FitBit Dataset

The dataset contains the amount of calories burnt based on various parameters. The dataset contains 15 parameters, out of which Calories is Dependent variable and rest are Independent variable. The dataset has 457 rows for each variable. The analysis of Calories with different variables are done.

In [ ]:

```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
import warnings
warnings.filterwarnings('ignore')
```

In [ ]:

```
df = pd.read_csv('FitBit data.csv')
```

In [ ]:

```
df.head()
```

Out[ ]:

	Id	ActivityDate	TotalSteps	TotalDistance	TrackerDistance	LoggedActivitiesDistance	VeryActiveDistance	Modera
0	1503960366	3/25/2016	11004	7.11	7.11	0.0	2.57	
1	1503960366	3/26/2016	17609	11.55	11.55	0.0	6.92	
2	1503960366	3/27/2016	12736	8.53	8.53	0.0	4.66	
3	1503960366	3/28/2016	13231	8.93	8.93	0.0	3.19	
4	1503960366	3/29/2016	12041	7.85	7.85	0.0	2.16	

In [ ]:

```
df.shape
```

Out[ ]:

```
(457, 15)
```

Dataset description, data types and finding out any null values in the dataset

In [ ]:

```
df.describe()
```

Out[ ]:

	Id	TotalSteps	TotalDistance	TrackerDistance	LoggedActivitiesDistance	VeryActiveDistance	Moderately
count	4.570000e+02	457.000000	457.000000	457.000000	457.000000	457.000000	
mean	4.628595e+09	6546.562363	4.663523	4.609847	0.179427	1.180897	
std	2.293781e+09	5398.493064	4.082072	4.068540	0.849232	2.487159	
min	1.503960e+09	0.000000	0.000000	0.000000	0.000000	0.000000	
25%	2.347168e+09	1988.000000	1.410000	1.280000	0.000000	0.000000	
50%	4.057193e+09	5986.000000	4.090000	4.090000	0.000000	0.000000	

	Id	TotalSteps	TotalDistance	TrackerDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyA
50%	4.057193e+09	5986.000000	4.090000	4.090000	0.000000	0.000000	
75%	6.391747e+09	10198.000000	7.160000	7.110000	0.000000	1.310000	
max	8.877689e+09	28497.000000	27.530001	27.530001	6.727057	21.920000	

The following things can be analysed by dataset description.

1. **We see the the minimum calorie burnt is 0. Along this minimum column, we observe that expect SedentaryMinutes, all other variables /activities for burning calories are zero.**
2. **The count of all variables are 457 which implies that there are no null values.**

In [ ]:

```
df.isnull().any()
```

Out[ ]:

```
Id                          False
ActivityDate                False
TotalSteps                  False
TotalDistance               False
TrackerDistance             False
LoggedActivitiesDistance    False
VeryActiveDistance          False
ModeratelyActiveDistance    False
LightActiveDistance         False
SedentaryActiveDistance     False
VeryActiveMinutes           False
FairlyActiveMinutes         False
LightlyActiveMinutes        False
SedentaryMinutes            False
Calories                    False
dtype: bool
```

We observe that the datset does not contain any null values.

In [ ]:

```
df.dtypes
```

Out[ ]:

```
Id                            int64
ActivityDate                 object
TotalSteps                    int64
TotalDistance               float64
TrackerDistance             float64
LoggedActivitiesDistance    float64
VeryActiveDistance          float64
ModeratelyActiveDistance    float64
LightActiveDistance         float64
SedentaryActiveDistance     float64
VeryActiveMinutes             int64
FairlyActiveMinutes           int64
LightlyActiveMinutes          int64
SedentaryMinutes              int64
Calories                      int64
dtype: object
```

The data types for dataset is correct. However, we shall convert the activityDate to data-time format for more analysis with respect to calories burnt.

In [ ]:

```
df['ActivityDate'] = pd.to_datetime(df['ActivityDate'])
```

In [ ]:

```
df.head()
```

Out[ ]:

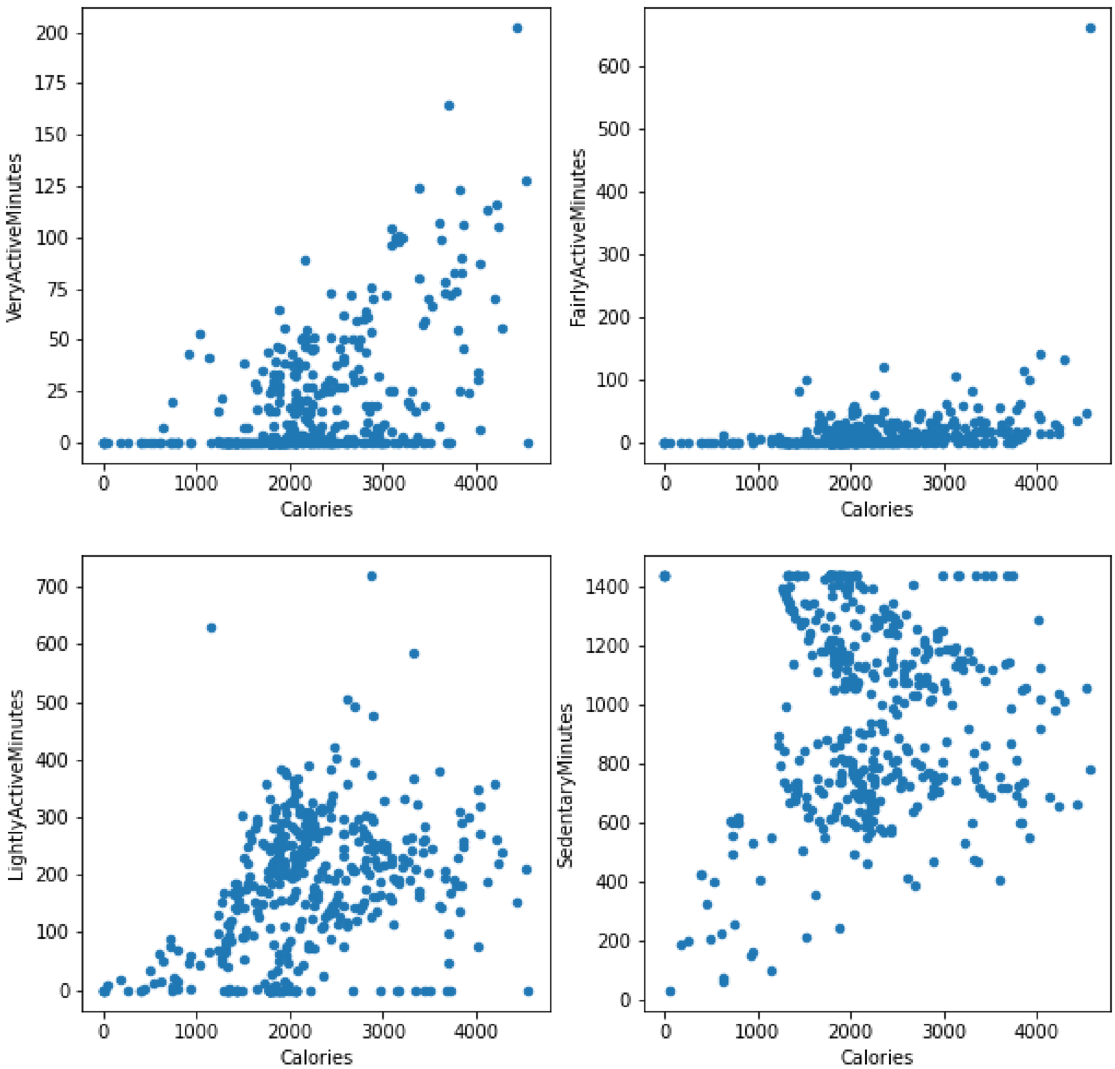
	Id	ActivityDate	TotalSteps	TotalDistance	TrackerDistance	LoggedActivitiesDistance	VeryActiveDistance	Modera
0	1503960366	2016-03-25	11004	7.11	7.11	0.0	2.57	
1	1503960366	2016-03-26	17609	11.55	11.55	0.0	6.92	
2	1503960366	2016-03-27	12736	8.53	8.53	0.0	4.66	
3	1503960366	2016-03-28	13231	8.93	8.93	0.0	3.19	
4	1503960366	2016-03-29	12041	7.85	7.85	0.0	2.16	

Based on the ActiveMinutes, How are calories burnt?

In [ ]:

```
fig1, ax1 = plt.subplots(2, 2, figsize = (10, 10))

df.plot.scatter('Calories', 'VeryActiveMinutes', ax = ax1[0][0])
df.plot.scatter('Calories', 'FairlyActiveMinutes', ax = ax1[0][1])
df.plot.scatter('Calories', 'LightlyActiveMinutes', ax = ax1[1][0])
df.plot.scatter('Calories', 'SedentaryMinutes', ax = ax1[1][1])
plt.show()
```



From scatter plot analysis, we can observe following things:

1. **More concentration of FairlyActiveMinutes is present in its low values which means that, Calories are burnt more by only few amount of FairlyActiveMinutes.**
2. **For SedentaryMinutes, the datas are scattered more in the mid and upper region. Meaning, calories are**

burnt in the range of 2000-3000 by spending the concentrated amount in SedentaryMinutes.

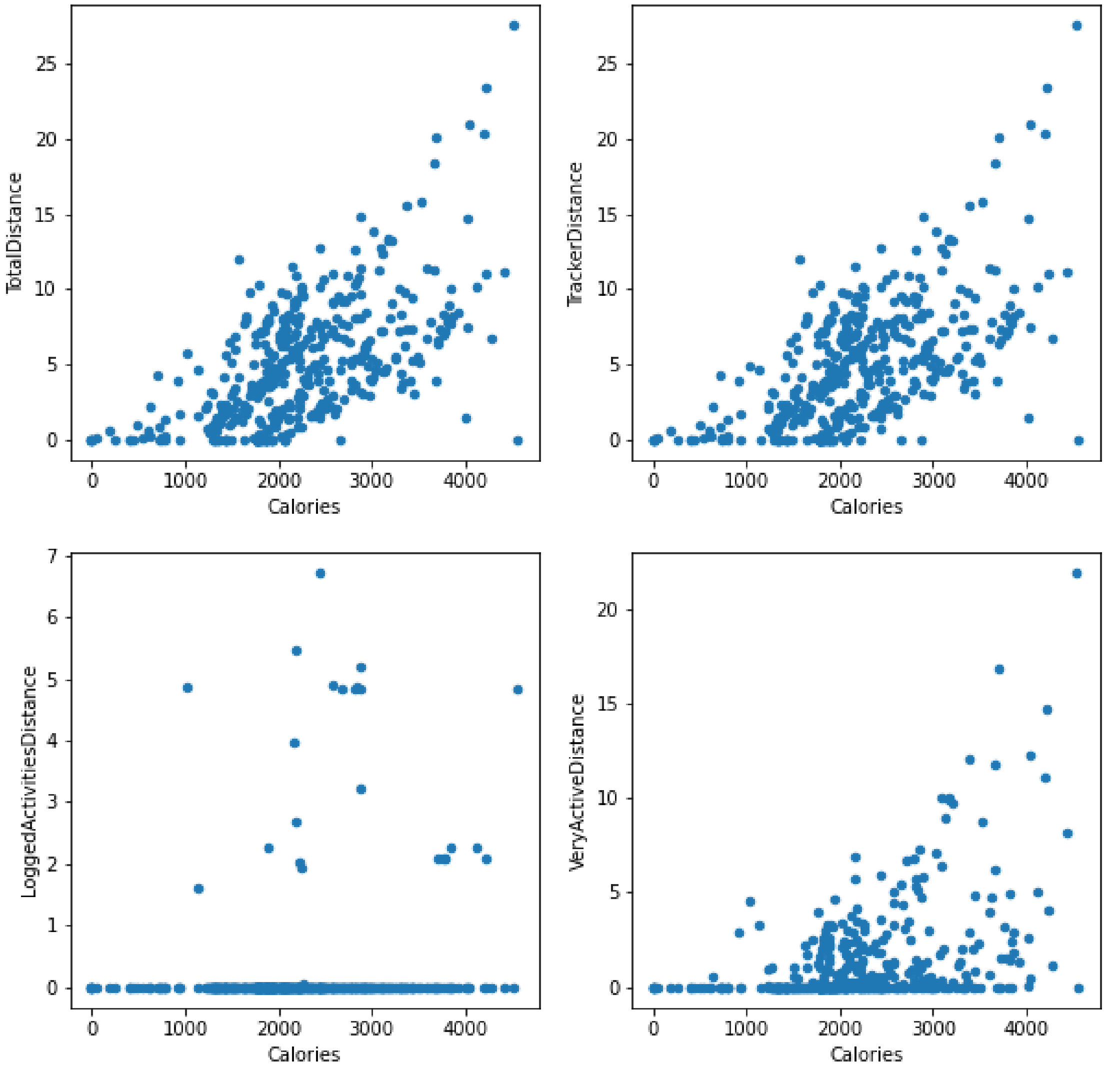
3. Also for VeryActiveMinutes and LightlyActiveMinutes, the concentration are more in the mid-region.

Based on the Distance covered, How are calories burnt?

In [ ]:

```
fig1, ax1 = plt.subplots(2, 2, figsize = (10, 10))

df.plot.scatter('Calories', 'TotalDistance', ax = ax1[0][0])
df.plot.scatter('Calories', 'TrackerDistance', ax = ax1[0][1])
df.plot.scatter('Calories', 'LoggedActivitiesDistance', ax = ax1[1][0])
df.plot.scatter('Calories', 'VeryActiveDistance', ax = ax1[1][1])
plt.show()
```



From the scatter plot, we can observe that TotalDistance and Tracker Distance shows a similar distribution.

Elimination of column

Since TotalDistance and TrackerDistance are same, there is no need of one of the column.

In [ ]:

```
df.drop(['TrackerDistance'], axis = 1, inplace = True)
```

Maximum calories burnt

In [ ]:

```python
#df[df['Calories'] == df['Calories'].max()]
max_calories = df.nlargest(5, ['Calories'])
max_calories.drop(['Id','SedentaryActiveDistance'], axis = 1, inplace = True)
max_calories
#SedentaryActiveDistance showed 0
```

Out[ ]:

	ActivityDate	TotalSteps	TotalDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyActiveDistance	LightAct
138	2016-04-01	0	0.000000	4.828032	0.00	0.00	
454	2016-04-10	28497	27.530001	0.000000	21.92	1.12	
304	2016-04-02	14873	11.110000	0.000000	8.19	0.60	
347	2016-04-05	9348	6.700000	0.000000	1.13	2.04	
416	2016-04-04	13935	11.050000	2.092147	4.09	0.79	

The max_calories dataframe gives the max 5 datas grouped by calories. We can see that for a calorie burnt of 4526, total steps taken is 28497, total distance is 27.53, also veryActiveDistance is 21.92. This took place on 2016-04-10.

Calories burnt based on ActivityDate

Splitting activitydate to year, day and month.

In [ ]:

```python
df['day'] = df['ActivityDate'].dt.day
df['month'] = df['ActivityDate'].dt.month
df['year'] = df['ActivityDate'].dt.year
```

In [ ]:

```python
df.head()
```

Out[ ]:

	Id	ActivityDate	TotalSteps	TotalDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyActiveDistanc
0	1503960366	2016-03-25	11004	7.11	0.0	2.57	0.4
1	1503960366	2016-03-26	17609	11.55	0.0	6.92	0.7
2	1503960366	2016-03-27	12736	8.53	0.0	4.66	0.1
3	1503960366	2016-03-28	13231	8.93	0.0	3.19	0.7
4	1503960366	2016-03-29	12041	7.85	0.0	2.16	1.0

In [ ]:

```python
df.drop('ActivityDate', axis = 1, inplace=True)
```

The variable Id is not necessary. So, it can be removed.

In [ ]:

```python
df.drop('Id', axis = 1, inplace = True)
```

In [ ]:

```python
data2 = df[df['month']==3]
max_calories1 = data2.nlargest(5, ['Calories'])
max_calories1
```

Out[ ]:

	TotalSteps	TotalDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyActiveDistance	LightActiveDistance
181	2106	1.51	0.0	0.02	0.05	0.21
169	12483	8.99	0.0	1.45	0.57	6.90
173	10330	7.41	0.0	0.00	0.00	0.00
170	8940	6.41	0.0	0.00	0.00	0.61
178	5563	3.99	0.0	0.00	0.00	0.00

From this filteration, we can observe that max calories value was 4010 on 28th day of 3rd month.

In [ ]:

```
data3 = df[df['month']==4]
max_calories2 = data3.nlargest(5, ['Calories'])
max_calories2
```

Out[ ]:

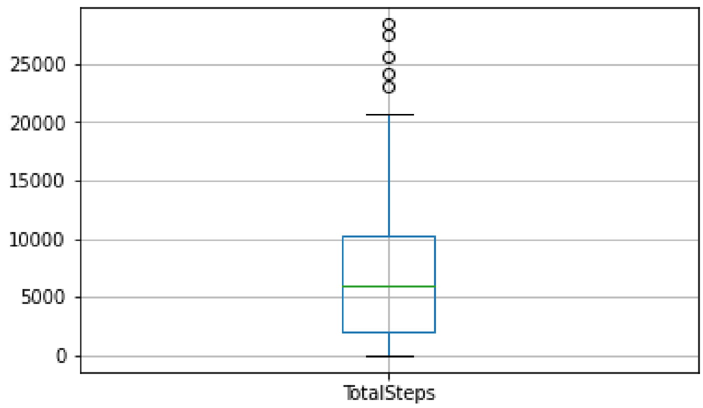
	TotalSteps	TotalDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyActiveDistance	LightActiveDistance
138	0	0.000000	4.828032	0.00	0.00	0.00
454	28497	27.530001	0.000000	21.92	1.12	4.46
304	14873	11.110000	0.000000	8.19	0.60	2.31
347	9348	6.700000	0.000000	1.13	2.04	3.14
416	13935	11.050000	2.092147	4.09	0.79	6.17

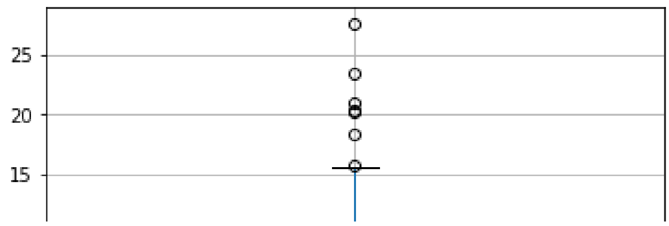
From this filteration, we can observe that max calories value was 4562 on 28th day of 4th month.

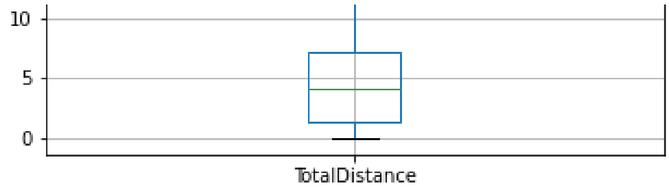
Box plot

In [ ]:

```
fig, ax1 = plt.subplots(2, figsize = (6, 8))
df.boxplot('TotalSteps', ax = ax1[0])
df.boxplot('TotalDistance', ax = ax1[1])
plt.show()
```







The Boxpolot shows the presence of outliers in the dataFrame.

1. **Presented here is the variable TotalSteps and TotalDistance.**
2. **We can observe that the median for TotalSteps is around 6000 and for TotalDistance is around 4.**
3. **The max for TotalSteps is around 21000 and for TotalDistance is around 16.**
4. **There are outliers present in both the dataframes which are present outside the InterQuartile range.**

Correlation Matrix

In [ ]:

```
df.corr()
```

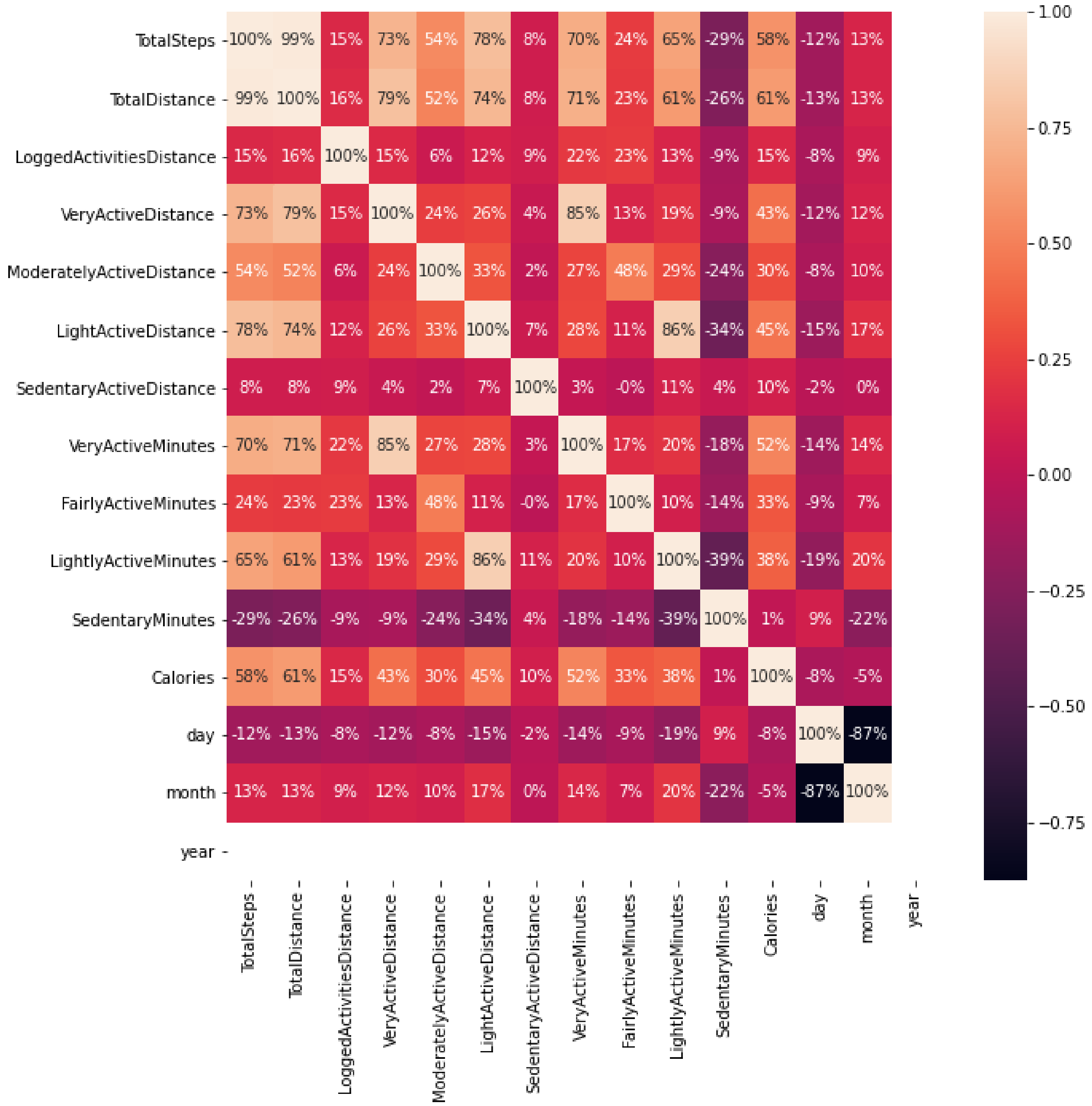
Out[ ]:

	TotalSteps	TotalDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyActiveDistance
TotalSteps	1.000000	0.986789	0.146380	0.733689	0.541838
TotalDistance	0.986789	1.000000	0.164312	0.791778	0.515128
LoggedActivitiesDistance	0.146380	0.164312	1.000000	0.154754	0.060123
VeryActiveDistance	0.733689	0.791778	0.154754	1.000000	0.240440
ModeratelyActiveDistance	0.541838	0.515128	0.060123	0.240440	1.000000
LightActiveDistance	0.775562	0.744812	0.115671	0.264580	0.326959
SedentaryActiveDistance	0.081965	0.080787	0.091091	0.044666	0.016350
VeryActiveMinutes	0.699699	0.714320	0.218253	0.854292	0.272720
FairlyActiveMinutes	0.238389	0.230712	0.231675	0.129528	0.480906
LightlyActiveMinutes	0.654418	0.614152	0.133856	0.193593	0.291906
SedentaryMinutes	-0.285258	-0.260301	-0.092991	-0.087726	-0.236723
Calories	0.581380	0.613647	0.148740	0.434133	0.300781
day	-0.122238	-0.126215	-0.084718	-0.117278	-0.080761
month	0.125961	0.127902	0.092581	0.118005	0.096244
year	NaN	NaN	NaN	NaN	NaN

In [ ]:

```
# Co-relation matrix
plt.figure(figsize = (10, 10))
```

```
sns.heatmap(df.corr(), annot = True, fmt = '.0%')
plt.show()
```



The Correlation matrix has a lot of positive relation which means that as one variable increases, the corresponding varaible increases by the respective percentage.

1. **We can observe that Calories and TotalDistance have correlation of a percentage of 61% meaning as the TotalDistance is increased, Calories increases by 61% and so on.**
2. **There is a 86% correlation between LightActiveDistance and LightlyActiveMinutes.**

Conclusion

1. **The dataset predicts the amount of calories burnt.**
2. **The activity date has been converted to day, month and year and analysed.**
3. **Analysis based on different variables affecting the calories burnt have been done.**
4. **Correlation matrix have been analysed.**
5. **This is a regression type of problem for ML.**