LINK
https://colab.research.google.com/drive/1FIOGkDVkXxhQPFAm7wZ3dXn2a_CTBgab?usp=sharing

CALORIES_BURN_PREDICTION

July 17, 2023

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A. EDA dan Visualisasi Data

[184]:
```
import numpy as np
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import zipfile
from sklearn.model_selection import train_test_split
# from xgboost import XGBRegressor
from sklearn import metrics
from sklearn.metrics import mean_absolute_error, mean_squared_error
from sklearn.linear_model import LinearRegression
from sklearn.metrics import r2_score
```

[185]:
```
#kaggle.json dapat didownload melalui setting di akun kaggle masing" dengan␣
 ↪click "Create New Token" pada bagian API
! chmod 600 /content/kaggle.json
```

[186]:
```
#download dataset
! KAGGLE_CONFIG_DIR=/content/ kaggle datasets download -d fmendes/
 ↪fmendesdat263xdemos
```

```
Downloading fmendesdat263xdemos.zip to /content/drive/MyDrive/Colab Notebooks
  0% 0.00/296k [00:00<?, ?B/s]
100% 296k/296k [00:00<00:00, 25.6MB/s]
```

[187]:
```
#unzip dataset
zip_file = zipfile.ZipFile('/content/fmendesdat263xdemos.zip')
zip_file.extractall('/tmp/FP_BDPA')
```

[188]:

```
#Membaca dan menampilkan data 'calories.csv'
df_calories = pd.read_csv('/tmp/FP_BDPA/calories.csv')
df_calories.head()
```

[188]:

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

[189]:

```
#Membaca dan menampilkan data 'exercise.csv'
df_exercise = pd.read_csv('/tmp/FP_BDPA/exercise.csv')
df_exercise.head()
```

[189]:

```
    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
```

[190]:

```
#menggabungkan tabel 'calories.csv' dan 'exercise.csv' menjadi satu
df = pd.concat([df_exercise, df_calories['Calories']], axis=1)
df.head()
```

[190]:

```
    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

   Calories
0     231.0
1      66.0
2      26.0
3      71.0
4      35.0
```

[191]:

```
#mengubah gender menjadi integer agar bisa dianalisis
df.replace({"Gender":{'male':0,'female':1}}, inplace=True)
df.head()
```

[191]:

```
    User_ID  Gender  Age  Height  Weight  Duration  Heart_Rate  Body_Temp  \
0  14733363       0   68   190.0    94.0      29.0       105.0       40.8
1  14861698       1   20   166.0    60.0      14.0        94.0       40.3
```

```
2  11179863       0   69   179.0    79.0        5.0         88.0        38.7
3  16180408       1   34   179.0    71.0       13.0        100.0        40.5
4  17771927       1   27   154.0    58.0       10.0         81.0        39.8

   Calories
0     231.0
1      66.0
2      26.0
3      71.0
4      35.0
```

[192]:

```
#menampilkan jumlah baris dan kolom
df.shape
```

[192]:

```
(15000, 9)
```

[193]:

```
#menampilkan info pada dataset
df.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  float64
 7   Body_Temp   15000 non-null  float64
 8   Calories    15000 non-null  float64
dtypes: float64(6), int64(3)
memory usage: 1.0 MB
```

[194]:

```
#memastikan tidak ada data kosong
df.isnull().sum()
```

[194]:

```
User_ID       0
Gender        0
Age           0
Height        0
Weight        0
Duration      0
Heart_Rate    0
Body_Temp     0
```

```
Calories      0
dtype: int64
```

[195]:

```
#memastikan tidak ada data duplikat
df.duplicated().sum()
```

[195]:

```
0
```

[196]:

```
#menampilkan beberapa info terkait mean, min, max dll
df.describe()
```

[196]:

```
            User_ID        Gender           Age        Height        Weight  \
count  1.500000e+04  15000.000000  15000.000000  15000.000000  15000.000000
mean   1.497736e+07      0.503533     42.789800    174.465133     74.966867
std    2.872851e+06      0.500004     16.980264     14.258114     15.035657
min    1.000116e+07      0.000000     20.000000    123.000000     36.000000
25%    1.247419e+07      0.000000     28.000000    164.000000     63.000000
50%    1.499728e+07      1.000000     39.000000    175.000000     74.000000
75%    1.744928e+07      1.000000     56.000000    185.000000     87.000000
max    1.999965e+07      1.000000     79.000000    222.000000    132.000000

           Duration    Heart_Rate     Body_Temp      Calories
count  15000.000000  15000.000000  15000.000000  15000.000000
mean      15.530600     95.518533     40.025453     89.539533
std        8.319203      9.583328      0.779230     62.456978
min        1.000000     67.000000     37.100000      1.000000
25%        8.000000     88.000000     39.600000     35.000000
50%       16.000000     96.000000     40.200000     79.000000
75%       23.000000    103.000000     40.600000    138.000000
max       30.000000    128.000000     41.500000    314.000000
```

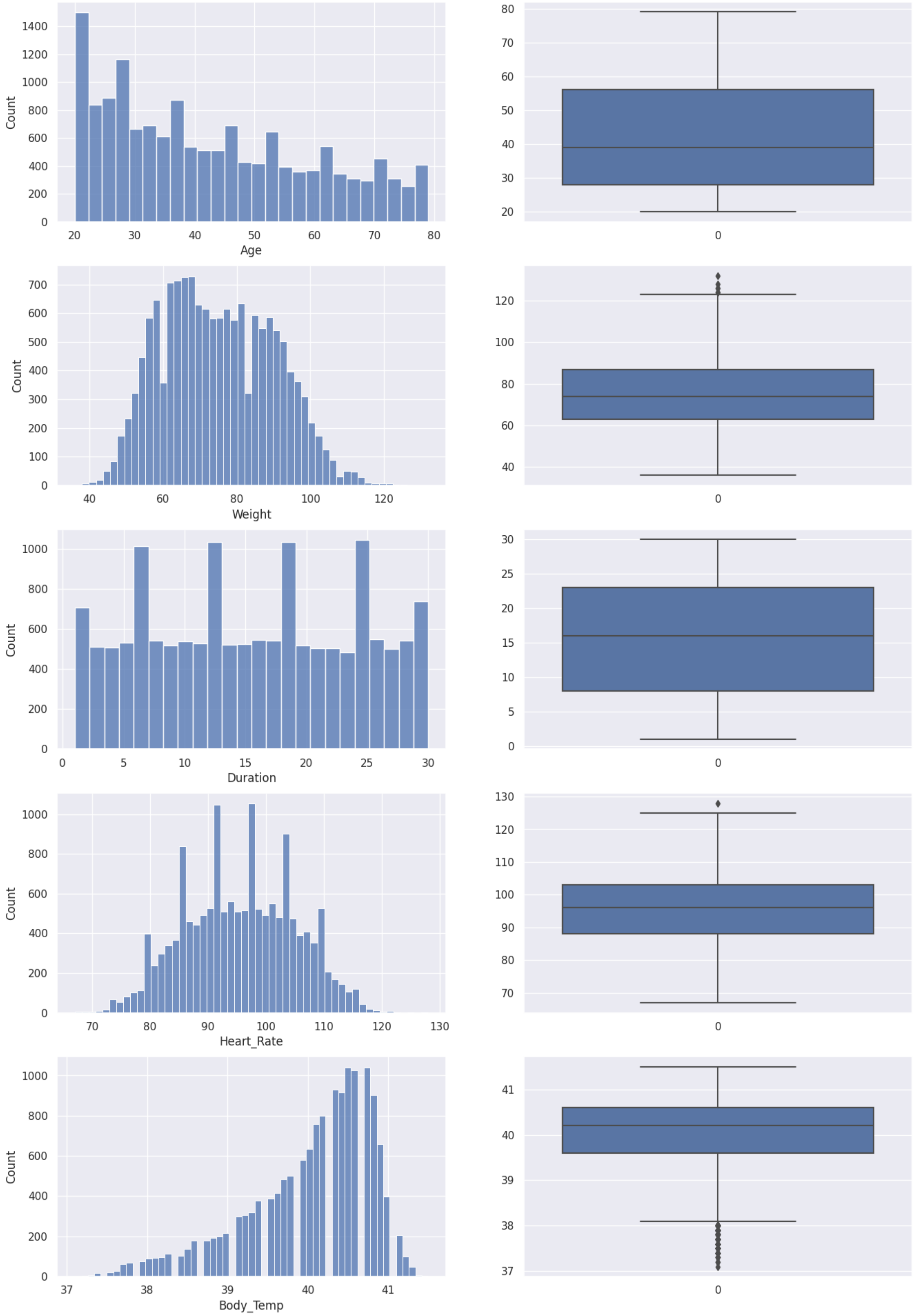
[197]:

```
#mengatur gaya (style) dari plot yang akan dibuat menggunakan Seaborn.
sns.set()
```

[198]:

```
#melihat ada tidaknya data outlier
plt.figure(figsize=(16,24))
plt.subplot(5,2,1)
sns.histplot(df['Age'])
plt.subplot(5,2,2)
sns.boxplot(df['Age'])
plt.subplot(5,2,3)
sns.histplot(df['Weight'])
plt.subplot(5,2,4)
sns.boxplot(df['Weight'])
plt.subplot(5,2,5)
sns.histplot(df['Duration'])
plt.subplot(5,2,6)
```

```
sns.boxplot(df['Duration'])
plt.subplot(5,2,7)
sns.histplot(df['Heart_Rate'])
plt.subplot(5,2,8)
sns.boxplot(df['Heart_Rate'])
plt.subplot(5,2,9)
sns.histplot(df['Body_Temp'])
plt.subplot(5,2,10)
sns.boxplot(df['Body_Temp'])
plt.show()
```


Count
1400
1200
1000
800
600
400
200
0
20
30
40
50
60
70
80
Age
80
70
60
50
40
30
20
0
Count
700
600
500
400
300
200
100
0
40
60
80
100
120
Weight
120
100
80
60
40
0
Count
1000
800
600
400
200
0
0
5
10
15
20
25
30
Duration
30
25
20
15
10
5
0
0
Count
1000
800
600
400
200
0
70
80
90
100
110
120
130
Heart_Rate
130
120
110
100
90
80
70
0
Count
1000
800
600
400
200
0
37
38
39
40
41
Body_Temp
41
40
39
38
37
0

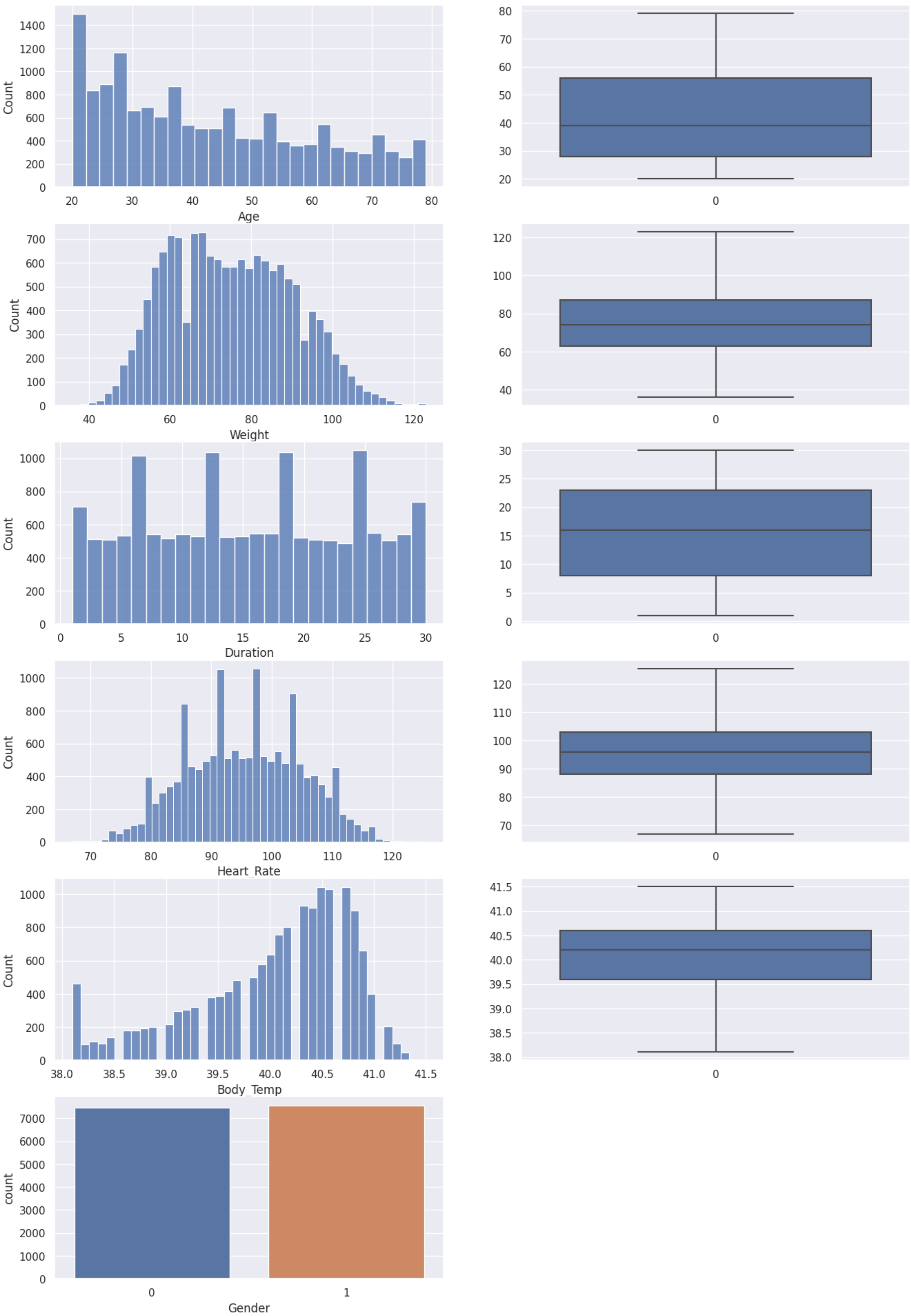
[199]:

```
#menghapus outlier pada kolom weight, heat rate, dan body temperature
Weight25 = df['Weight'].quantile(0.25)
Weight75 = df['Weight'].quantile(0.75)
Weight_IQR = Weight75 - Weight25
Weight_upper_limit = Weight75 + 1.5 * Weight_IQR
Weight_lower_limit = Weight25 - 1.5 * Weight_IQR
df['Weight'] = np.where(
  df['Weight'] > Weight_upper_limit,
    Weight_upper_limit,
    np.where(
      df['Weight'] < Weight_lower_limit,
        Weight_lower_limit,
      df['Weight']))

Heart_Rate25 = df['Heart_Rate'].quantile(0.25)
Heart_Rate75 = df['Heart_Rate'].quantile(0.75)
Heart_Rate_IQR = Heart_Rate75 - Heart_Rate25
Heart_Rate_upper_limit = Heart_Rate75 + 1.5 * Heart_Rate_IQR
Heart_Rate_lower_limit = Heart_Rate25 - 1.5 * Heart_Rate_IQR
df['Heart_Rate'] = np.where(
  df['Heart_Rate'] > Heart_Rate_upper_limit,
    Heart_Rate_upper_limit,
    np.where(
      df['Heart_Rate'] < Heart_Rate_lower_limit,
        Heart_Rate_lower_limit,
      df['Heart_Rate']))

Body_Temp25 = df['Body_Temp'].quantile(0.25)
Body_Temp75 = df['Body_Temp'].quantile(0.75)
Body_Temp_IQR = Body_Temp75 - Body_Temp25
Body_Temp_upper_limit = Body_Temp75 + 1.5 * Body_Temp_IQR
Body_Temp_lower_limit = Body_Temp25 - 1.5 * Body_Temp_IQR
df['Body_Temp'] = np.where(
  df['Body_Temp'] > Body_Temp_upper_limit,
    Body_Temp_upper_limit,
    np.where(
      df['Body_Temp'] < Body_Temp_lower_limit,
        Body_Temp_lower_limit,
      df['Body_Temp']))
```

[200]:

```
#menampilkan kembali data setelah dilakukan proses penghapusan outlier
plt.figure(figsize=(16,24))
plt.subplot(6,2,1)
sns.histplot(df['Age'])
plt.subplot(6,2,2)
sns.boxplot(df['Age'])
plt.subplot(6,2,3)
```

```
sns.histplot(df['Weight'])
plt.subplot(6,2,4)
sns.boxplot(df['Weight'])
plt.subplot(6,2,5)
sns.histplot(df['Duration'])
plt.subplot(6,2,6)
sns.boxplot(df['Duration'])
plt.subplot(6,2,7)
sns.histplot(df['Heart_Rate'])
plt.subplot(6,2,8)
sns.boxplot(df['Heart_Rate'])
plt.subplot(6,2,9)
sns.histplot(df['Body_Temp'])
plt.subplot(6,2,10)
sns.boxplot(df['Body_Temp'])
plt.subplot(6,2,11)
sns.countplot(x='Gender', data=df)
plt.show()
```


Count
0
200
400
600
800
1000
1200
1400
20
30
40
50
60
70
80
Age
20
30
40
50
60
70
80
0
Count
0
100
200
300
400
500
600
700
40
60
80
100
120
Weight
40
60
80
100
120
0
Count
0
200
400
600
800
1000
0
5
10
15
20
25
30
Duration
0
5
10
15
20
25
30
0
Count
0
200
400
600
800
1000
70
80
90
100
110
120
Heart_Rate
70
80
90
100
110
120
0
Count
0
200
400
600
800
1000
38.0
38.5
39.0
39.5
40.0
40.5
41.0
41.5
Body_Temp
38.0
38.5
39.0
39.5
40.0
40.5
41.0
41.5
0
count
0
1000
2000
3000
4000
5000
6000
7000
0
1
Gender

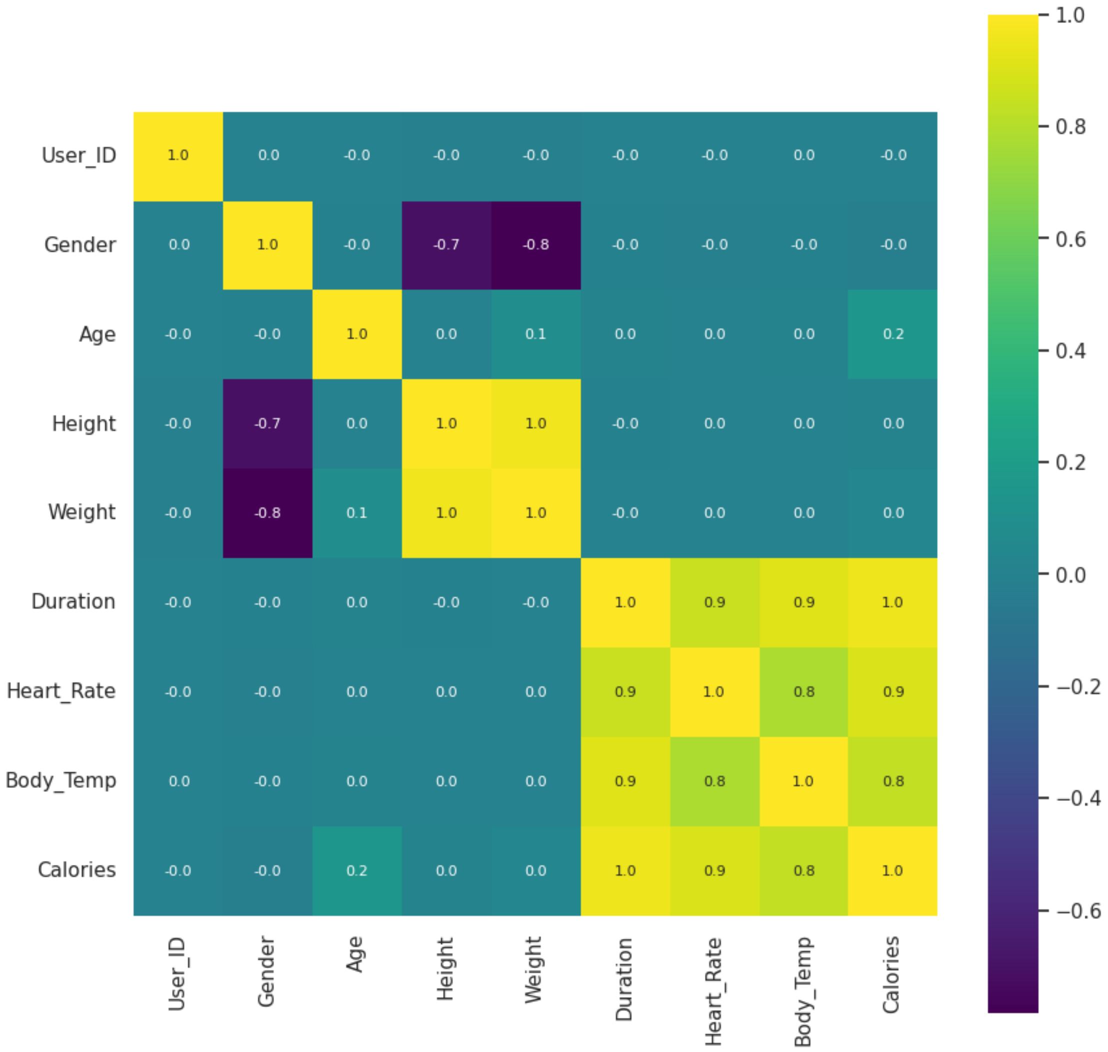
B. Analisis Korelasi

[201]:
```
#menampilkan korelasi secara detail dengan tabel
df.corr()
```

[201]:
```
              User_ID    Gender       Age    Height    Weight  Duration  \
User_ID      1.000000  0.000687 -0.001827 -0.013520 -0.011558 -0.002751
Gender       0.000687  1.000000 -0.003222 -0.710534 -0.783347 -0.003440
Age         -0.001827 -0.003222  1.000000  0.009554  0.090159  0.013247
Height      -0.013520 -0.710534  0.009554  1.000000  0.958466 -0.004625
Weight      -0.011558 -0.783347  0.090159  0.958466  1.000000 -0.001792
Duration    -0.002751 -0.003440  0.013247 -0.004625 -0.001792  1.000000
Heart_Rate -0.000440 -0.011538  0.010493  0.000512  0.004357  0.852887
Body_Temp    0.000909 -0.007236  0.012204  0.001536  0.004308  0.911465
Calories    -0.001661 -0.022357  0.154395  0.017537  0.035568  0.955421

            Heart_Rate  Body_Temp  Calories
User_ID      -0.000440   0.000909 -0.001661
Gender       -0.011538  -0.007236 -0.022357
Age           0.010493   0.012204  0.154395
Height        0.000512   0.001536  0.017537
Weight        0.004357   0.004308  0.035568
Duration      0.852887   0.911465  0.955421
Heart_Rate    1.000000   0.778540  0.897877
Body_Temp     0.778540   1.000000  0.834175
Calories      0.897877   0.834175  1.000000
```

[202]:
```
#menampilkan korelasi agar mudah dilihat dengan heatmap
correlation = df.corr()
plt.figure(figsize=(10,10))
sns.heatmap(correlation, cbar=True, square=True, fmt='.1f', annot=True,␣
 ↪annot_kws={'size':8}, cmap='viridis')
```

[202]:
```
<Axes: >
```



C. Membuat Model Regresi Linear

[203]:

```
#memasukkan data dependen dan independen ke dalam variabel X dan Y
X = df.drop(columns=['User_ID','Calories','Height'], axis=1)
Y = df['Calories']
```

[204]:

```
print(X)
```

```
        Gender  Age  Weight  Duration  Heart_Rate  Body_Temp
0            0   68    94.0      29.0       105.0       40.8
1            1   20    60.0      14.0        94.0       40.3
2            0   69    79.0       5.0        88.0       38.7
3            1   34    71.0      13.0       100.0       40.5
4            1   27    58.0      10.0        81.0       39.8
…          …  …     …       …         …         …
```

```
14995       1   20    86.0      11.0        92.0       40.4
14996       1   27    65.0       6.0        85.0       39.2
14997       1   43    58.0      16.0        90.0       40.1
14998       0   78    97.0       2.0        84.0       38.3
14999       0   63    79.0      18.0        92.0       40.5

[15000 rows x 6 columns]
```

[205]:
```
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
```

[206]:
```
#membuat variabel train dan test secara random dengan perbandingan 80 : 20
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2,␣
 ↪random_state=2)
print(X.shape, X_train.shape, X_test.shape)
```

```
(15000, 6) (12000, 6) (3000, 6)
```

[207]:
```
#memasukkan algoritma yang akan digunakan
# model = XGBRegressor() => algoritma untuk prediksi lebih maksimal
model = LinearRegression()
model.fit(X_train, Y_train)
```

[207]:
```
LinearRegression()
```

[207]:
```

```

D. Evaluasi Model Linear

[208]:
```
#membuat variabel Y_pred untuk menyimpan data hasil prediksi
Y_pred = model.predict(X_test)
```

[209]:
```
#melakukan evaluasi model menggunakan MAE, MSE, MAPE dan R-square
print('Mean Absolute Eror (MAE) : %.2f' % mean_absolute_error(Y_pred,Y_test))
print('Mean Squared Error (MSE) : %.2f' % mean_squared_error(Y_pred , Y_test))
print('Root Mean Squared Error (RMSE) : %.2f' % np.sqrt(␣
 ↪mean_squared_error(Y_pred , Y_test)))
print("R-squared:", ((r2_score(Y_test, Y_pred))*100), "%")
```

```
Mean Absolute Eror (MAE) : 8.40
Mean Squared Error (MSE) : 130.50
Root Mean Squared Error (RMSE) : 11.42
R-squared: 96.67750808978263 %
```