Smartwatch Data Analysis using Python

In [1]:
```
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import plotly.express as px
import plotly.graph_objects as go
```

In [2]:
```
data = pd.read_csv("dailyActivity.csv")
print(data.head())
```

```
           Id ActivityDate  TotalSteps  TotalDistance  TrackerDistance  \
0  1503960366    4/12/2016       13162           8.50             8.50
1  1503960366    4/13/2016       10735           6.97             6.97
2  1503960366    4/14/2016       10460           6.74             6.74
3  1503960366    4/15/2016        9762           6.28             6.28
4  1503960366    4/16/2016       12669           8.16             8.16

   LoggedActivitiesDistance  VeryActiveDistance  ModeratelyActiveDistance  \
0                       0.0                1.88                      0.55
1                       0.0                1.57                      0.69
2                       0.0                2.44                      0.40
3                       0.0                2.14                      1.26
4                       0.0                2.71                      0.41

   LightActiveDistance  SedentaryActiveDistance  VeryActiveMinutes  \
0                 6.06                      0.0                 25
1                 4.71                      0.0                 21
2                 3.91                      0.0                 30
3                 2.83                      0.0                 29
4                 5.04                      0.0                 36

   FairlyActiveMinutes  LightlyActiveMinutes  SedentaryMinutes  Calories
0                   13                   328               728      1985
1                   19                   217               776      1797
2                   11                   181              1218      1776
3                   34                   209               726      1745
4                   10                   221               773      1863
```

In [3]:
```
print(data.isnull().sum())
```

```
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
```

In [4]:
```
print(data.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 940 entries, 0 to 939
Data columns (total 15 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Id                        940 non-null    int64
 1   ActivityDate              940 non-null    object
 2   TotalSteps                940 non-null    int64
 3   TotalDistance             940 non-null    float64
 4   TrackerDistance           940 non-null    float64
 5   LoggedActivitiesDistance  940 non-null    float64
 6   VeryActiveDistance        940 non-null    float64
 7   ModeratelyActiveDistance  940 non-null    float64
 8   LightActiveDistance       940 non-null    float64
 9   SedentaryActiveDistance   940 non-null    float64
 10  VeryActiveMinutes         940 non-null    int64
 11  FairlyActiveMinutes       940 non-null    int64
 12  LightlyActiveMinutes      940 non-null    int64
 13  SedentaryMinutes          940 non-null    int64
 14  Calories                  940 non-null    int64
dtypes: float64(7), int64(7), object(1)
memory usage: 110.3+ KB
None
```

In [6]:
```
# let's change the datatype of ActivityDate
data['ActivityDate'] = pd.to_datetime(data['ActivityDate'],
                                      format="%m/%d/%Y")
print(data.info())
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 940 entries, 0 to 939
Data columns (total 15 columns):
 #   Column                    Non-Null Count  Dtype
---  ------                    --------------  -----
 0   Id                        940 non-null    int64
 1   ActivityDate              940 non-null    datetime64[ns]
 2   TotalSteps                940 non-null    int64
 3   TotalDistance             940 non-null    float64
 4   TrackerDistance           940 non-null    float64
 5   LoggedActivitiesDistance  940 non-null    float64
 6   VeryActiveDistance        940 non-null    float64
 7   ModeratelyActiveDistance  940 non-null    float64
 8   LightActiveDistance       940 non-null    float64
 9   SedentaryActiveDistance   940 non-null    float64
 10  VeryActiveMinutes         940 non-null    int64
 11  FairlyActiveMinutes       940 non-null    int64
 12  LightlyActiveMinutes      940 non-null    int64
 13  SedentaryMinutes          940 non-null    int64
 14  Calories                  940 non-null    int64
dtypes: datetime64[ns](1), float64(7), int64(7)
memory usage: 110.3 KB
None
```

In [8]:
```
data['TotalMinutes'] = data['VeryActiveMinutes'] + data['FairlyActiveMinutes'] + data['LightlyActiveMinutes'] + data['SedentaryMinutes']
print(data["TotalMinutes"].sample(5))
```

```
303    1440
454    1440
534    1070
708     997
169    1440
Name: TotalMinutes, dtype: int64
```

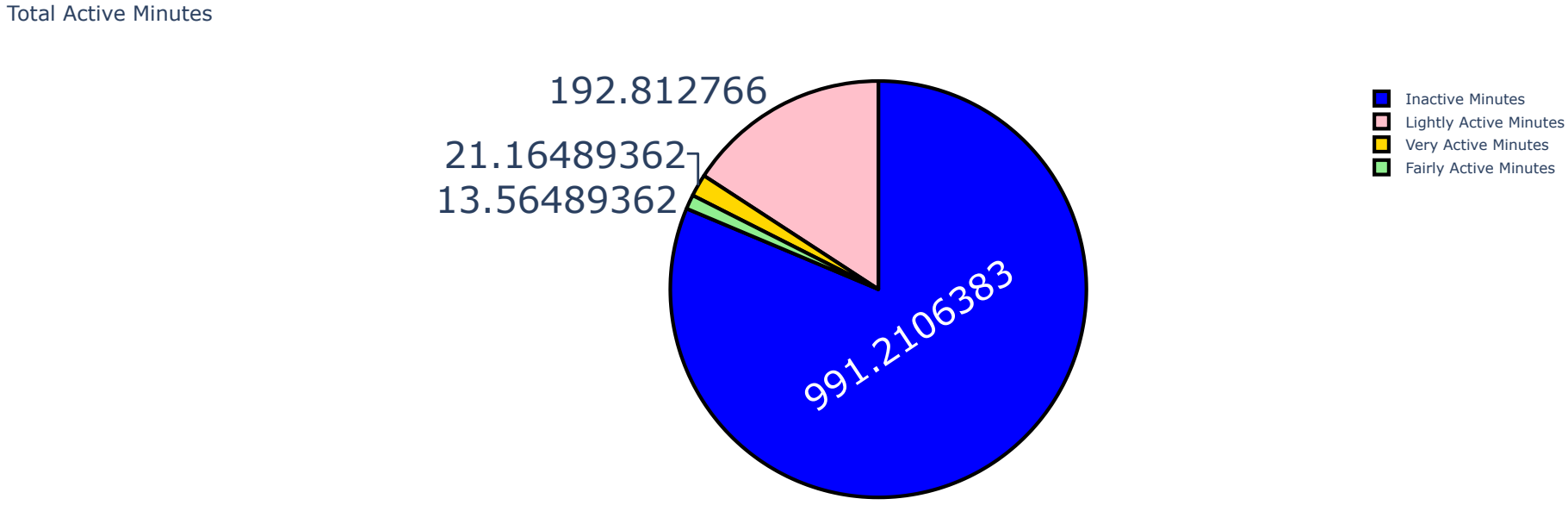
In [9]:
```
print(data.describe())
```

```
                 Id                  ActivityDate    TotalSteps  \
count  9.400000e+02                           940    940.000000
mean   4.855407e+09  2016-04-26 06:53:37.021276672   7637.910638
min    1.503960e+09            2016-04-12 00:00:00      0.000000
25%    2.320127e+09            2016-04-19 00:00:00   3789.750000
50%    4.445115e+09            2016-04-26 00:00:00   7405.500000
75%    6.962181e+09            2016-05-04 00:00:00  10727.000000
max    8.877689e+09            2016-05-12 00:00:00  36019.000000
std    2.424805e+09                            NaN   5087.150742

       TotalDistance  TrackerDistance  LoggedActivitiesDistance  \
count     940.000000       940.000000                940.000000
mean        5.489702         5.475351                  0.108171
min         0.000000         0.000000                  0.000000
25%         2.620000         2.620000                  0.000000
50%         5.245000         5.245000                  0.000000
75%         7.712500         7.710000                  0.000000
max        28.030001        28.030001                  4.942142
std         3.924606         3.907276                  0.619897

       VeryActiveDistance  ModeratelyActiveDistance  LightActiveDistance  \
count          940.000000                940.000000           940.000000
mean             1.502681                  0.567543             3.340819
min              0.000000                  0.000000             0.000000
25%              0.000000                  0.000000             1.945000
50%              0.210000                  0.240000             3.365000
75%              2.052500                  0.800000             4.782500
max             21.920000                  6.480000            10.710000
std              2.658941                  0.883580             2.040655

       SedentaryActiveDistance  VeryActiveMinutes  FairlyActiveMinutes  \
count               940.000000         940.000000           940.000000
mean                  0.001606          21.164894            13.564894
min                   0.000000           0.000000             0.000000
25%                   0.000000           0.000000             0.000000
50%                   0.000000           4.000000             6.000000
75%                   0.000000          32.000000            19.000000
max                   0.110000         210.000000           143.000000
std                   0.007346          32.844803            19.987404

       LightlyActiveMinutes  SedentaryMinutes     Calories  TotalMinutes
count            940.000000        940.000000   940.000000    940.000000
mean             192.812766        991.210638  2303.609574   1218.753191
min                0.000000          0.000000     0.000000      2.000000
25%              127.000000        729.750000  1828.500000    989.750000
50%              199.000000       1057.500000  2134.000000   1440.000000
75%              264.000000       1229.500000  2793.250000   1440.000000
max              518.000000       1440.000000  4900.000000   1440.000000
std              109.174700        301.267437   718.166862    265.931767
```

In [10]:

```
# Analyze smart watch data
figure = px.scatter(data_frame=data, x = "Calories", y = "TotalSteps",
                    size="VeryActiveMinutes", trendline="ols",
                    title="Relationship between Calories & Total Steps")
figure.show()
```

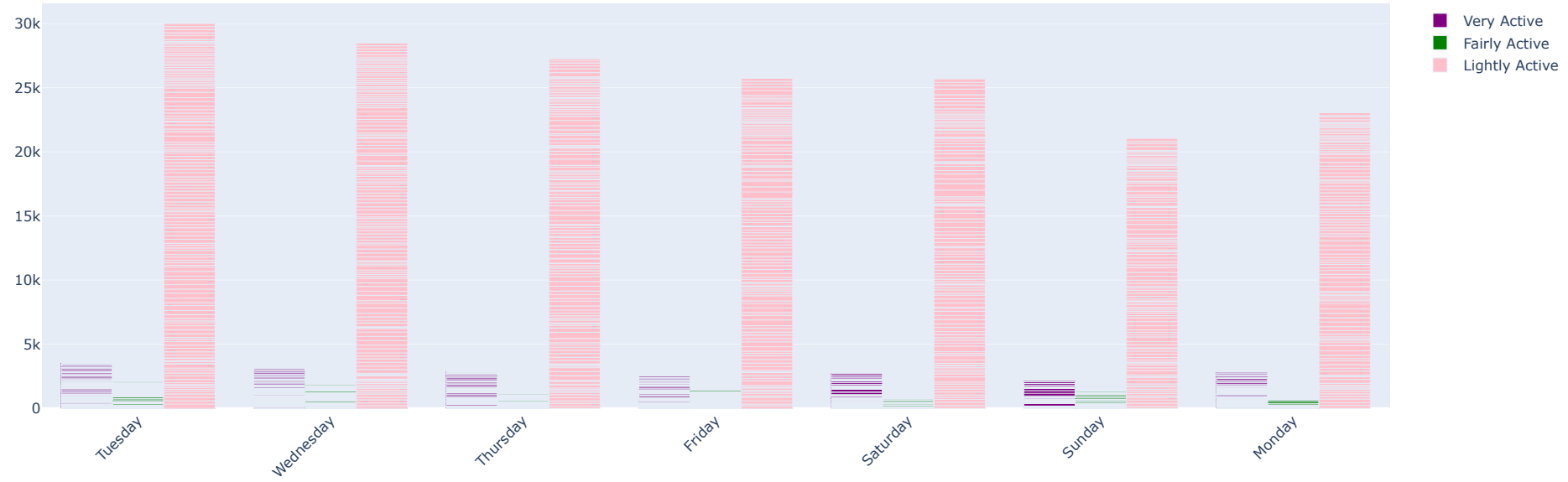
In [11]:
```
label = ["Very Active Minutes", "Fairly Active Minutes",
         "Lightly Active Minutes", "Inactive Minutes"]
counts = data[['VeryActiveMinutes', 'FairlyActiveMinutes',
               'LightlyActiveMinutes', 'SedentaryMinutes']].mean()
colors = ['gold', 'lightgreen', 'pink', 'blue']

fig = go.Figure(data=[go.Pie(labels=label, values=counts)])
fig.update_layout(title_text = 'Total Active Minutes')
fig.update_traces(hoverinfo='label+percent', textinfo = 'value', textfont_size=30,
                  marker=dict(colors=colors, line = dict(color='black', width=3)))
fig.show()
```



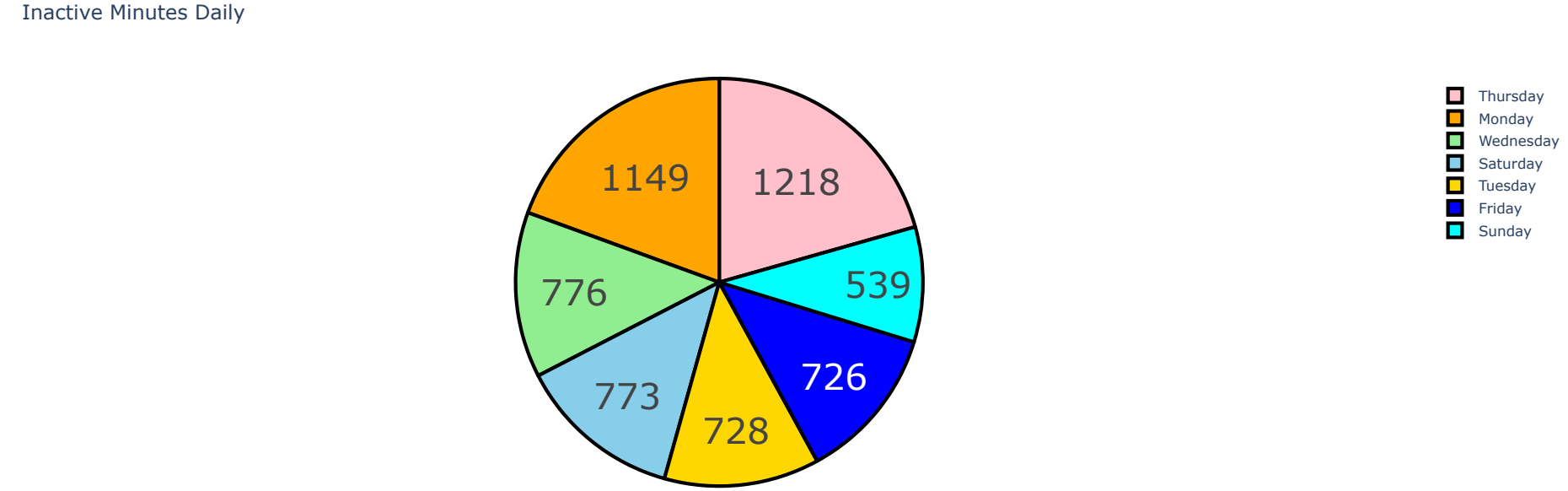
In [22]:
```
data['Day'] = data['ActivityDate'].dt.day_name()
print(data['Day'].head(7))
```

```
0      Tuesday
1    Wednesday
2     Thursday
3       Friday
4     Saturday
5       Sunday
6       Monday
Name: Day, dtype: object
```

In [16]:
```
fig = go.Figure()
fig.add_trace(go.Bar(
    x=data['Day'],
    y=data['VeryActiveMinutes'],
    name='Very Active',
    marker_color = 'purple'
))
fig.add_trace(go.Bar(
    x=data['Day'],
    y=data['FairlyActiveMinutes'],
    name='Fairly Active',
    marker_color = 'green',
))
fig.add_trace(go.Bar(
    x=data['Day'],
    y=data['LightlyActiveMinutes'],
    name='Lightly Active',
    marker_color = 'pink',
))
fig.update_layout(barmode='group', xaxis_tickangle=-45)
fig.show()
```

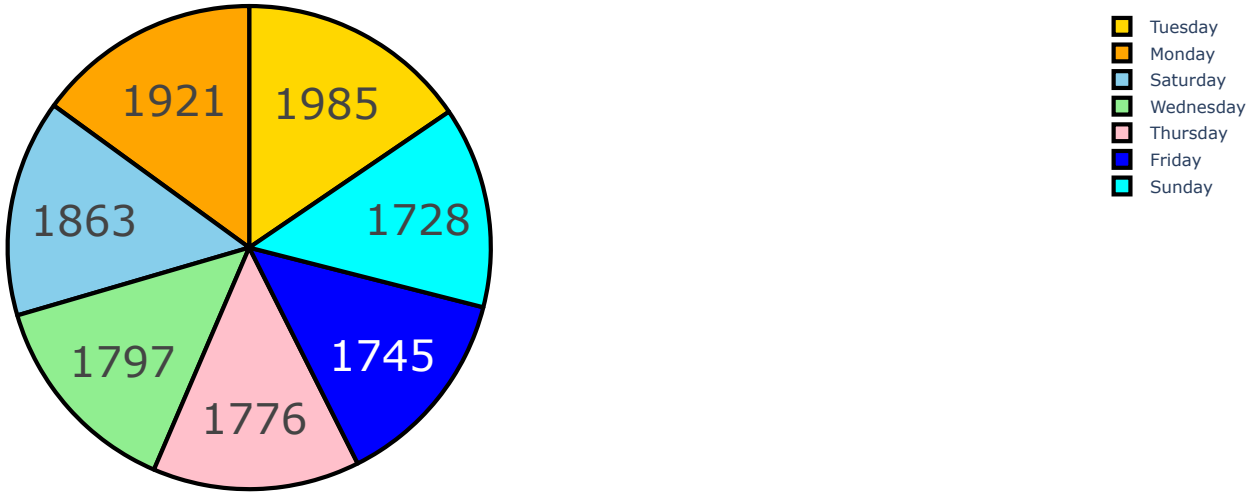


In [20]:
```
day = data['Day'].value_counts()
label = day.index
counts = data['SedentaryMinutes']
colors = ['gold','lightgreen', "pink", "blue", "skyblue", "cyan", "orange"]

fig = go.Figure(data=[go.Pie(labels=label, values=counts)])
fig.update_layout(title_text="Inactive Minutes Daily")
fig.update_traces(hoverinfo='label+percent', textinfo='value', textfont_size=30,
                  marker=dict(colors=colors, line=dict(color='black', width=3)))
fig.show()
```



In [23]:
```
calories = data["Day"].value_counts()
label = calories.index
counts = data["Calories"]
colors = ['gold','lightgreen', "pink", "blue", "skyblue", "cyan", "orange"]

fig = go.Figure(data=[go.Pie(labels=label, values=counts)])
fig.update_layout(title_text='Calories Burned Daily')
fig.update_traces(hoverinfo='label+percent', textinfo='value', textfont_size=30,
                  marker=dict(colors=colors, line=dict(color='black', width=3)))
fig.show()
```

Calories Burned Daily



You can find this project on **GitHub.**