GROUP_11-CALORIE BURNT PREDICTION

Data Pre-processing :

In [92]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sb
import warnings
warnings.filterwarnings('ignore')
```

In [93]:
```
path1='C://Users//SUSHMA REDDY//Downloads//exercise.csv'
exercise=pd.read_csv(path1)
exercise
```

Out[93]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
0	14733363	male	68	190.0	94.0	29	105	40.8
1	14861698	female	20	166.0	60.0	14	94	40.3
2	11179863	male	69	179.0	79.0	5	88	38.7
3	16180408	female	34	179.0	71.0	13	100	40.5
4	17771927	female	27	154.0	58.0	10	81	39.8
...	...	...	...	...	...	...	...	...
14995	15644082	female	20	193.0	86.0	11	92	40.4
14996	17212577	female	27	165.0	65.0	6	85	39.2
14997	17271188	female	43	159.0	58.0	16	90	40.1
14998	18643037	male	78	193.0	97.0	2	84	38.3
14999	11751526	male	63	173.0	79.0	18	92	40.5

15000 rows × 8 columns

In [94]:
```
path2='C://Users//SUSHMA REDDY//Downloads//datasets//calories.csv'
calories=pd.read_csv(path2)
calories
```

Out[94]:

	User_ID	Calories
0	14733363	231.0
1	14861698	66.0
2	11179863	26.0
3	16180408	71.0
4	17771927	35.0
...	...	...
14995	15644082	45.0
14996	17212577	23.0
14997	17271188	75.0
14998	18643037	11.0
14999	11751526	98.0

15000 rows × 2 columns

- **Numerical data**
  - **Normalization**

Normalization of data set

In [99]:
```
from sklearn.preprocessing import MinMaxScaler
print ("Before Normalization : \n")
exercise.head()
```

```
Before Normalization :
```

Out[99]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
0	14733363	male	68	174.562739	73.181027	29	105	40.8
1	14861698	female	20	174.173175	74.458074	14	94	40.3
2	11179863	male	69	174.562739	74.458074	5	88	38.7
3	16180408	female	34	174.423704	74.458074	13	100	40.5
4	17771927	female	27	154.000000	76.178569	10	81	39.8

In [100]:
```
norm = MinMaxScaler()
data = exercise
data["Duration"] = norm.fit_transform(data["Duration"].values.reshape(-1,1))
print ("After Normalisation : \n")
data.head()
```

```
After Normalisation :
```

Out[100]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
0	14733363	male	68	174.562739	73.181027	0.965517	105	40.8
1	14861698	female	20	174.173175	74.458074	0.448276	94	40.3
2	11179863	male	69	174.562739	74.458074	0.137931	88	38.7
3	16180408	female	34	174.423704	74.458074	0.413793	100	40.5
4	17771927	female	27	154.000000	76.178569	0.310345	81	39.8

▪ Standardization

Standardization of data set

In [101]:
```
from sklearn.preprocessing import StandardScaler
print ("Before Standardisation : \n")
exercise.tail()
```

```
Before Standardisation :
```

Out[101]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
14995	15644082	female	20	193.0	86.0	0.344828	92	40.4
14996	17212577	female	27	165.0	65.0	0.172414	85	39.2
14997	17271188	female	43	159.0	58.0	0.517241	90	40.1
14998	18643037	male	78	193.0	97.0	0.034483	84	38.3
14999	11751526	male	63	173.0	79.0	0.586207	92	40.5

In [102]:
```
scalar = StandardScaler(copy=True, with_mean=True, with_std=True)
data = exercise
data["Duration"] = scalar.fit_transform(data["Duration"].values.reshape(-1,1))
print ("After Standardisation : \n")
data.tail()
```

```
After Standardisation :
```

Out[102]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
14995	15644082	female	20	193.0	86.0	-0.544989	92	40.4
14996	17212577	female	27	165.0	65.0	-1.145983	85	39.2
14997	17271188	female	43	159.0	58.0	0.056005	90	40.1
14998	18643037	male	78	193.0	97.0	-1.626778	84	38.3
14999	11751526	male	63	173.0	79.0	0.296402	92	40.5

▪ Imputing Missing values

Checking whether null values exist in the dataset

In [95]:
```
exercise.isnull().sum()
```

Out[95]:
```
User_ID        0
Gender         0
Age            0
Height         4
Weight        17
Duration       0
Heart_Rate     0
Body_Temp      0
dtype: int64
```

From this it is understood that the attributes that have null values are Height , Weight respectively

Filling Missing values for weight using averaging in an age interval

In [96]:

```
import statistics
# storing the data for null weights and setting the nan values as zero
NullWeight = exercise[exercise["Weight"].isnull()].replace(np.nan , 0)

print("Before : \n ")
print(NullWeight)

exercise["Weight"] = exercise["Weight"].replace(np.nan , 0)
# storing the data for null weights and setting the nan values as zero

i = 0
for age in NullWeight['Age']:    # accessing each age
    age = age // 10       # setting up the range for age
    age = age * 10
    ageRange = exercise[(exercise["Age"] >= age) & (exercise["Age"] <= age + 10)]
    # collecting age interval for a given age

    ageRangeAverage = np.nanmean(ageRange["Weight"])
    # calculating the mean of the particular interval

    exercise["Weight"].iloc[i] = ageRangeAverage    # updating the mean inplace for the missing values in the main dataset
    NullWeight["Weight"].iloc[i] = ageRangeAverage
    i += 1

print("\nAfter:\n")
NullWeight  # displaying the updated result for the range of null dataset
```

```
Before :

       User_ID  Gender  Age  Height  Weight  Duration  Heart_Rate  Body_Temp
114   13616455    male   21   189.0     0.0        27         114       41.0
123   18789619  female   35   182.0     0.0         2          83       38.4
162   19572798  female   38   169.0     0.0        14          94       40.1
200   12847212  female   30   168.0     0.0         6          76       39.4
269   13135068  female   69   156.0     0.0         8          83       39.4
797   16156697  female   43   173.0     0.0        30          79       38.2
802   19354925    male   33   181.0     0.0         4          89       38.6
808   16908484  female   46   168.0     0.0         2          85       37.7
872   19928569  female   39   159.0     0.0        15          93       40.0
878   19906933    male   53   179.0     0.0        14          93       40.0
942   16583091  female   28   163.0     0.0        27          99       41.1
1013  15330323    male   58   191.0     0.0        16          94       40.2
1154  12142970  female   38   169.0     0.0         3          85       38.5
1224  17492547  female   24   171.0     0.0        17          95       40.9
1277  18557816    male   32   182.0     0.0        20          98       40.7
1340  17755264    male   25   181.0     0.0        12          93       39.8
1397  18376618  female   37   172.0     0.0        17         108       40.3

After:
```

t[96]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
114	13616455	male	21	189.0	73.181027	27	114	41.0
123	18789619	female	35	182.0	74.458074	2	83	38.4
162	19572798	female	38	169.0	74.458074	14	94	40.1
200	12847212	female	30	168.0	74.458074	6	76	39.4
269	13135068	female	69	156.0	76.178569	8	83	39.4
797	16156697	female	43	173.0	75.407039	30	79	38.2
802	19354925	male	33	181.0	74.466627	4	89	38.6
808	16908484	female	46	168.0	75.407039	2	85	37.7
872	19928569	female	39	159.0	74.472098	15	93	40.0
878	19906933	male	53	179.0	75.672227	14	93	40.0
942	16583091	female	28	163.0	73.193189	27	99	41.1
1013	15330323	male	58	191.0	75.672227	16	94	40.2
1154	12142970	female	38	169.0	74.471267	3	85	38.5
1224	17492547	female	24	171.0	73.197364	17	95	40.9
1277	18557816	male	32	182.0	74.476955	20	98	40.7
1340	17755264	male	25	181.0	73.197364	12	93	39.8
1397	18376618	female	37	172.0	74.480272	17	108	40.3

Filling Missing values for Height and Weight using averaging in an age interval

In [97]:
```
NullHeight = exercise[exercise["Height"].isnull()].replace(np.nan , 0)
# storing the data for null heights and setting the nan values as zero

print("Before : \n ")
print(NullHeight)

exercise["Height"] = exercise["Height"].replace(np.nan , 0)
# storing the data for null heights and setting the nan values as zero



i = 0
for age in NullHeight['Age']:   # accessing each age
    age = age // 10   # setting up the range for age
    age = age * 10
    ageRange = exercise[(exercise["Age"] >= age) & (exercise["Age"] <= age + 10)]
    # collecting age interval for a given age

    ageRangeAverage = np.nanmean(ageRange["Height"])  # calculating the mean of the particular interval
    exercise["Height"].iloc[i] = ageRangeAverage   # updating the mean inplace for the missing values in the main dataset
    NullHeight["Height"].iloc[i] = ageRangeAverage
    i += 1
print("\nAfter:\n")
NullHeight  # displaying the updated result for the range of null dataset
```

```
Before :

      User_ID  Gender  Age  Height  Weight  Duration  Heart_Rate  Body_Temp
17   15236104    male   46     0.0    67.0        11          89       40.2
52   10146087  female   21     0.0    73.0         9          90       39.6
68   13777657    male   45     0.0    69.0        22         113       40.6
102  10481882  female   31     0.0    60.0        25         115       40.8

After:
```

Out[97]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp
17	15236104	male	46	174.562739	67.0	11	89	40.2
52	10146087	female	21	174.173175	73.0	9	90	39.6
68	13777657	male	45	174.562739	69.0	22	113	40.6
102	10481882	female	31	174.423704	60.0	25	115	40.8

In [98]:
```
data.isnull().sum()
```

Out[98]:
```
User_ID       0
Gender        0
Age           0
Height        0
Weight        0
Duration      0
Heart_Rate    0
Body_Temp     0
Calories      0
dtype: int64
```

- ## Text data
  - ### Conversion of text data to numeric

Replacing male with 0 and female with 1

```
data = data.replace("male",0)
data = data.replace("female",1)
data
```

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
0	14733363	0	68	174.562739	73.181027	1.618588	105	40.8	231.0
1	14861698	1	20	174.173175	74.458074	-0.184393	94	40.3	66.0
2	11179863	0	69	174.562739	74.458074	-1.266182	88	38.7	26.0
3	16180408	1	34	174.423704	74.458074	-0.304592	100	40.5	71.0
4	17771927	1	27	154.000000	76.178569	-0.665188	81	39.8	35.0
...	...	...	...	...	...	...	...	...	...
14995	15644082	1	20	193.000000	86.000000	-0.544989	92	40.4	45.0
14996	17212577	1	27	165.000000	65.000000	-1.145983	85	39.2	23.0
14997	17271188	1	43	159.000000	58.000000	0.056005	90	40.1	75.0
14998	18643037	0	78	193.000000	97.000000	-1.626778	84	38.3	11.0
14999	11751526	0	63	173.000000	79.000000	0.296402	92	40.5	98.0

15000 rows × 9 columns

- ## Data Summarization:

In [105]:
```
#Information about the data
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  int64  
 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  int64  
 7   Body_Temp   15000 non-null  float64
 8   Calories    15000 non-null  float64
dtypes: float64(5), int64(4)
memory usage: 1.0 MB
```

In [106]:
```
data.describe()
```

Out[106]:

	User_ID	Gender	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
count	1.500000e+04	15000.000000	15000.000000	15000.000000	15000.000000	1.500000e+04	15000.000000	15000.000000	15000.000000
mean	1.497736e+07	0.503533	42.789800	174.418581	74.889723	-4.696243e-17	95.518533	40.025453	89.539533
std	2.872851e+06	0.500004	16.980264	14.538709	15.231519	1.000033e+00	9.583328	0.779230	62.456978
min	1.000116e+07	0.000000	20.000000	0.000000	0.000000	-1.746977e+00	67.000000	37.100000	1.000000
25%	1.247419e+07	0.000000	28.000000	164.000000	63.000000	-9.055854e-01	88.000000	39.600000	35.000000
50%	1.499728e+07	1.000000	39.000000	175.000000	74.000000	5.600461e-02	96.000000	40.200000	79.000000
75%	1.744928e+07	1.000000	56.000000	185.000000	87.000000	8.973959e-01	103.000000	40.600000	138.000000
max	1.999965e+07	1.000000	79.000000	222.000000	132.000000	1.738787e+00	128.000000	41.500000	314.000000

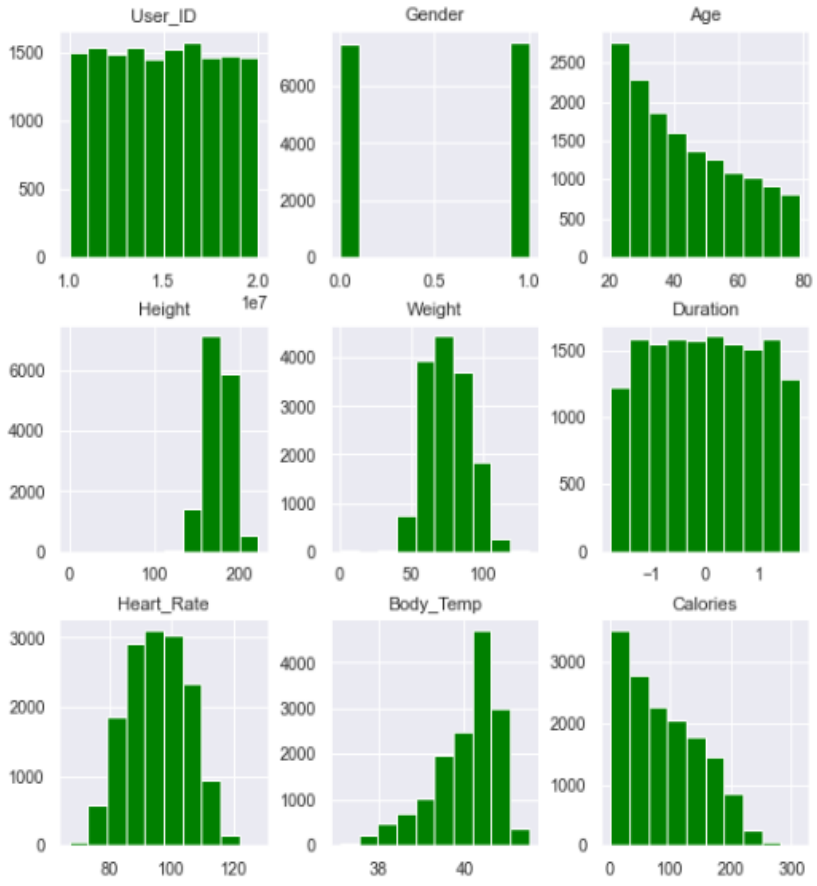
- **Data Visualization:**

Histogram

In [107]:
```
sb.set()
```

In [108]:
```
from matplotlib import pyplot
data.hist(color = "green", figsize = (9,9))
```

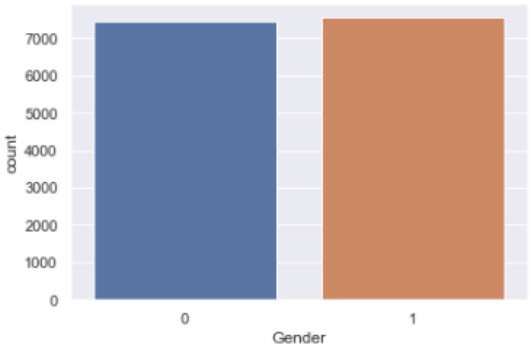
Out[108]:
```
array([[<AxesSubplot:title={'center':'User_ID'}>,
        <AxesSubplot:title={'center':'Gender'}>,
        <AxesSubplot:title={'center':'Age'}>],
       [<AxesSubplot:title={'center':'Height'}>,
        <AxesSubplot:title={'center':'Weight'}>,
        <AxesSubplot:title={'center':'Duration'}>],
       [<AxesSubplot:title={'center':'Heart_Rate'}>,
        <AxesSubplot:title={'center':'Body_Temp'}>,
        <AxesSubplot:title={'center':'Calories'}>]], dtype=object)
```



Gender Count using countplot

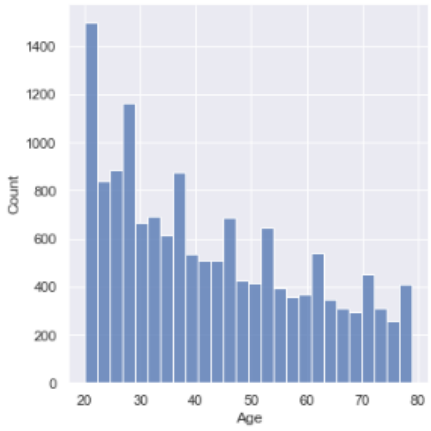
In [109]:
```
sb.countplot(data['Gender'])
```

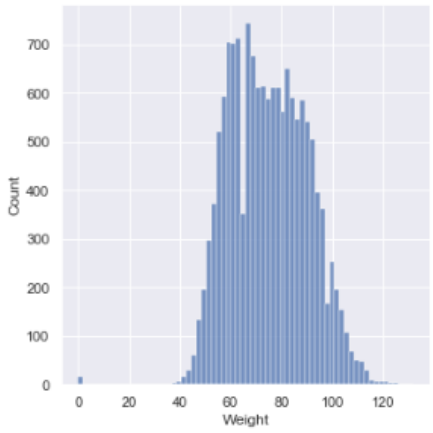
Out[109]: <AxesSubplot:xlabel='Gender', ylabel='count'>

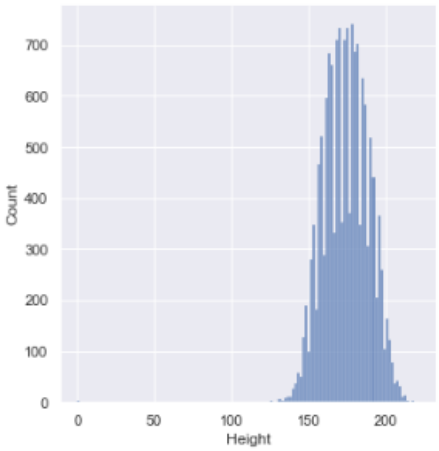


Distribution of age,height,weight column using distplot

In [110]:
```
sb.displot(data['Age'])
sb.displot(data['Height'])
sb.displot(data['Weight'])
```



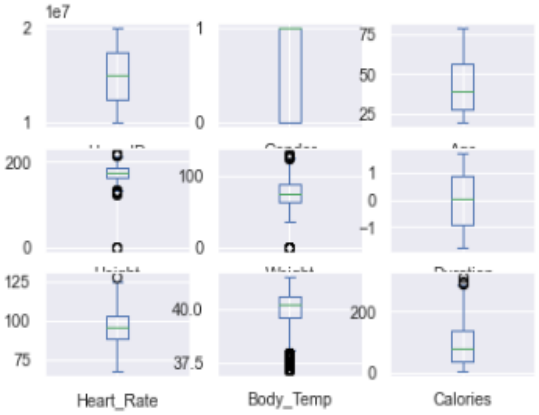




Box plot

In [111]:
```
data.plot(kind='box', subplots=True, layout=(3,3), sharex=False,sharey=False)
```

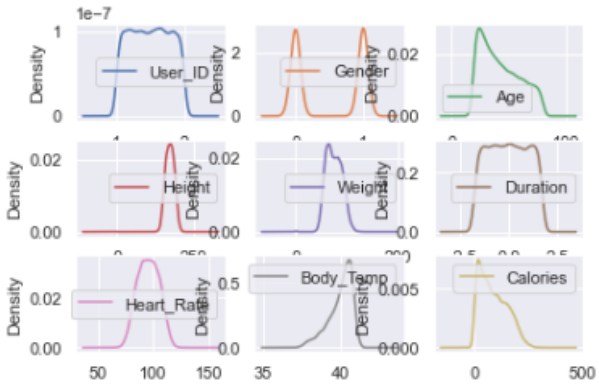
Out[111]:
```
User_ID          AxesSubplot(0.125,0.657941;0.227941x0.222059)
Gender        AxesSubplot(0.398529,0.657941;0.227941x0.222059)
Age           AxesSubplot(0.672059,0.657941;0.227941x0.222059)
Height           AxesSubplot(0.125,0.391471;0.227941x0.222059)
Weight        AxesSubplot(0.398529,0.391471;0.227941x0.222059)
Duration      AxesSubplot(0.672059,0.391471;0.227941x0.222059)
Heart_Rate          AxesSubplot(0.125,0.125;0.227941x0.222059)
Body_Temp        AxesSubplot(0.398529,0.125;0.227941x0.222059)
Calories         AxesSubplot(0.672059,0.125;0.227941x0.222059)
dtype: object
```



Density plot

In [112]:
```
data.plot(kind='density', subplots=True, layout=(3,3), sharex=False)
```

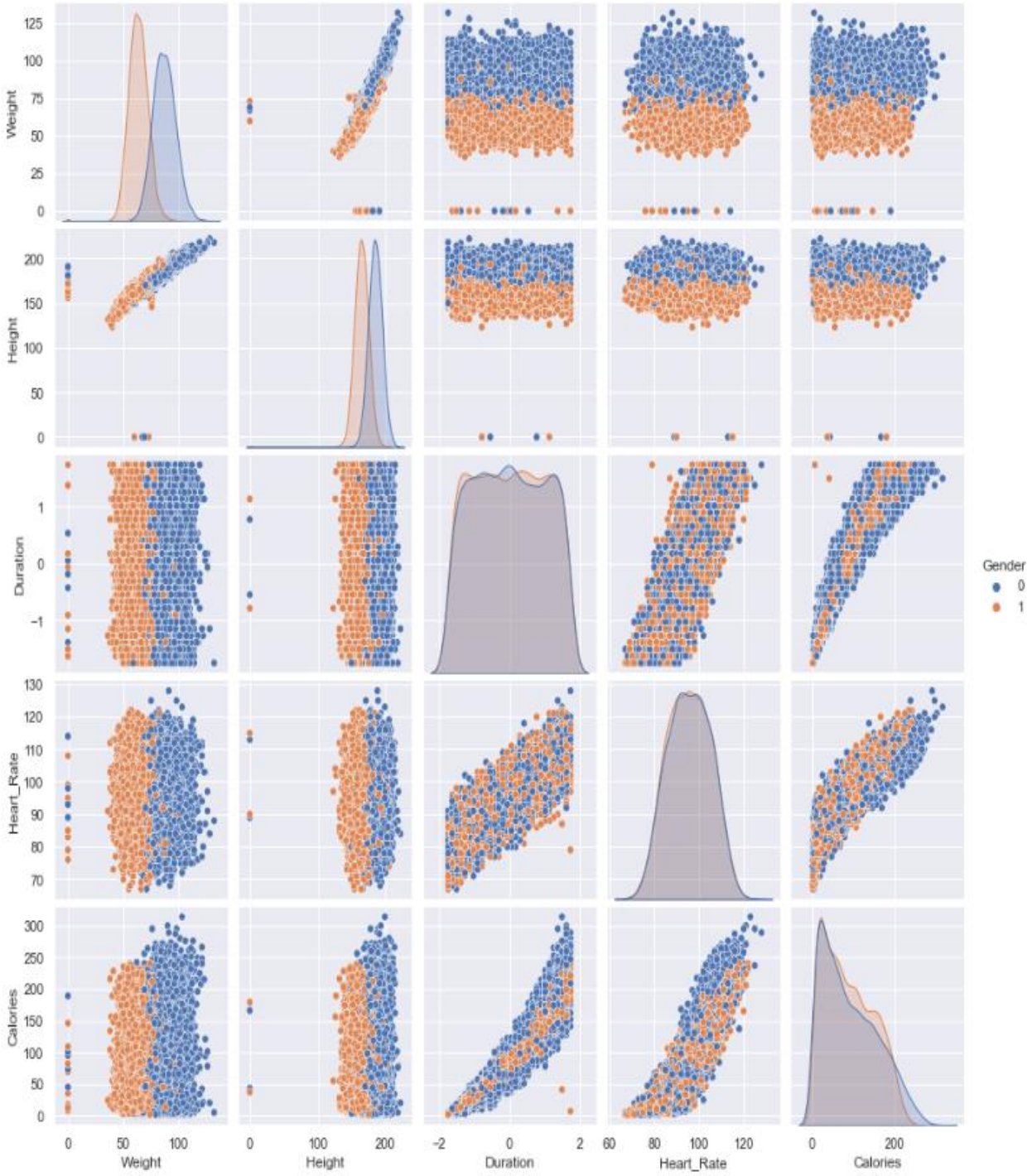
Out[112]:
```
array([[<AxesSubplot:ylabel='Density'>, <AxesSubplot:ylabel='Density'>,
        <AxesSubplot:ylabel='Density'>],
       [<AxesSubplot:ylabel='Density'>, <AxesSubplot:ylabel='Density'>,
        <AxesSubplot:ylabel='Density'>],
       [<AxesSubplot:ylabel='Density'>, <AxesSubplot:ylabel='Density'>,
        <AxesSubplot:ylabel='Density'>]], dtype=object)
```



Pair plot

```
In [114]: sb.pairplot(data[["Weight" , "Height" , "Duration" , "Heart_Rate" , "Calories" , "Gender"]] , hue = "Gender")
```

```
Out[114]: <seaborn.axisgrid.PairGrid at 0x2006efe6970>
```



- **Data Interpretation**:
  - Duration with respect to weight is more for male compared to female.
  - Weight is more for male compared to female.
  - The number of calories burnt by male is greater which implies the more you weight the more calories will be burnt
  - Heart rate is similar for both male and female but net calorie burnt is more for male.
  - Calories burnt by both male and female are similar from the above plot.

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