** Project Day - 30 **

[Calories Burnt Prediction]

Importing the Dependencies

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

Data Collection & Processing

```python
# loading the data from csv file to a Pandas DataFrame
calories = pd.read_csv('calories.csv')
```

```python
# print the first 5 rows of the dataframe
calories.head()
```

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

```python
exercise_data = pd.read_csv('exercise.csv')
```

```python
exercise_data.head()
```

	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

Combining the two Dataframes

```python
calories_data = pd.concat([exercise_data, calories['Calories']], axis=1)
```

```python
calories_data.head()
```

	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

```python
# checking the number of rows and columns
calories_data.shape
```

```
(15000, 9)
```

```python
# getting some informations about the data
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
```

```python
# checking for missing values
calories_data.isnull().sum()
```

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

Data Analysis

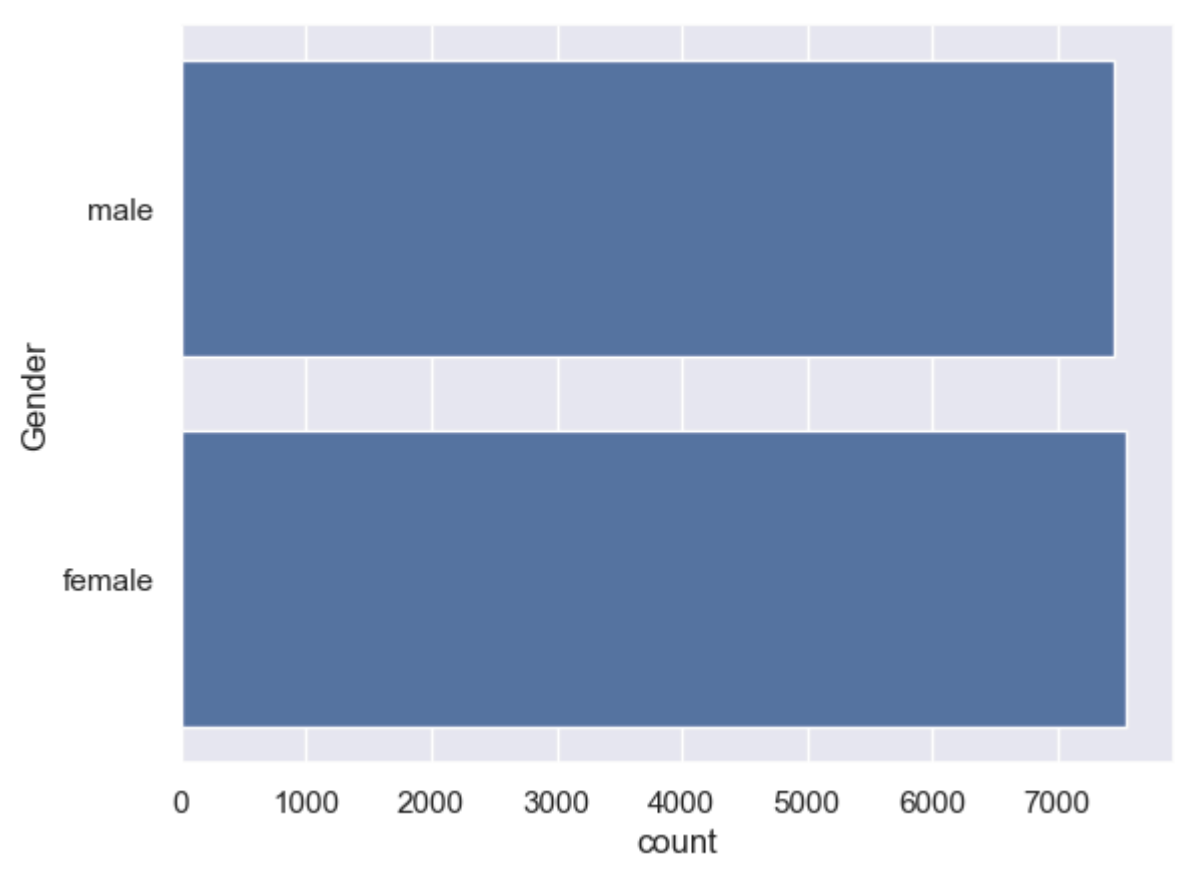
```python
# get some statistical measures about the data
calories_data.describe()
```

	User_ID	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
count	1.500000e+04	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000	15000.000000
mean	1.497736e+07	42.789800	174.465133	74.966867	15.530600	95.518533	40.025453	89.539533
std	2.872851e+06	16.980264	14.258114	15.035657	8.319203	9.583328	0.779230	62.456978
min	1.000116e+07	20.000000	123.000000	36.000000	1.000000	67.000000	37.100000	1.000000
25%	1.247419e+07	28.000000	164.000000	63.000000	8.000000	88.000000	39.600000	35.000000
50%	1.499728e+07	39.000000	175.000000	74.000000	16.000000	96.000000	40.200000	79.000000
75%	1.744928e+07	56.000000	185.000000	87.000000	23.000000	103.000000	40.600000	138.000000
max	1.999965e+07	79.000000	222.000000	132.000000	30.000000	128.000000	41.500000	314.000000

Data Visualization

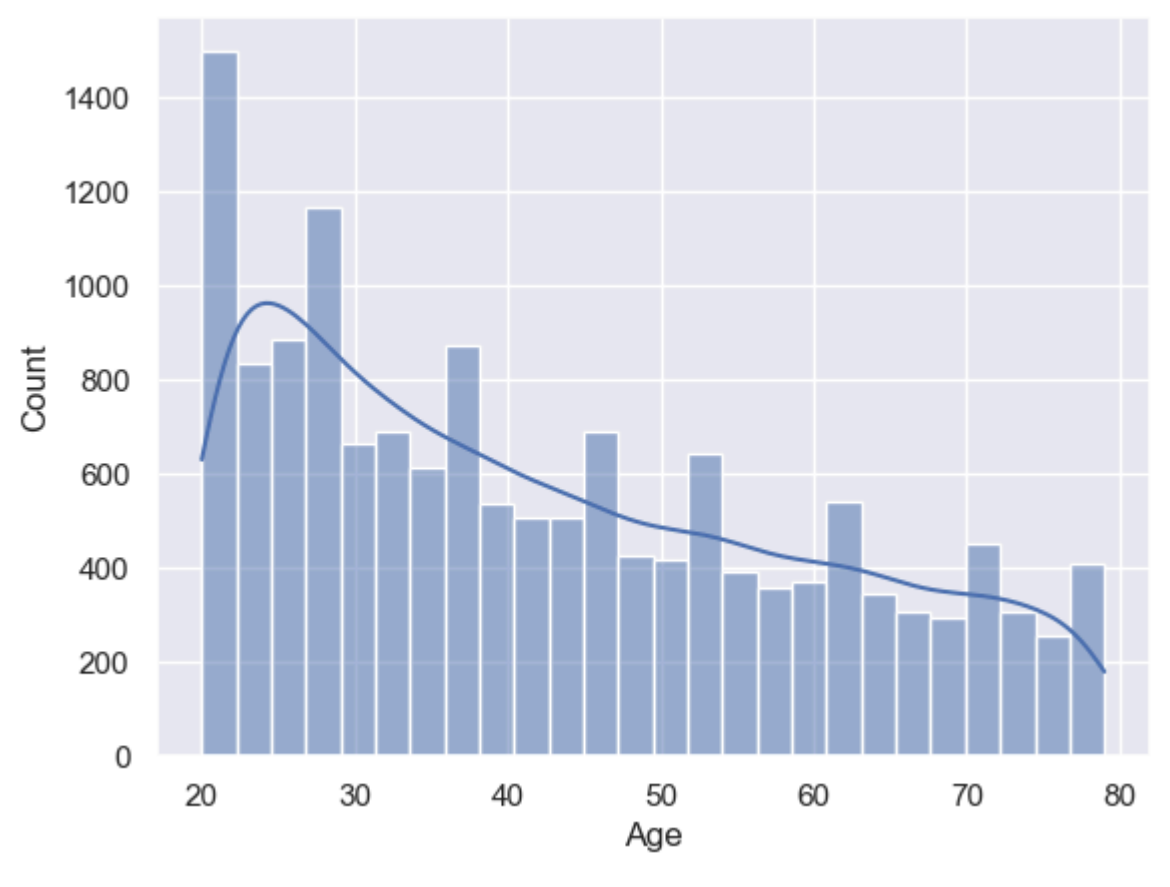
```python
sns.set()
```

```python
# plotting the gender column in count plot
sns.countplot(calories_data['Gender'])
plt.show()
```



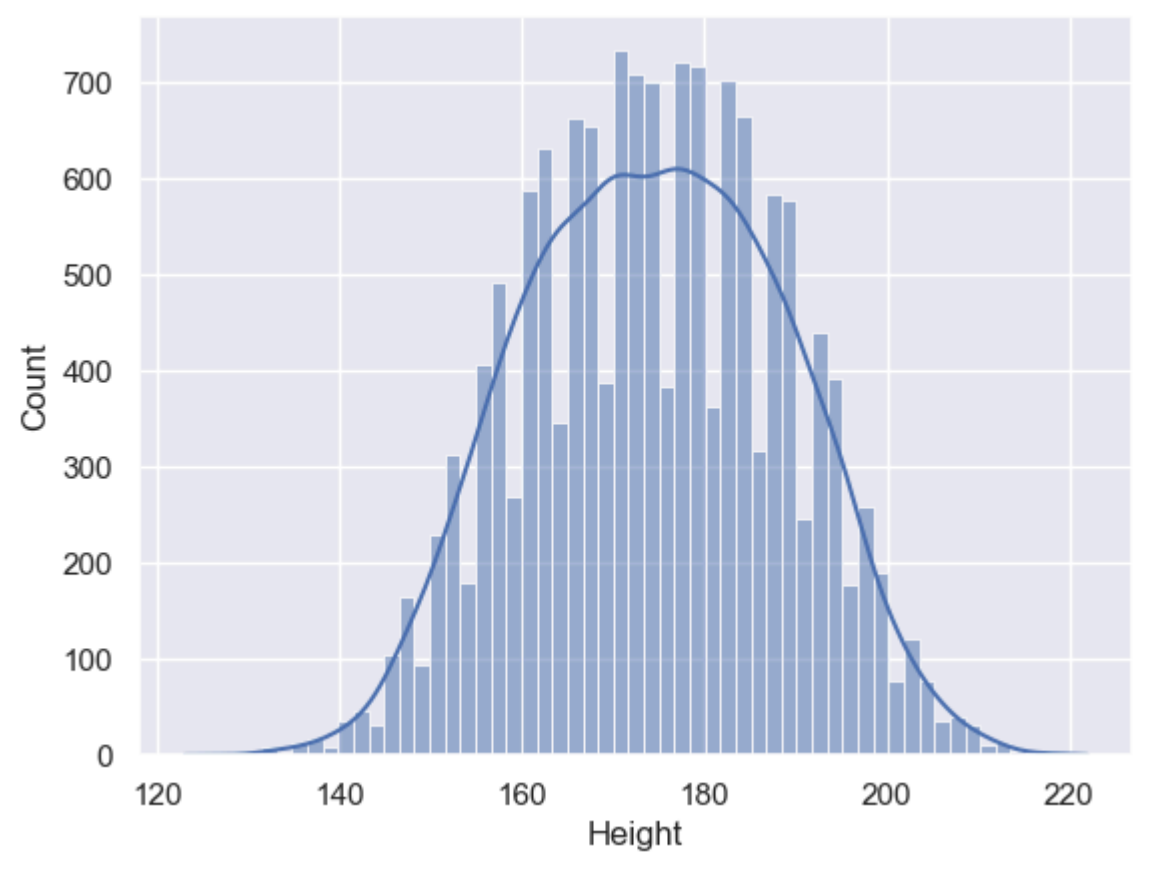

```python
# finding the distribution of the "Age" column
sns.histplot(calories_data['Age'],kde=True)
```

```
<Axes: xlabel='Age', ylabel='Count'>
```



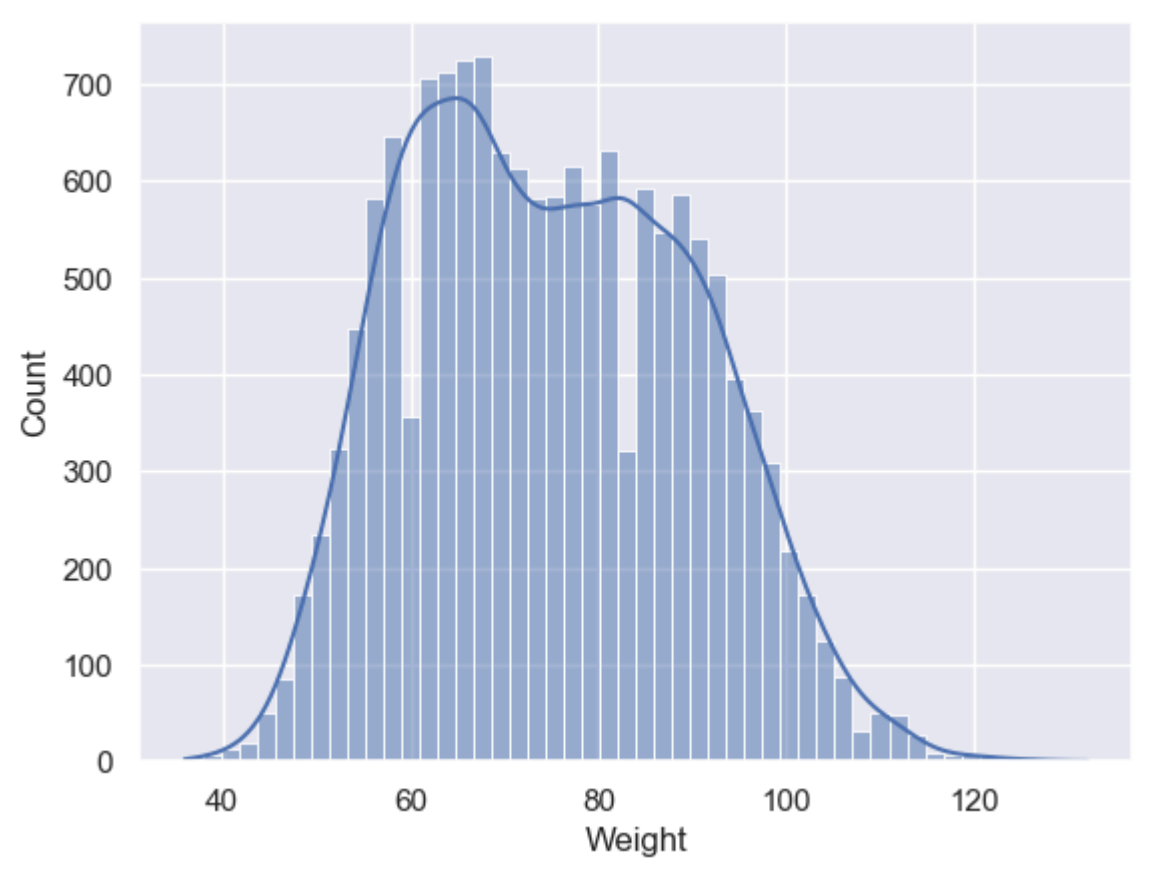

```python
# finding the distribution of "Height" column
sns.histplot(calories_data['Height'],kde=True)
```

```
<Axes: xlabel='Height', ylabel='Count'>
```




```python
# finding the distribution of "Weight" column
sns.histplot(calories_data['Weight'],kde=True)
```

```
<Axes: xlabel='Weight', ylabel='Count'>
```



Finding the Correlation in the dataset

1.Positive Correlation
2.Negative Correlation

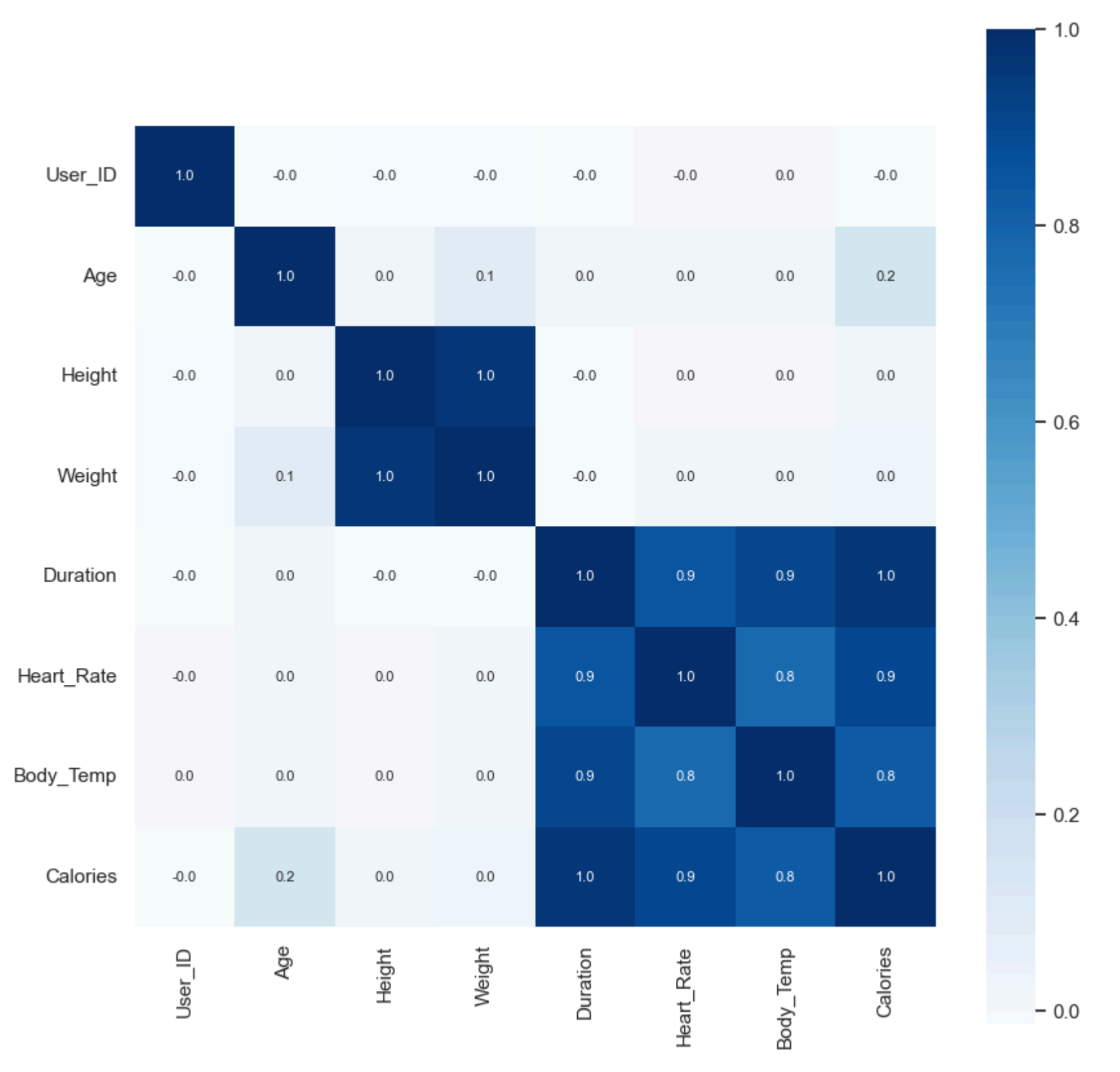
```python
correlation = calories_data.corr(numeric_only=True)
correlation
```

	User_ID	Age	Height	Weight	Duration	Heart_Rate	Body_Temp	Calories
User_ID	1.000000	-0.001827	-0.013520	-0.011603	-0.002751	-0.000457	0.000923	-0.001661
Age	-0.001827	1.000000	0.009554	0.090094	0.013247	0.010482	0.013175	0.154395
Height	-0.013520	0.009554	1.000000	0.958451	-0.004625	0.000528	0.001200	0.017537
Weight	-0.011603	0.090094	0.958451	1.000000	-0.001884	0.004311	0.004095	0.035481
Duration	-0.002751	0.013247	-0.004625	-0.001884	1.000000	0.852869	0.903167	0.955421
Heart_Rate	-0.000457	0.010482	0.000528	0.004311	0.852869	1.000000	0.771529	0.897882
Body_Temp	0.000923	0.013175	0.001200	0.004095	0.903167	0.771529	1.000000	0.824558
Calories	-0.001661	0.154395	0.017537	0.035481	0.955421	0.897882	0.824558	1.000000

```python
# constructing a heatmap to understand the correlation

plt.figure(figsize=(10,10))
sns.heatmap(correlation, cbar=True, square=True, fmt='.1f', annot=True, annot_kws={'size':8}, cmap='Blues')
```

```
<Axes: >
```



Converting the text data to numerical values

```python
calories_data['Gender'] = calories_data['Gender'].map({'male': 0, 'female': 1})
```

```python
calories_data.head()
```

	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

Separating features and Target

```python
X = calories_data.drop(columns=['User_ID','Calories'], axis=1)
Y = calories_data['Calories']
```

```python
X
```

	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 × 7 columns

```python
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
```

Splitting the data into training data and Test data

```python
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size=0.2, random_state=2)
```

```python
X.shape, X_train.shape, X_test.shape
```

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

Model Training

XGBoost Regressor

```python
# loading the model
model = XGBRegressor()
```

```python
# training the model with X_train
model.fit(X_train, Y_train)
```

```
▾ XGBRegressor
XGBRegressor(base_score=None, booster=None, callbacks=None,
             colsample_bylevel=None, colsample_bynode=None,
             colsample_bytree=None, device=None, early_stopping_rounds=None,
             enable_categorical=False, eval_metric=None, feature_types=None,
             feature_weights=None, gamma=None, grow_policy=None,
             importance_type=None, interaction_constraints=None,
             learning_rate=None, max_bin=None, max_cat_threshold=None,
             max_cat_to_onehot=None, max_delta_step=None, max_depth=None,
             max_leaves=None, min_child_weight=None, missing=nan,
```

Evaluation

Prediction on Test Data

```python
test_data_prediction = model.predict(X_test)
```

```python
test_data_prediction
```

```
array([125.58828 , 222.11377 ,  38.725952, ..., 144.3179  ,  23.425894,
        90.100494], dtype=float32)
```

Mean Absolute Error

```python
mae = metrics.mean_absolute_error(Y_test, test_data_prediction)
```

```python
print("Mean Absolute Error = ", mae)
```

```
Mean Absolute Error =  1.4833678883314132
```

** END- PROJECT **