```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
from sklearn.model_selection import train_test_split
from sklearn.preprocessing import StandardScaler
from sklearn.impute import SimpleImputer
import seaborn as sns
import plotly.express as px
import plotly.graph_objects as go
```

Prepocessing

```
data = pd.read_csv('/content/dailyActivity_merged.csv')
```

```
print(data.head())
```

```
           Id ActivityDate  TotalSteps  TotalDistance  TrackerDistance  \
0  1503960366    3/25/2016       11004           7.11             7.11
1  1503960366    3/26/2016       17609          11.55            11.55
2  1503960366    3/27/2016       12736           8.53             8.53
3  1503960366    3/28/2016       13231           8.93             8.93
4  1503960366    3/29/2016       12041           7.85             7.85

   LoggedActivitiesDistance  VeryActiveDistance  ModeratelyActiveDistance  \
0                       0.0                2.57                      0.46
1                       0.0                6.92                      0.73
2                       0.0                4.66                      0.16
3                       0.0                3.19                      0.79
4                       0.0                2.16                      1.09

   LightActiveDistance  SedentaryActiveDistance  VeryActiveMinutes  \
0                 4.07                      0.0                 33
1                 3.91                      0.0                 89
2                 3.71                      0.0                 56
3                 4.95                      0.0                 39
4                 4.61                      0.0                 28

   FairlyActiveMinutes  LightlyActiveMinutes  SedentaryMinutes  Calories
0                   12                   205               804      1819
1                   17                   274               588      2154
2                    5                   268               605      1944
3                   20                   224              1080      1932
4                   28                   243               763      1886
```

```
1 data.describe()
```

	Id	TotalSteps	TotalDistance	TrackerDistance	LoggedActivitiesDistance	VeryActiveDistance	ModeratelyActiveDistance
count	4.570000e+02	457.000000	457.000000	457.000000	457.000000	457.000000	457.00000
mean	4.628595e+09	6546.562363	4.663523	4.609847	0.179427	1.180897	0.47864
std	2.293781e+09	5398.493064	4.082072	4.068540	0.849232	2.487159	0.83099
min	1.503960e+09	0.000000	0.000000	0.000000	0.000000	0.000000	0.00000
25%	2.347168e+09	1988.000000	1.410000	1.280000	0.000000	0.000000	0.00000
50%	4.057193e+09	5986.000000	4.090000	4.090000	0.000000	0.000000	0.02000
75%	6.391747e+09	10198.000000	7.160000	7.110000	0.000000	1.310000	0.67000
max	8.877689e+09	28497.000000	27.530001	27.530001	6.727057	21.920000	6.40000

```
1 data.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 457 entries, 0 to 456
```

```
Data columns (total 15 columns):
 #   Column                    Non-Null Count  Dtype  
---  ------                    --------------  -----  
 0   Id                        457 non-null    int64  
 1   ActivityDate              457 non-null    object 
 2   TotalSteps                457 non-null    int64  
 3   TotalDistance             457 non-null    float64
 4   TrackerDistance           457 non-null    float64
 5   LoggedActivitiesDistance  457 non-null    float64
 6   VeryActiveDistance        457 non-null    float64
 7   ModeratelyActiveDistance  457 non-null    float64
 8   LightActiveDistance       457 non-null    float64
 9   SedentaryActiveDistance   457 non-null    float64
 10  VeryActiveMinutes         457 non-null    int64  
 11  FairlyActiveMinutes       457 non-null    int64  
 12  LightlyActiveMinutes      457 non-null    int64  
 13  SedentaryMinutes          457 non-null    int64  
 14  Calories                  457 non-null    int64  
dtypes: float64(7), int64(7), object(1)
memory usage: 53.7+ KB
```

```
data.isnull().sum()
```

	0
Id	0
ActivityDate	0
TotalSteps	0
TotalDistance	0
TrackerDistance	0
LoggedActivitiesDistance	0
VeryActiveDistance	0
ModeratelyActiveDistance	0
LightActiveDistance	0
SedentaryActiveDistance	0
VeryActiveMinutes	0
FairlyActiveMinutes	0
LightlyActiveMinutes	0
SedentaryMinutes	0
Calories	0

dtype: int64

```
data.dtypes
```

	0
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

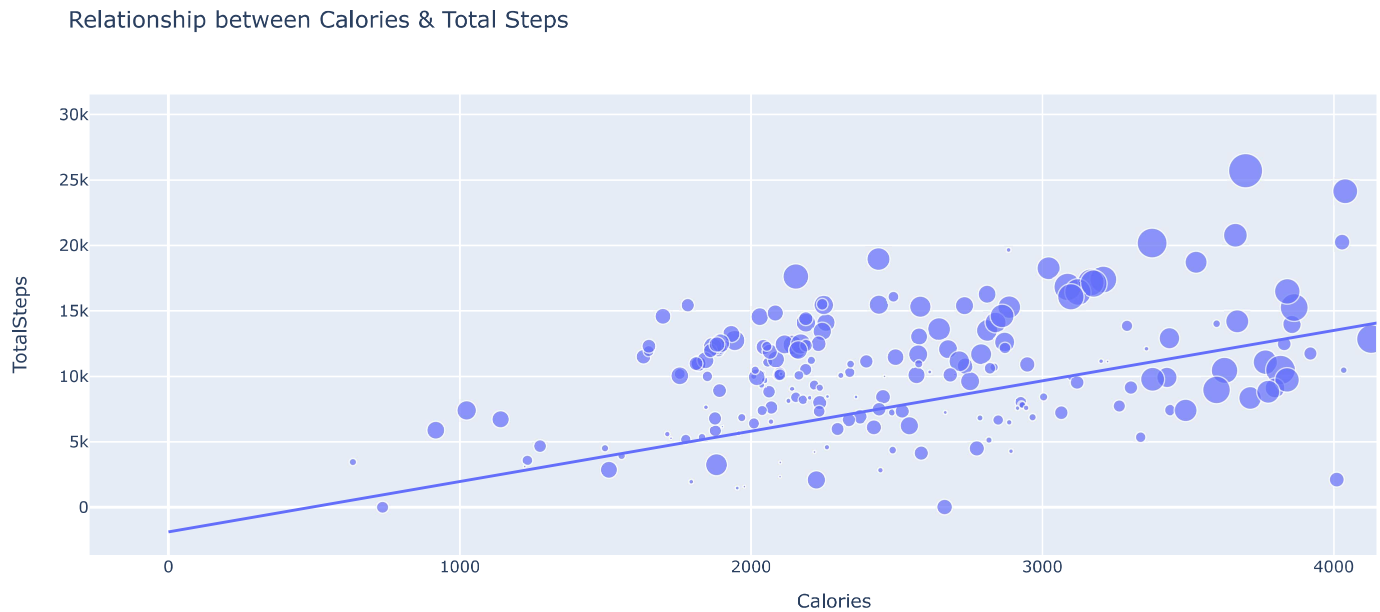
```
data.duplicated().sum()
```

```
0
```

```

data['ActivityDate'] = pd.to_datetime(data['ActivityDate'],format="%m/%d/%Y")

data['Day'] = data['ActivityDate'].dt.day_name()

data['TotalMinutes'] = data['VeryActiveMinutes'] + data['FairlyActiveMinutes'] + data['LightlyActiveMinutes'] + data['SedentaryMinutes']


```

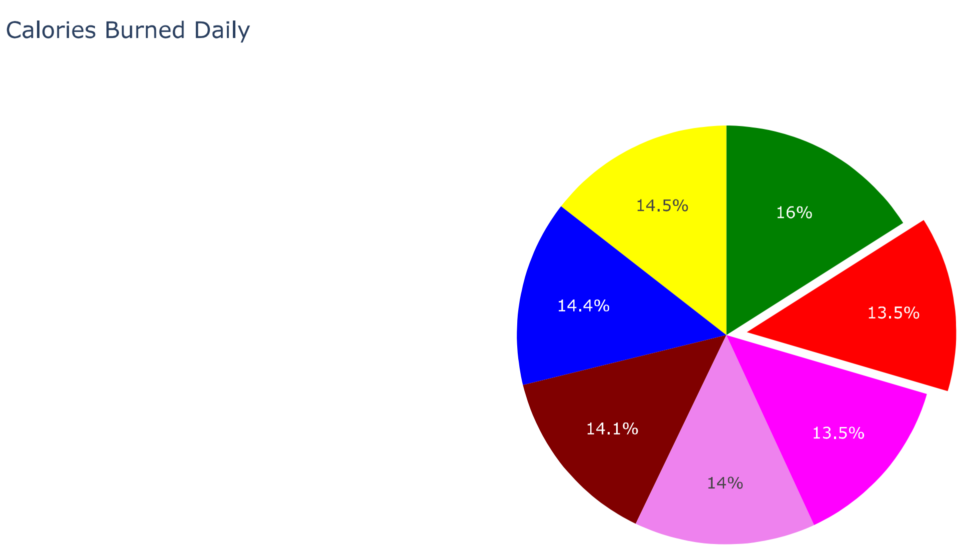
Relation between calories and TotalSteps

```
fig = px.scatter(data_frame = data, x ='Calories',y='TotalSteps',size ='VeryActiveMinutes',trendline='ols',title="Relationship between Ca
fig.show()
```



Distribution of calories on each day

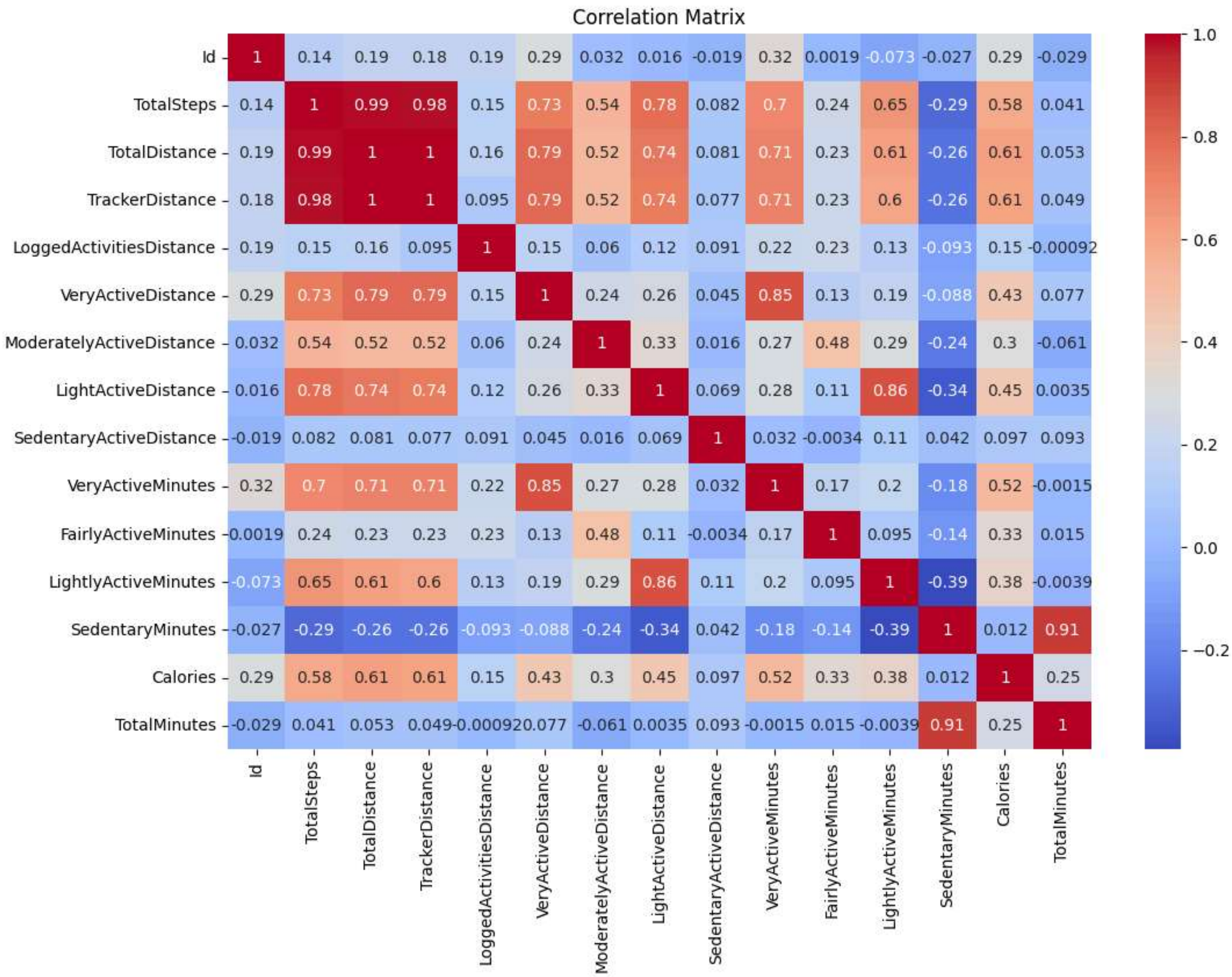
```
calories = data["Day"].value_counts()
label = calories.index
counts = data["Calories"]
Colors = ['red','green','yellow','blue','violet','magenta','maroon']
explode = (0.1, 0, 0, 0, 0, 0, 0)

fig = go.Figure(data=[go.Pie(
    labels=label,
    values=counts,
    marker=dict(colors=Colors),
    pull=explode
)])

fig.update_layout(title_text='Calories Burned Daily')
fig.show()
```



Correlation Matrix

```

numeric_data = data.select_dtypes(include=['number'])
correlation_matrix = numeric_data.corr()
```

```
plt.figure(figsize=(12, 8))
sns.heatmap(correlation_matrix, annot=True, cmap='coolwarm')
plt.title('Correlation Matrix')
plt.show()
```




```
data.drop(columns=["LoggedActivitiesDistance","SedentaryActiveDistance"])
```

	Id	ActivityDate	TotalSteps	TotalDistance	TrackerDistance	VeryActiveDistance	ModeratelyActiveDistance	LightActiveDist
0	1503960366	2016-03-25	11004	7.110000	7.110000	2.57	0.46	
1	1503960366	2016-03-26	17609	11.550000	11.550000	6.92	0.73	
2	1503960366	2016-03-27	12736	8.530000	8.530000	4.66	0.16	
3	1503960366	2016-03-28	13231	8.930000	8.930000	3.19	0.79	
4	1503960366	2016-03-29	12041	7.850000	7.850000	2.16	1.09	
...	...	...	...	...	...	...	...	
452	8877689391	2016-04-08	23014	20.389999	20.389999	11.10	0.63	
453	8877689391	2016-04-09	16470	8.070000	8.070000	0.00	0.02	
454	8877689391	2016-04-10	28497	27.530001	27.530001	21.92	1.12	
455	8877689391	2016-04-11	10622	8.060000	8.060000	1.47	0.15	
456	8877689391	2016-04-12	2350	1.780000	1.780000	0.00	0.00	

457 rows × 15 columns

```
Start coding or generate with AI.
```

Splitting of data into Train and Test

```

numeric_data = data.select_dtypes(include=['number'])
scaler = StandardScaler()
data_scaled = scaler.fit_transform(numeric_data)
X = data_scaled[:, :-1]
y = data_scaled[:, -1]
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)
```

Neural Network Model

```
Start coding or generate with AI.
```

```
import tensorflow as tf
from tensorflow.keras.models import Sequential
from tensorflow.keras.layers import Dense, Dropout
from tensorflow.keras.callbacks import EarlyStopping

# Define the neural network model
model = Sequential([
    Dense(64, input_dim=X_train.shape[1], activation='relu'),
    Dropout(0.5),
    Dense(32, activation='relu'),
    Dropout(0.5),
    Dense(1, activation='linear')  # Regression output
])
model.compile(optimizer='adam', loss='mean_squared_error', metrics=['mean_absolute_error'])

early_stopping = EarlyStopping(monitor='val_loss', patience=10, restore_best_weights=True)

history = model.fit(X_train, y_train, validation_data=(X_test, y_test), epochs=100, batch_size=32, callbacks=[early_stopping])

loss, mae = model.evaluate(X_test, y_test)
print(f'Mean Absolute Error on Test Set: {mae}')

```

```
Epoch 1/100
/usr/local/lib/python3.10/dist-packages/keras/src/layers/core/dense.py:87: UserWarning:

Do not pass an `input_shape`/`input_dim` argument to a layer. When using Sequential models, prefer using an `Input(shape)` object as

12/12 ━━━━━━━━━━━━━━━━━━━━ 1s 18ms/step - loss: 1.8104 - mean_absolute_error: 1.0691 - val_loss: 0.6812 - val_mean_absolute_error: 0.
Epoch 2/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 1.5929 - mean_absolute_error: 0.9608 - val_loss: 0.6100 - val_mean_absolute_error: 0.7
Epoch 3/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 4ms/step - loss: 1.0429 - mean_absolute_error: 0.8036 - val_loss: 0.5573 - val_mean_absolute_error: 0.6
Epoch 4/100
```

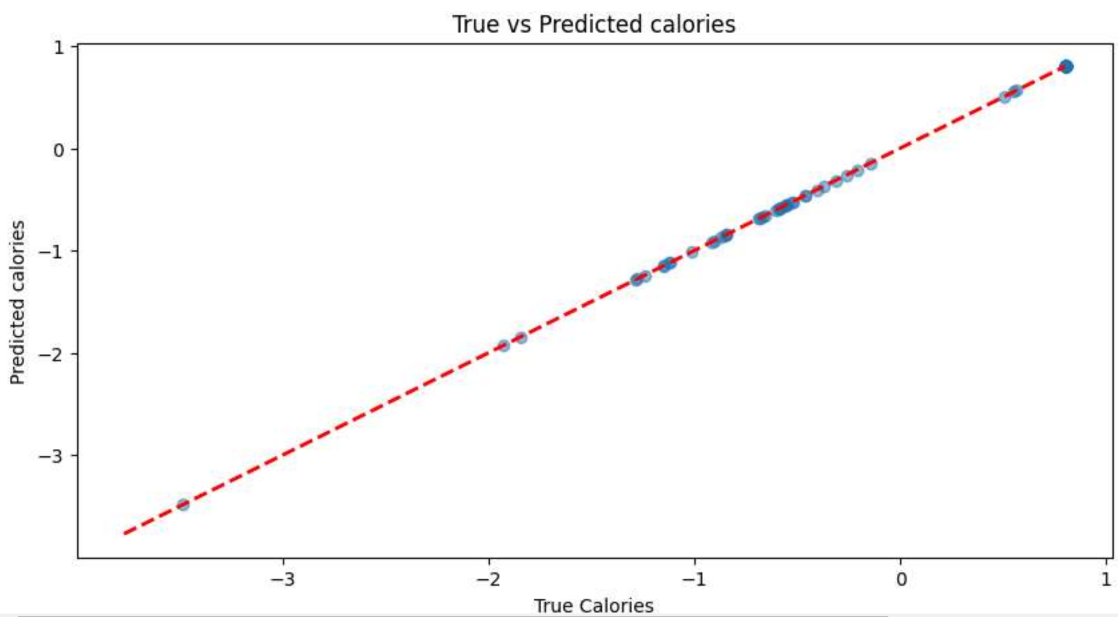
```
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 1.1198 - mean_absolute_error: 0.8147 - val_loss: 0.5144 - val_mean_absolute_error: 0.6
Epoch 5/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.8514 - mean_absolute_error: 0.7204 - val_loss: 0.4532 - val_mean_absolute_error: 0.6
Epoch 6/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.6839 - mean_absolute_error: 0.6655 - val_loss: 0.4183 - val_mean_absolute_error: 0.5
Epoch 7/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.8612 - mean_absolute_error: 0.7189 - val_loss: 0.3885 - val_mean_absolute_error: 0.5
Epoch 8/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.8814 - mean_absolute_error: 0.7053 - val_loss: 0.3513 - val_mean_absolute_error: 0.5
Epoch 9/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.7972 - mean_absolute_error: 0.6733 - val_loss: 0.3229 - val_mean_absolute_error: 0.5
Epoch 10/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - loss: 0.6008 - mean_absolute_error: 0.6059 - val_loss: 0.2971 - val_mean_absolute_error: 0.4
Epoch 11/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.5828 - mean_absolute_error: 0.6031 - val_loss: 0.2697 - val_mean_absolute_error: 0.4
Epoch 12/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.5046 - mean_absolute_error: 0.5536 - val_loss: 0.2535 - val_mean_absolute_error: 0.4
Epoch 13/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.5923 - mean_absolute_error: 0.5917 - val_loss: 0.2350 - val_mean_absolute_error: 0.4
Epoch 14/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.4504 - mean_absolute_error: 0.5229 - val_loss: 0.2187 - val_mean_absolute_error: 0.4
Epoch 15/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.4128 - mean_absolute_error: 0.5145 - val_loss: 0.2046 - val_mean_absolute_error: 0.3
Epoch 16/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.5360 - mean_absolute_error: 0.5713 - val_loss: 0.1936 - val_mean_absolute_error: 0.3
Epoch 17/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.4950 - mean_absolute_error: 0.5507 - val_loss: 0.1893 - val_mean_absolute_error: 0.3
Epoch 18/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.3899 - mean_absolute_error: 0.4798 - val_loss: 0.1823 - val_mean_absolute_error: 0.3
Epoch 19/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.3838 - mean_absolute_error: 0.4748 - val_loss: 0.1740 - val_mean_absolute_error: 0.3
Epoch 20/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.4072 - mean_absolute_error: 0.4796 - val_loss: 0.1733 - val_mean_absolute_error: 0.3
Epoch 21/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.4136 - mean_absolute_error: 0.4898 - val_loss: 0.1758 - val_mean_absolute_error: 0.3
Epoch 22/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.4093 - mean_absolute_error: 0.4754 - val_loss: 0.1714 - val_mean_absolute_error: 0.3
Epoch 23/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 5ms/step - loss: 0.3880 - mean_absolute_error: 0.4518 - val_loss: 0.1694 - val_mean_absolute_error: 0.3
Epoch 24/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - loss: 0.3082 - mean_absolute_error: 0.4299 - val_loss: 0.1683 - val_mean_absolute_error: 0.3
Epoch 25/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 6ms/step - loss: 0.3508 - mean_absolute_error: 0.4297 - val_loss: 0.1662 - val_mean_absolute_error: 0.3
Epoch 26/100
12/12 ━━━━━━━━━━━━━━━━━━━━ 0s 7ms/step - loss: 0.2861 - mean_absolute_error: 0.4214 - val_loss: 0.1643 - val_mean_absolute_error: 0.3
Epoch 27/100
```

Linear Regression

Double-click (or enter) to edit

```python

from sklearn.linear_model import LinearRegression
from sklearn.metrics import mean_squared_error



# Split the data into training and testing sets
X_train, X_test, y_train, y_test = train_test_split(X, y, test_size=0.2, random_state=42)

# Normalize the data
scaler = StandardScaler()
X_train_scaled = scaler.fit_transform(X_train)
X_test_scaled = scaler.transform(X_test)

# Train a simple linear regression model
model = LinearRegression()
model.fit(X_train_scaled, y_train)

# Predict on the test set
y_pred = model.predict(X_test_scaled)

# Evaluate the model
mse = mean_squared_error(y_test, y_pred)
print(f'Mean Squared Error: {mse}')


plt.figure(figsize=(10, 5))
plt.scatter(y_test, y_pred, alpha=0.5)
plt.plot([y.min(), y.max()], [y.min(), y.max()], 'r--', lw=2)
plt.xlabel('True Calories')
plt.ylabel('Predicted calories')
plt.title('True vs Predicted calories')
plt.show()
```

```
Mean Squared Error: 1.3825916126417812e-30
```



Longitudinal Analysis

```python

data['ActivityDate'] = pd.to_datetime(data['ActivityDate'])



# Filter data for the specific user
user_data = data[data['Id']==1503960366]

# Check if the user_data DataFrame is not empty
if not user_data.empty:
    plt.figure(figsize=(14, 7))
    plt.plot(user_data['ActivityDate'], user_data['TotalSteps'], label='Total Steps', color='blue')
    plt.plot(user_data['ActivityDate'], user_data['Calories'], label='Calories', color='red')

    plt.title(f'User {Id} - Longitudinal Analysis')
    plt.xlabel('Date')
    plt.ylabel('Values')
    plt.legend()
    plt.show()
else:
    print(f"No data available for User {Id}.")
```