In [31]:
```
#LOADING PYTHON LIBRARIES
import numpy as np #LIBRARY TO CREATE ARRAYS WHICH IS USEFULL FOR DATA-PROCESSING.ALIAZ
import pandas as pd #LIBRARY USED TO MAKE DATAFRAMES(STRUCTURED TABLES).
import matplotlib.pyplot as plt #CREATING PLOTS FOR DATA ANALYSIS(VIZUALISATION LIBRARY
import seaborn as sns  #VIZUALISATION LIBRARY.
from sklearn.model_selection import train_test_split #SPLIT DATASETS.
from xgboost import XGBRegressor #FOR THE ALGORITHM.
from sklearn import metrics  #USED TO EVALUATE OUR MODEL.
```

In [19]:
```
#LOADING exercise.csv
exercise_data = pd.read_csv('exercise.csv')
exercise_data.head() #first five coloumns is displayed.
exercise_data.shape #displays size of the array.
```

Out[19]: (15000, 8)

In [22]:
```
#LOAD calories.csv
calories = pd.read_csv('calories.csv')
calories.head() #first five coloumns is displayed.
#alories.shape #displays size of the array.
```

Out[22]:

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

In [20]:
```
#COMBINE exercise.csv and calories.csv
calories_data = pd.concat([exercise_data, calories['Calories']], axis=1)# axis=1 repres
```

In [27]:
```
#COMBINED DATASET
calories_data.head()
#calories_data.shape
```

Out[27]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
0	14733363	male	68	190.0	94.0	29.0	105.0	40.8	231.0
1	14861698	female	20	166.0	60.0	14.0	94.0	40.3	66.0
2	11179863	male	69	179.0	79.0	5.0	88.0	38.7	26.0
3	16180408	female	34	179.0	71.0	13.0	100.0	40.5	71.0
4	17771927	female	27	154.0	58.0	10.0	81.0	39.8	35.0

In [25]:
```
#INFORMATION ABOUT THE DATASET
```

```
calories_data.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
```

In [26]:

```
# CHECKING FOR NULL VALUES IN THE DATA TO IMPROVE THE QUALITY OF DATA
calories_data.isnull().sum()
```

Out[26]:

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

In [29]:

```
#STATISTICAL MEASURES ABOUT THE DATA
calories_data.describe()
```

Out[29]:

	User_ID	Age	Height	Weight	Duration	Heart_Rate	Body_Tem
count	1.500000e+04	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000	15000.0000(
mean	1.497736e+07	42.789800	174.465133	74.966867	15.530600	95.518533	40.02545
std	2.872851e+06	16.980264	14.258114	15.035657	8.319203	9.583328	0.77923
min	1.000116e+07	20.000000	123.000000	36.000000	1.000000	67.000000	37.1000(
25%	1.247419e+07	28.000000	164.000000	63.000000	8.000000	88.000000	39.6000(
50%	1.499728e+07	39.000000	175.000000	74.000000	16.000000	96.000000	40.2000(
75%	1.744928e+07	56.000000	185.000000	87.000000	23.000000	103.000000	40.6000(
max	1.999965e+07	79.000000	222.000000	132.000000	30.000000	128.000000	41.5000(

In [32]:

```
#DATA VIZUALIZATION
sns.set() #THEMES FOR PLOTTING
```

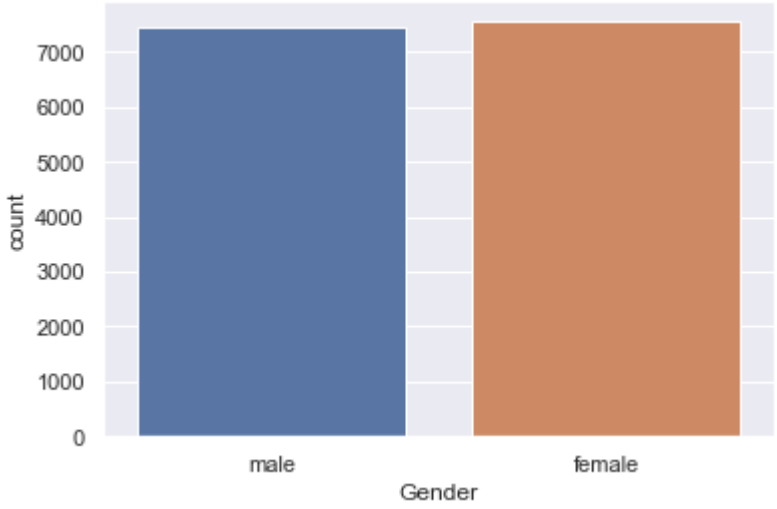
In [34]:

```
#DATA ANALYSIS OF GENDER USING COUNT PLOT
```

```
sns.countplot(calories_data['Gender'])#SHOWS EQUAL DISTRIBUTION OF MALE AND FEMALE AS T
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\_decora
tors.py:36: FutureWarning: Pass the following variable as a keyword arg: x. From version
0.12, the only valid positional argument will be `data`, and passing other arguments wit
hout an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

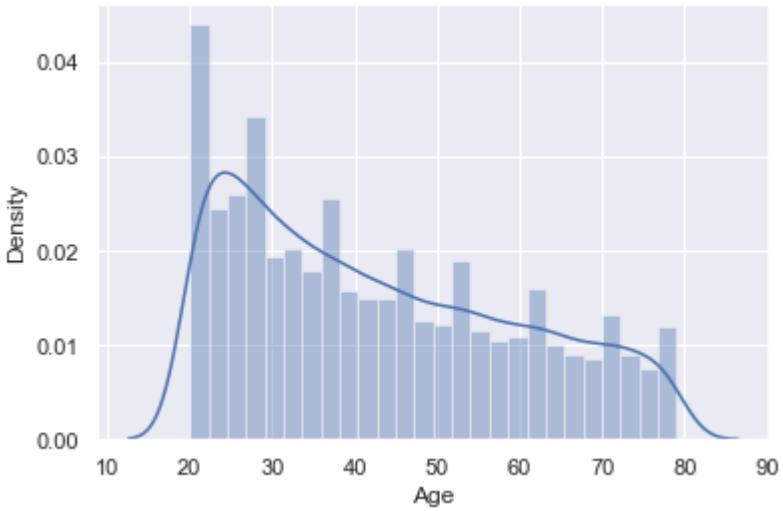
Out[34]: <AxesSubplot:xlabel='Gender', ylabel='count'>



In [35]:
```
#DATA ANALYSIS OF AGE USING DISTRIBUTION PLOT
sns.distplot(calories_data['Age'])#BASED ON THE DISTRIBUTION PLOT MORE VALUES IN THE RA
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

Out[35]: <AxesSubplot:xlabel='Age', ylabel='Density'>

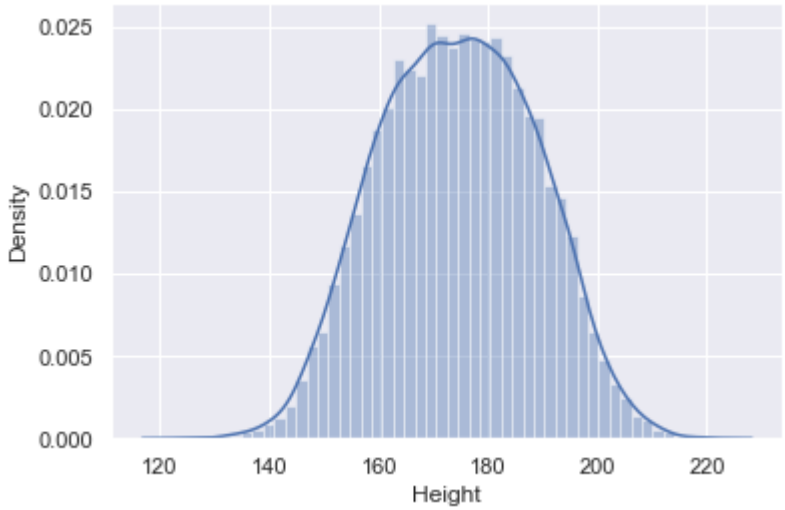


In [36]:
```
#DATA ANALYSIS OF HEIGHT USING DISTRIBUTION PLOT
sns.distplot(calories_data['Height'])#NORMAL DISTRIBUTION
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
```

```
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

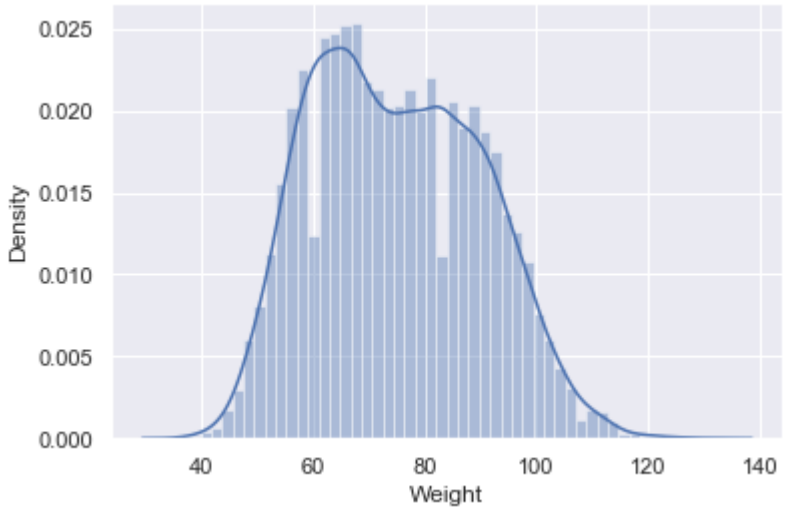
Out[36]: <AxesSubplot:xlabel='Height', ylabel='Density'>



In [37]:
```
#DATA ANALYSIS OF WEIGHT USING DISTRIBUTION PLOT
sns.distplot(calories_data['Weight'])
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

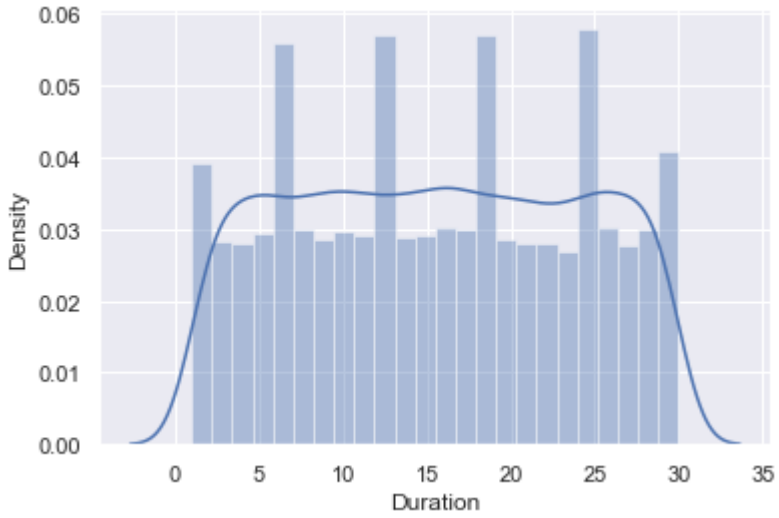
Out[37]: <AxesSubplot:xlabel='Weight', ylabel='Density'>



In [38]:
```
#DATA ANALYSIS OF DURATION USING DISTRIBUTION PLOT
sns.distplot(calories_data['Duration'])
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

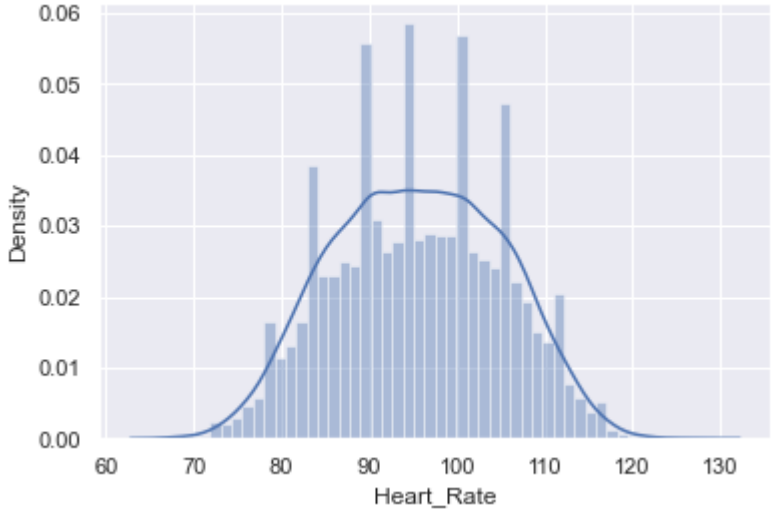
Out[38]: <AxesSubplot:xlabel='Duration', ylabel='Density'>



In [39]:
```
#DATA ANALYSIS OF HEART RATE USING DISTRIBUTION PLOT
sns.distplot(calories_data['Heart_Rate'])
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

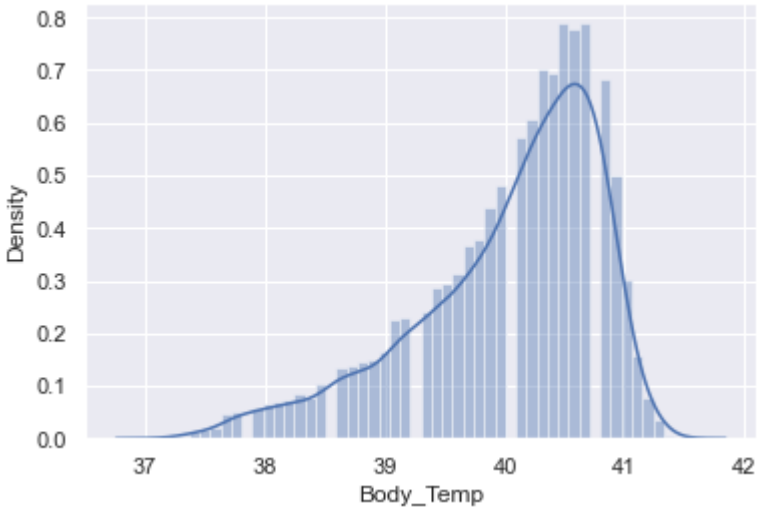
Out[39]: <AxesSubplot:xlabel='Heart_Rate', ylabel='Density'>



In [40]:
```
#DATA ANALYSIS OF BODY TEMPERATURE USING DISTRIBUTION PLOT
sns.distplot(calories_data['Body_Temp'])
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

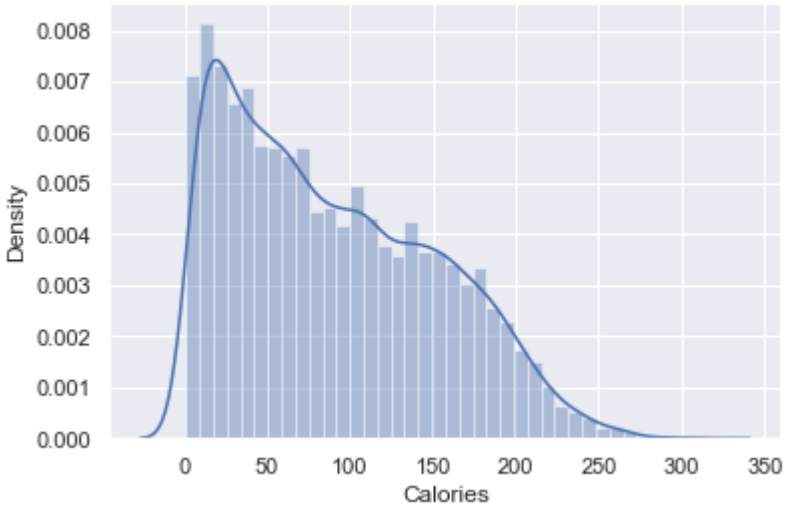
Out[40]: <AxesSubplot:xlabel='Body_Temp', ylabel='Density'>



In [41]:
```
#DATA ANALYSIS OF CALORIES USING DISTRIBUTION PLOT
sns.distplot(calories_data['Calories'])
```

```
c:\users\hp-kle\appdata\local\programs\python\python39\lib\site-packages\seaborn\distrib
utions.py:2557: FutureWarning: `distplot` is a deprecated function and will be removed i
n a future version. Please adapt your code to use either `displot` (a figure-level funct
ion with similar flexibility) or `histplot` (an axes-level function for histograms).
  warnings.warn(msg, FutureWarning)
```

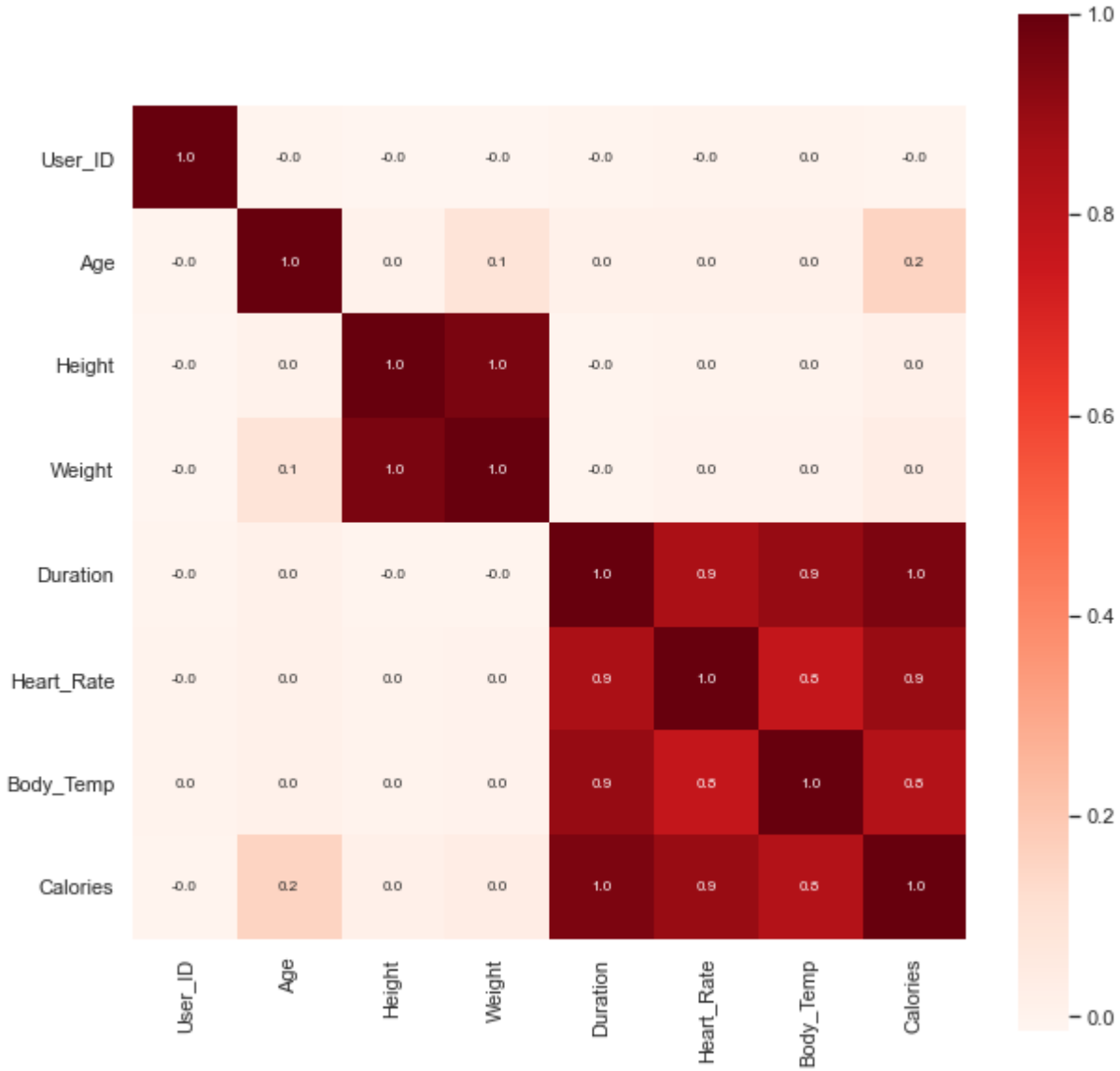
Out[41]: <AxesSubplot:xlabel='Calories', ylabel='Density'>



In [47]:
```
#FINDING THE CORRELATION BETWEEN THE DATA
correlation = calories_data.corr()
```

In [55]:
```
#CONSTRUCTING A HEATMAP TO UNDERSTAND CORRELATION
plt.figure(figsize=(10,10))
sns.heatmap(correlation, cbar=True, square=True, fmt='.1f', annot=True, annot_kws={'siz
# ACCORDING TO THE HEAT MAP THE FIELDS Duration Heart_Rate AND Body_Temp ARE POSITIVELY
#THE Height AND Weight ARE POSITIVELY CORRELATED.
#MEANING THE DATA ARE DIRECTLY PROPOTIONAL TO EACH OTHER.
```

Out[55]: <AxesSubplot:>



In [59]:
```
#CONVERTING THE GENDER FEILD IN THE DATASET FROM TEXT TO NUMERICAL VALUES.
calories_data.replace({"Gender":{'male':0,'female':1}}, inplace=True)
calories_data
#GENDER IS CONVERTED TO NUMERICAL VALUES
```

Out[59]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
0	14733363	0	68	190.0	94.0	29.0	105.0	40.8	231.0
1	14861698	1	20	166.0	60.0	14.0	94.0	40.3	66.0
2	11179863	0	69	179.0	79.0	5.0	88.0	38.7	26.0
3	16180408	1	34	179.0	71.0	13.0	100.0	40.5	71.0
4	17771927	1	27	154.0	58.0	10.0	81.0	39.8	35.0
...	...	...	...	...	...	...	...	...	...
14995	15644082	1	20	193.0	86.0	11.0	92.0	40.4	45.0
14996	17212577	1	27	165.0	65.0	6.0	85.0	39.2	23.0
14997	17271188	1	43	159.0	58.0	16.0	90.0	40.1	75.0

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
14998	18643037	0	78	193.0	97.0	2.0	84.0	38.3	11.0
14999	11751526	0	63	173.0	79.0	18.0	92.0	40.5	98.0

15000 rows × 9 columns

In [61]:
```
#ALL THE COLOUMNS ARE KNOW AS FEAUTURES.
#THE CALORIES FEILD IS CALLED TARGET.
#SEPERATING FEATURES AND TARGETS BEFORE TRAINING
X = calories_data.drop(columns=['User_ID', 'Calories'])
Y = calories_data['Calories']
```

In [62]:
```
print(X)#User_ID and Calories Dropped.
```

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

[15000 rows x 7 columns]
```

In [63]:
```
print(Y)
```

```
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
```

In [67]:
```
#SPLITTING DATA IN TRAINING DATA AND TEST DATA
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_state=2
```

In [68]:
```
print(X.shape,X_train.shape,X_test.shape)
#TRAINING DATA IS 12000 AND TESTING DATA IS 3000,THERFORE TOTAL DATA IS 15000.
```

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

In [69]:
```
#MODEL TRAINING USING XGBoost Regressor
model = XGBRegressor() #LOADING THE MODEL
```

In [70]:
```
model.fit(X_train, Y_train)# MODEL TRAINING WHEN THIS DATA IS GIVEN TO XGBoost Regresso
```

Out[70]:
```
XGBRegressor(base_score=0.5, booster='gbtree', colsample_bylevel=1,
             colsample_bynode=1, colsample_bytree=1, gamma=0, gpu_id=-1,
             importance_type='gain', interaction_constraints='',
             learning_rate=0.300000012, max_delta_step=0, max_depth=6,
             min_child_weight=1, missing=nan, monotone_constraints='()',
             n_estimators=100, n_jobs=4, num_parallel_tree=1, random_state=0,
             reg_alpha=0, reg_lambda=1, scale_pos_weight=1, subsample=1,
             tree_method='exact', validate_parameters=1, verbosity=None)
```

In [71]:
```
#MODEL IS TRAINED NOW EVALUATION OF MODEL BASED ON TEST DATA
#PREDICTION ON TEST DATA
test_data_prediction = model.predict(X_test)
```

In [72]:
```
print(test_data_prediction)
#VALUES PREDICTED BY OUR MODEL
```

```
[127.823784 226.00154   38.66253  ... 144.3636    22.767195  89.87375 ]
```

In [73]:
```
#COMPARING VALUES PREDICTED BY OUR MODEL VS ORIGINAL VALUES(Y_test)
#MEAN ABSOLUTE ERROR METRICS(MAGNITUDE OF ERROR OUR MODEL IS MAKING COMPARED TO ORIGINA
mae = metrics.mean_absolute_error(Y_test, test_data_prediction)
```

In [74]:
```
print("MEAN ABSOLUTE ERROR=", mae)#GOOD SCORE AS THE MAGNITUDE OF ERROR IS LESS
```

```
MEAN ABSOLUTE ERROR= 1.4807048829992613
```

In [75]:
```
print(Y_test)
```

```
7592     127.0
3551     224.0
9698      38.0
3759       6.0
2353     137.0
         ...
8859     177.0
2886      49.0
14357    145.0
9430      24.0
11870     90.0
Name: Calories, Length: 3000, dtype: float64
```

In [ ]:
```

```