000	175.000000	74.000000	16.000000	96.000
75%	1.744928e+07	56.000000	185.000000	87.000000	23.000000	103.000
max	1.999965e+07	79.000000	222.000000	132.000000	30.000000	128.000

B- Information about the data:

In [ ]:
```
data_caloriesBurned.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 15000 entries, 0 to 14999
Data columns (total 9 columns):
 #   Column      Non-Null Count  Dtype  
---  ------      --------------  -----  
 0   User_ID     15000 non-null  int64  
 1   Gender      15000 non-null  object 
 2   Age         15000 non-null  int64  
 3   Height      15000 non-null  float64
 4   Weight      15000 non-null  float64
 5   Duration    15000 non-null  float64
 6   Heart_Rate  15000 non-null  float64
 7   Body_Temp   15000 non-null  float64
 8   Calories    15000 non-null  float64
dtypes: float64(6), int64(2), object(1)
memory usage: 1.0+ MB
```

C- Number of missing value in each column;

In [ ]:
```
data_caloriesBurned.isnull().sum()
```

Out[ ]:
```
User_ID       0
Gender        0
Age           0
Height        0
Weight        0
Duration      0
Heart_Rate    0
Body_Temp     0
Calories      0
dtype: int64
```

3- Data Visualisation:

A- Basic set:

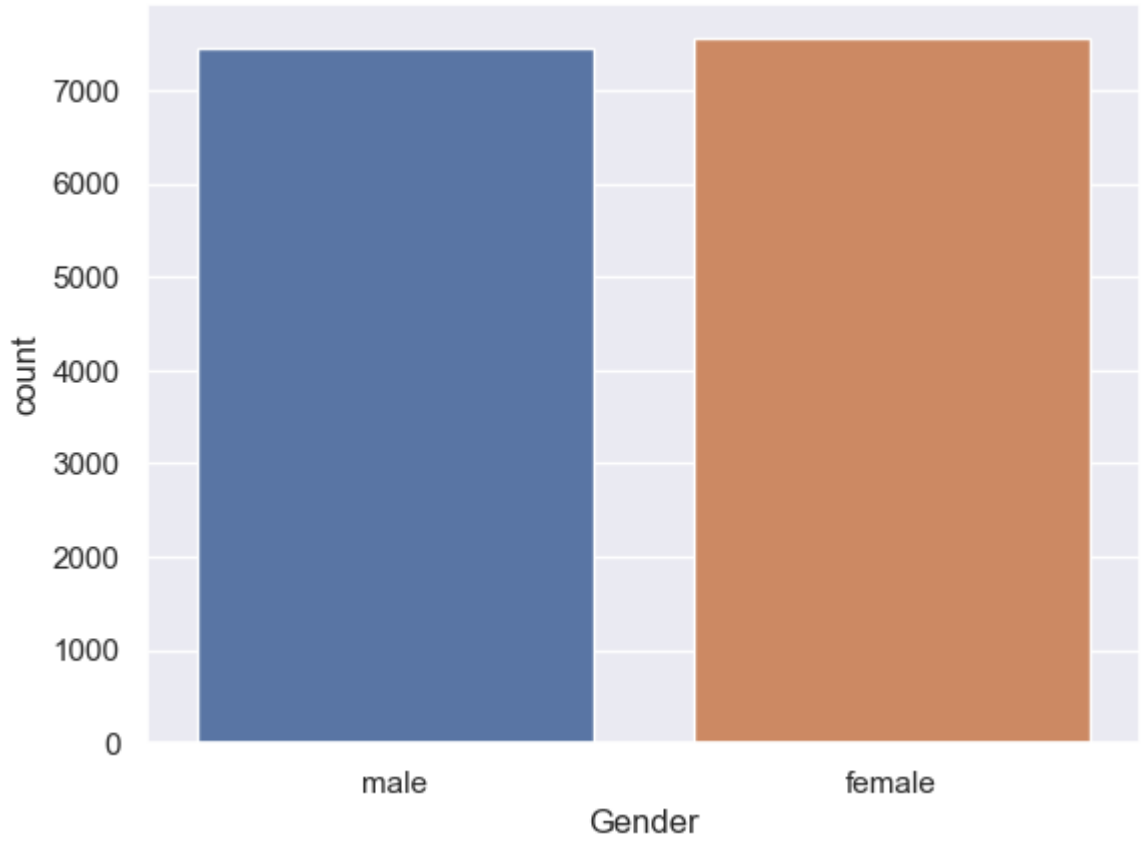
In [ ]:
```
sns.set()
```

B- Distrubution of the gender column:

In [ ]:
```
sns.countplot(data=data_caloriesBurned, x='Gender', palette='deep')
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_1676\3705081045.py:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v
0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effe
ct.

  sns.countplot(data=data_caloriesBurned, x='Gender', palette='deep')
```

Out[ ]:
```
<Axes: xlabel='Gender', ylabel='count'>
```

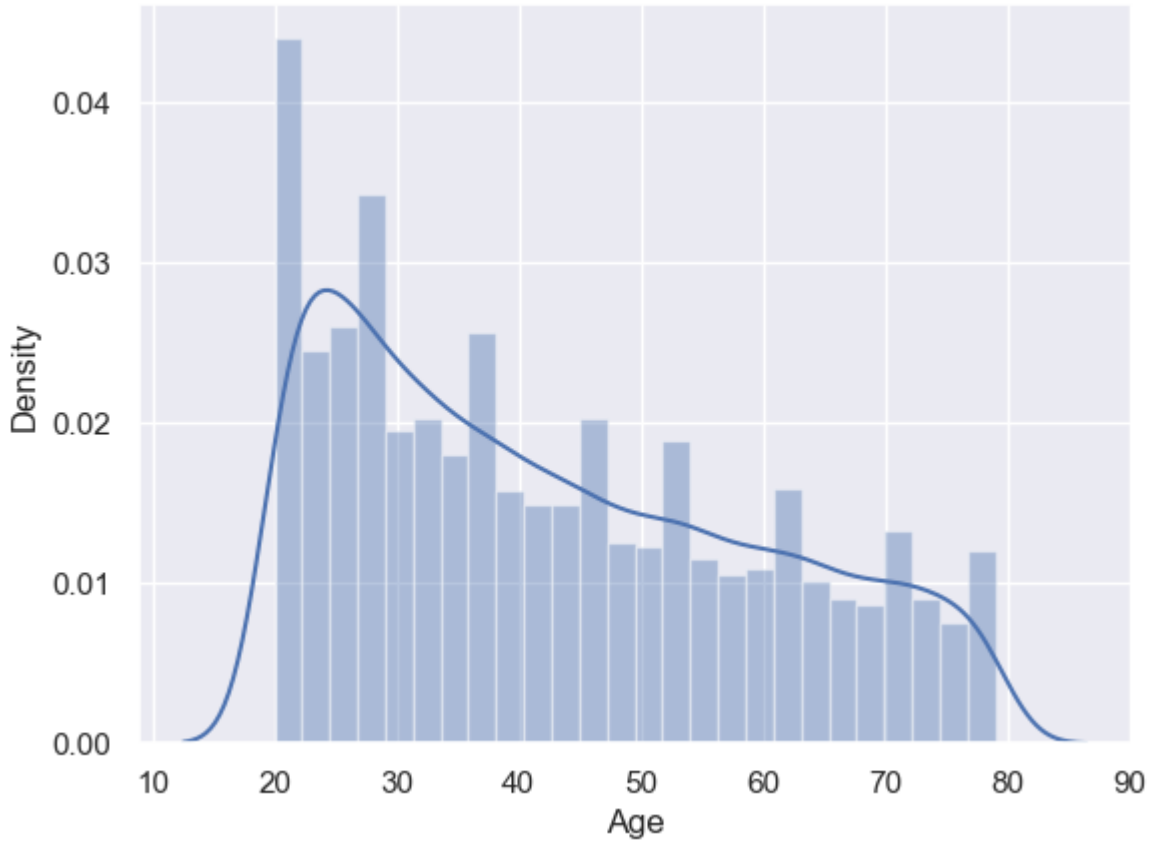


C- Distrubution of the age column:

In [ ]:
```
sns.distplot(data_caloriesBurned['Age'])
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_1676\219086085.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(data_caloriesBurned['Age'])
```

Out[ ]:
```
<Axes: xlabel='Age', ylabel='Density'>
```

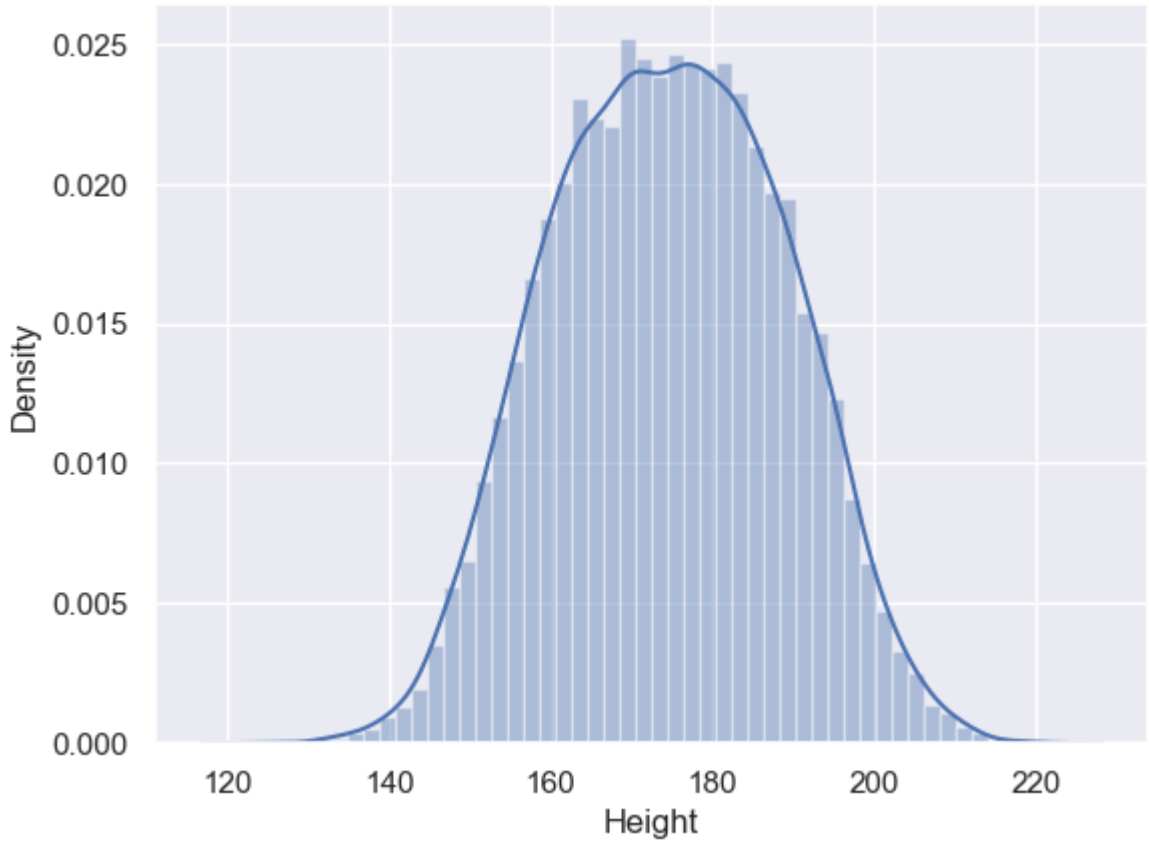


D- Distrubution of the height column:

In [ ]:
```
sns.distplot(data_caloriesBurned['Height'])
```

```
C:\Users\HP\AppData\Local\Temp\ipykernel_1676\479023956.py:1: UserWarning:

`distplot` is a deprecated function and will be removed in seaborn v0.14.0.

Please adapt your code to use either `displot` (a figure-level function with
similar flexibility) or `histplot` (an axes-level function for histograms).

For a guide to updating your code to use the new functions, please see
https://gist.github.com/mwaskom/de44147ed2974457ad6372750bbe5751

  sns.distplot(data_caloriesBurned['Height'])
```

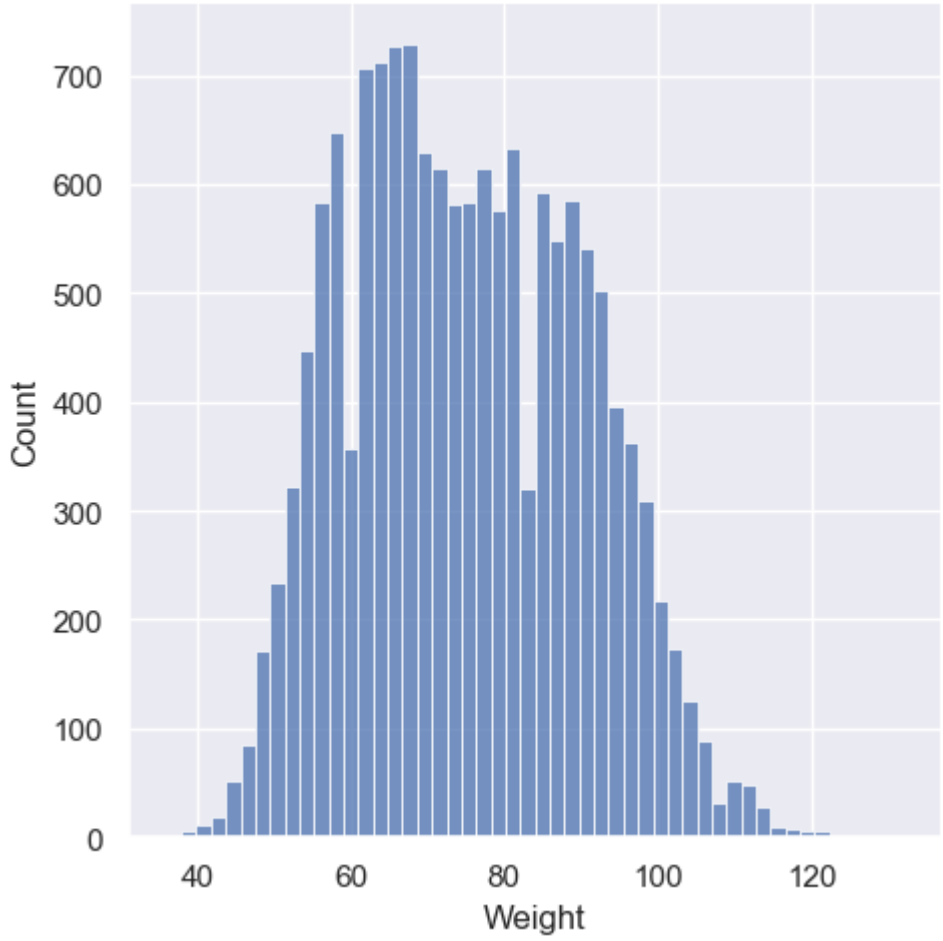
Out[ ]:
```
<Axes: xlabel='Height', ylabel='Density'>
```



E- Distrubution of the weight column:

In [ ]:
```
sns.displot(data_caloriesBurned["Weight"])
```

Out[ ]:
```
<seaborn.axisgrid.FacetGrid at 0x271fed21b20>
```



4. The correlation:

A- Convertion of the column gender (male = 0) ,(female = 1):

In [ ]:
```
data_caloriesBurned.replace({"Gender" : {'male': 1 , 'female' : 0}}, inplace=Tru
data_caloriesBurned.head()
```

Out[ ]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calorie
0	14733363	1	68	190.0	94.0	29.0	105.0	40.8	231.
1	14861698	0	20	166.0	60.0	14.0	94.0	40.3	66.
2	11179863	1	69	179.0	79.0	5.0	88.0	38.7	26.
3	16180408	0	34	179.0	71.0	13.0	100.0	40.5	71.
4	17771927	0	27	154.0	58.0	10.0	81.0	39.8	35.

B- Variable de correlation:

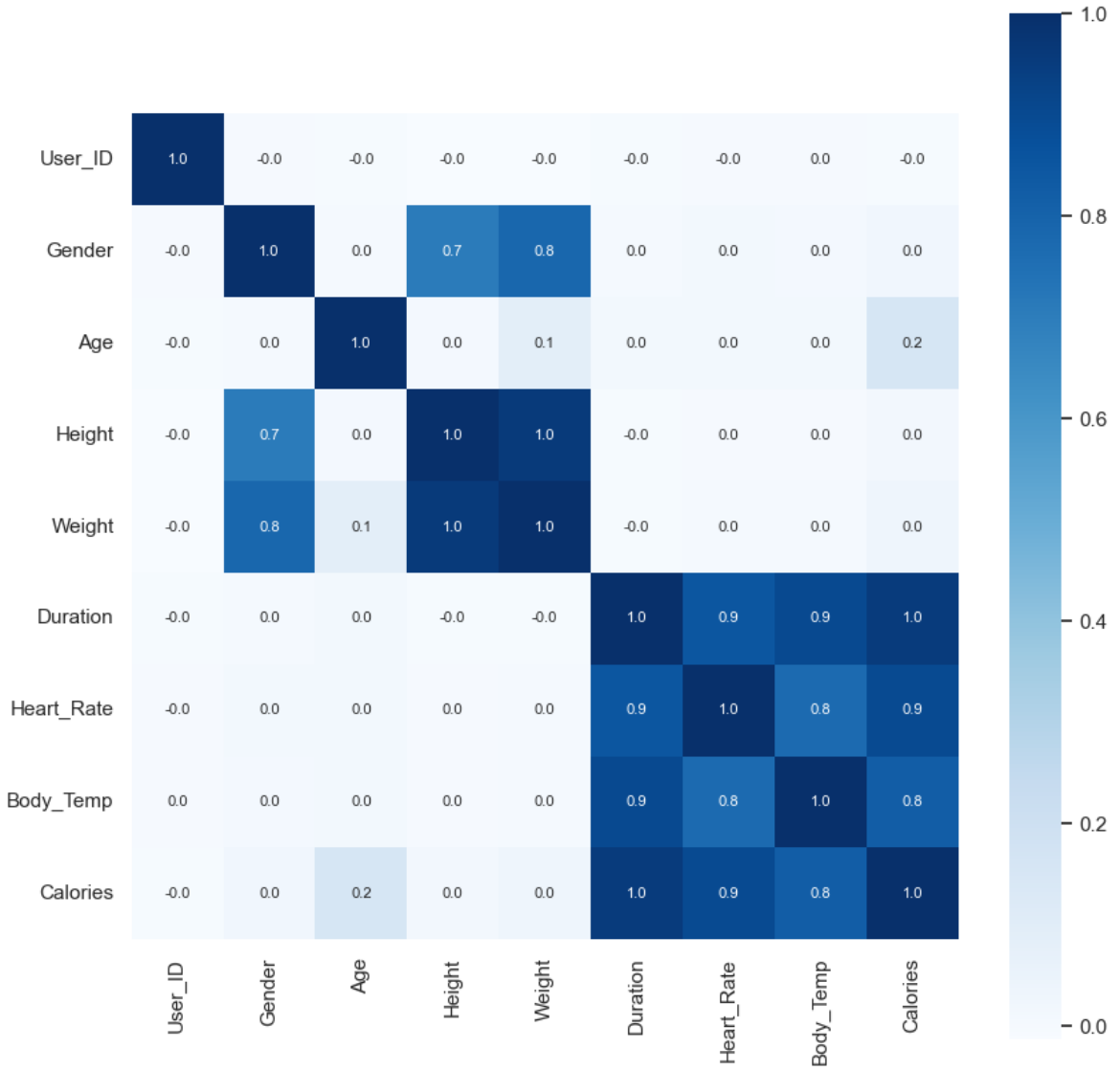
In [ ]:
```
corr = data_caloriesBurned.corr()
```

C- Matrice de correlation:

In [ ]:
```
plt.figure(figsize=(10,10))
```

```
sns.heatmap(corr , cbar=True, square=True, fmt='.1f', annot=True, annot_kws={'si
```

Out[ ]: <Axes: >



5. Train test split:

A- Separating a data & label

In [ ]:
```
X = data_caloriesBurned.drop(columns= ["User_ID" ,"Calories"] , axis=1 )
Y = data_caloriesBurned["Calories"]
print(X)
print(Y)
```

```
        Gender  Age  Height  Weight  Duration  Heart_Rate  Body_Temp
0            1   68   190.0    94.0      29.0       105.0       40.8
1            0   20   166.0    60.0      14.0        94.0       40.3
2            1   69   179.0    79.0       5.0        88.0       38.7
3            0   34   179.0    71.0      13.0       100.0       40.5
4            0   27   154.0    58.0      10.0        81.0       39.8
...        ...  ...     ...     ...       ...         ...        ...
14995        0   20   193.0    86.0      11.0        92.0       40.4
14996        0   27   165.0    65.0       6.0        85.0       39.2
14997        0   43   159.0    58.0      16.0        90.0       40.1
14998        1   78   193.0    97.0       2.0        84.0       38.3
14999        1   63   173.0    79.0      18.0        92.0       40.5

[15000 rows x 7 columns]
0        231.0
1         66.0
2         26.0
3         71.0
4         35.0
         ...
14995     45.0
14996     23.0
14997     75.0
14998     11.0
14999     98.0
Name: Calories, Length: 15000, dtype: float64
```

B- Test Split:

In [ ]:
```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_
```

In [ ]:
```
print(X.shape,X_train.shape, X_test.shape)
```

```
(15000, 7) (12000, 7) (3000, 7)
```

6. Model Training:

A- Loading the model:

In [ ]:
```
model = XGBRegressor()
```

B- Training the model:

In [ ]:
```
model.fit(X_train , Y_train)
```

Out[ ]:

```
XGBRegressor(base_score=None, booster=None, callbacks=None,
             colsample_bylevel=None, colsample_bynode=None,
             colsample_bytree=None, device=None, early_stopping_roun
ds=None,
             enable_categorical=False, eval_metric=None, feature_typ
es=None,
             gamma=None, grow_policy=None, importance_type=None,
             interaction_constraints=None, learning_rate=None, max_b
in=None,
```

7. Model Evaluation:

A- Absolute error:

In [ ]:

```
prediction = model.predict(X_test)
erreur = metrics.mean_absolute_error(Y_test , prediction)
print("Absolute Error = ", erreur)
```

```
Absolute Error =  1.4833678883314132
```

B- Example:

In [ ]:

```
def  predictionF(Gender,Age,Height,Weight,Duration,Heart_Rate,Body_Temp):
    input_data = (Gender,Age,Height,Weight,Duration,Heart_Rate,Body_Temp)
    #Input the data into the numpy array:
    input_dataNumpuy = np.asarray(input_data)
    #Reshape the data:
    input_dataReshaped = input_dataNumpuy.reshape(1,-1)
    prediction = model.predict(input_dataReshaped)
    return prediction[0]



print("Welcome to our model")
Gender = int(input("Enter your gender (0: male, 1: female): "))
Age = int(input("Enter your age: "))
Height = float(input("Enter your height: "))
Weight = float(input("Enter your weight: "))
Duration = float(input("Enter the test duration (in min): "))
Heart_Rate = float(input("Enter your heart rate: "))
Body_Temp = float(input("Enter your body temperature (in C): "))

print("You have burned: ", predictionF(Gender, Age, Height, Weight, Duration, He
```

```
Welcome to our model
You have burned:  135.10457 calories
```