1. Import dependencies:

In [ ]:
```
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 sklearn import svm
from sklearn import metrics
from sklearn.metrics import accuracy_score
import pickle
import streamlit as st
import streamlit as st
```

2. Data Collection:

A- Loading data:

In [ ]:
```
data_obesity = pd.read_csv('C:/Machine_learning Python/projets/obesityPrediction
```

B- Head of the data:

In [ ]:
```
data_obesity.head()
```

Out[ ]:

	Age	Gender	Height	Weight	BMI	PhysicalActivityLevel	ObesityCategor
0	56	Male	173.575262	71.982051	23.891783	4	Normal weig
1	69	Male	164.127306	89.959256	33.395209	2	Obes
2	46	Female	168.072202	72.930629	25.817737	4	Overweig
3	32	Male	168.459633	84.886912	29.912247	3	Overweig
4	60	Male	183.568568	69.038945	20.487903	3	Normal weig

C- Number of row and columns:

In [ ]:
```
data_obesity.shape
```

Out[ ]:
```
(1000, 7)
```

D- Information about the data:

In [ ]:
```
data_obesity.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 1000 entries, 0 to 999
Data columns (total 7 columns):
 #   Column                 Non-Null Count  Dtype  
---  ------                 --------------  -----  
 0   Age                    1000 non-null   int64  
 1   Gender                 1000 non-null   object 
 2   Height                 1000 non-null   float64
 3   Weight                 1000 non-null   float64
 4   BMI                    1000 non-null   float64
 5   PhysicalActivityLevel  1000 non-null   int64  
 6   ObesityCategory        1000 non-null   object 
dtypes: float64(3), int64(2), object(2)
memory usage: 54.8+ KB
```

2. Statisctical measures :

A- General statistics:

In [ ]:
```
data_obesity.describe()
```

Out[ ]:

	Age	Height	Weight	BMI	PhysicalActivityLevel
count	1000.000000	1000.000000	1000.000000	1000.000000	1000.000000
mean	49.857000	170.052417	71.205769	24.888317	2.534000
std	18.114267	10.309971	15.509849	6.193912	1.116284
min	18.000000	136.115719	26.065730	8.470572	1.000000
25%	35.000000	163.514205	61.129629	20.918068	2.000000
50%	50.000000	169.801665	71.929072	24.698647	3.000000
75%	66.000000	177.353596	81.133746	28.732132	4.000000
max	79.000000	201.419670	118.907366	50.791898	4.000000

B- Number of missing value:

In [ ]:
```
data_obesity.isnull().sum()
```

Out[ ]:
```
Age                    0
Gender                 0
Height                 0
Weight                 0
BMI                    0
PhysicalActivityLevel  0
ObesityCategory        0
dtype: int64
```

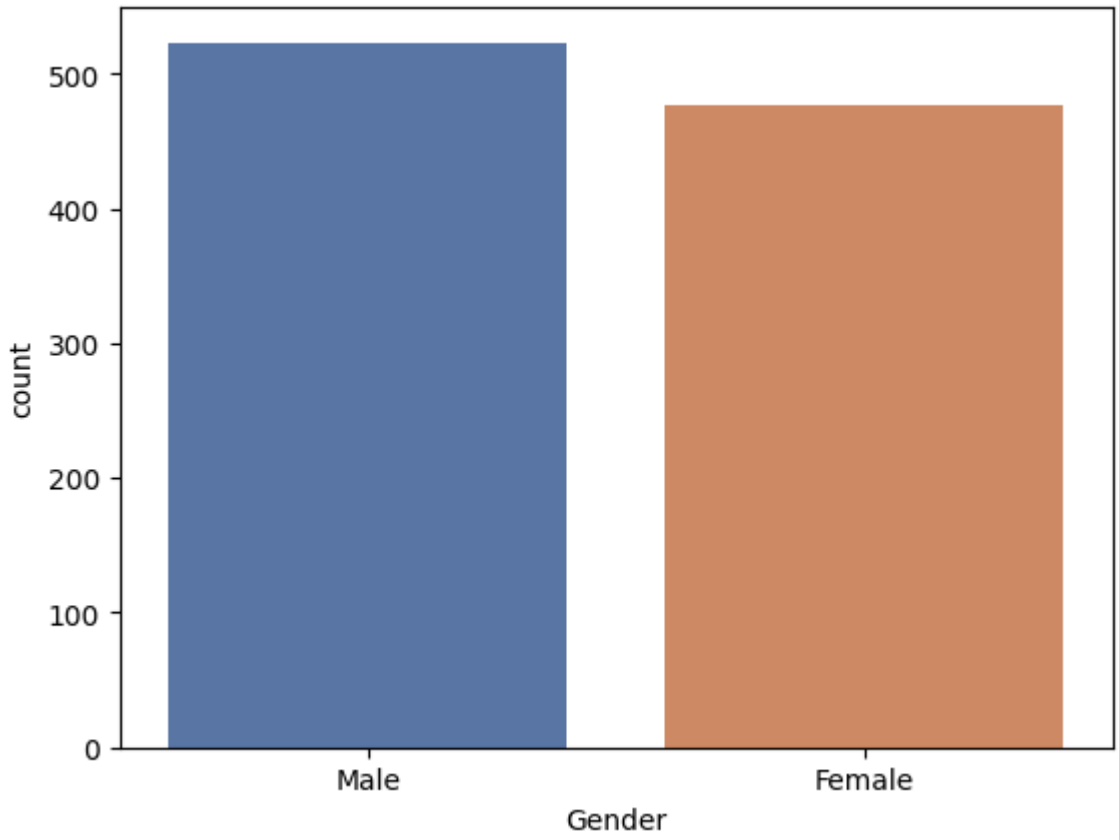
3. Visualisation:

A- The distrubution of the gender columns:

In [ ]:
```
sns.countplot(data= data_obesity , x = 'Gender' , palette= 'deep')
```

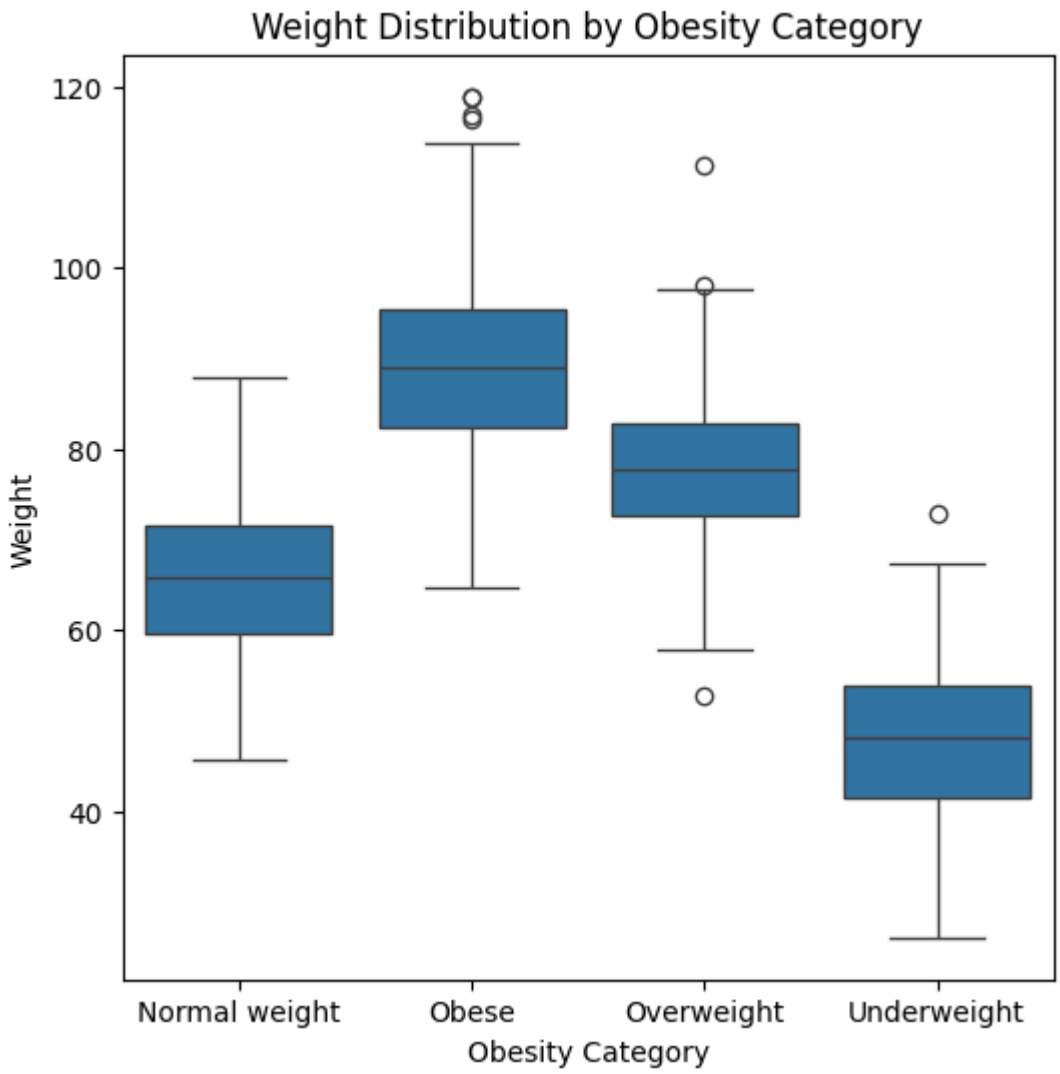
```
C:\Users\HP\AppData\Local\Temp\ipykernel_19220\1994219091.py:1: FutureWarning:

Passing `palette` without assigning `hue` is deprecated and will be removed in v
0.14.0. Assign the `x` variable to `hue` and set `legend=False` for the same effe
ct.

  sns.countplot(data= data_obesity , x = 'Gender' , palette= 'deep')
```

Out[ ]: <Axes: xlabel='Gender', ylabel='count'>



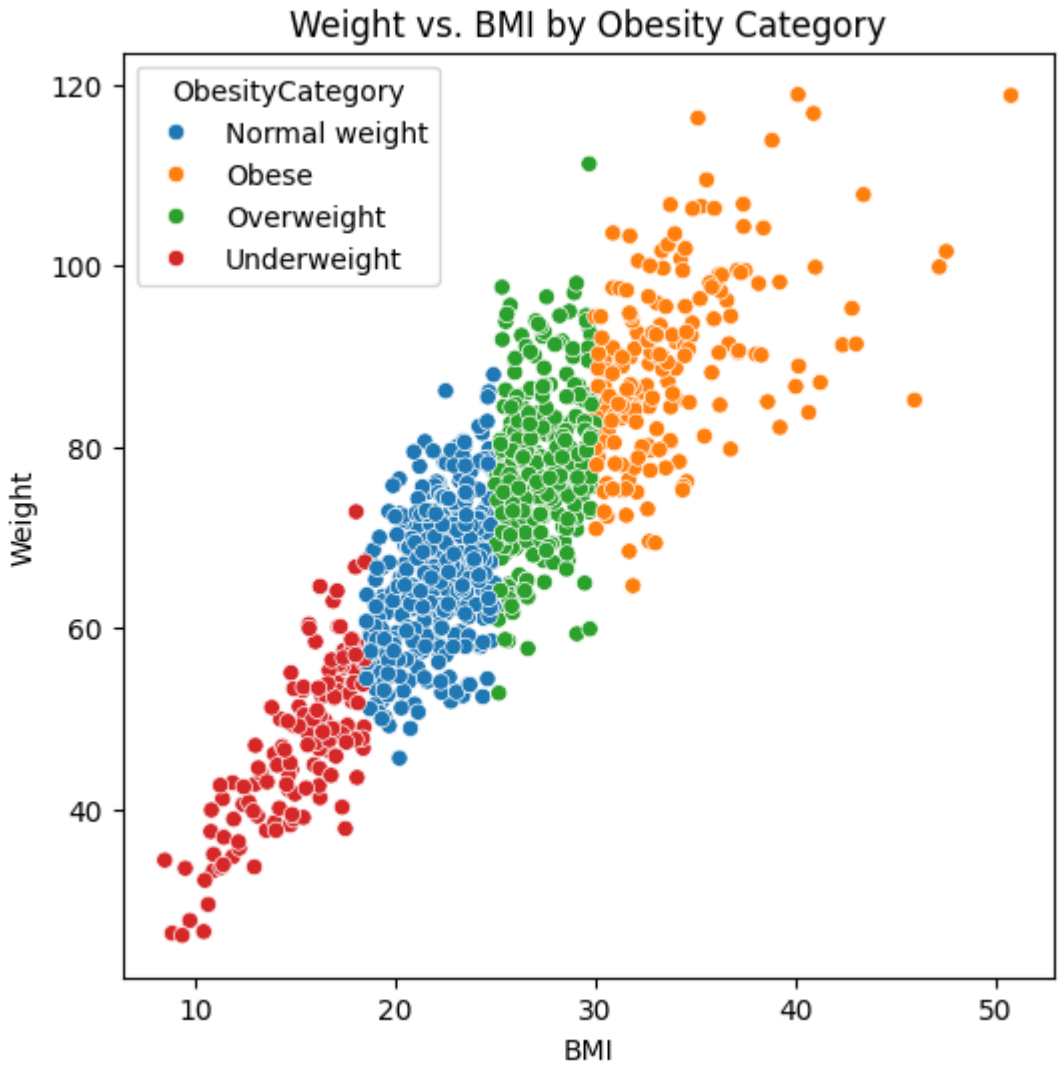
B- Weight Distribution by Obesity Category:

In [ ]:
```
plt.figure(figsize=(6, 6))
sns.boxplot(x='ObesityCategory', y='Weight', data=data_obesity)
plt.title('Weight Distribution by Obesity Category')
plt.xlabel('Obesity Category')
plt.ylabel('Weight')
plt.show()
```



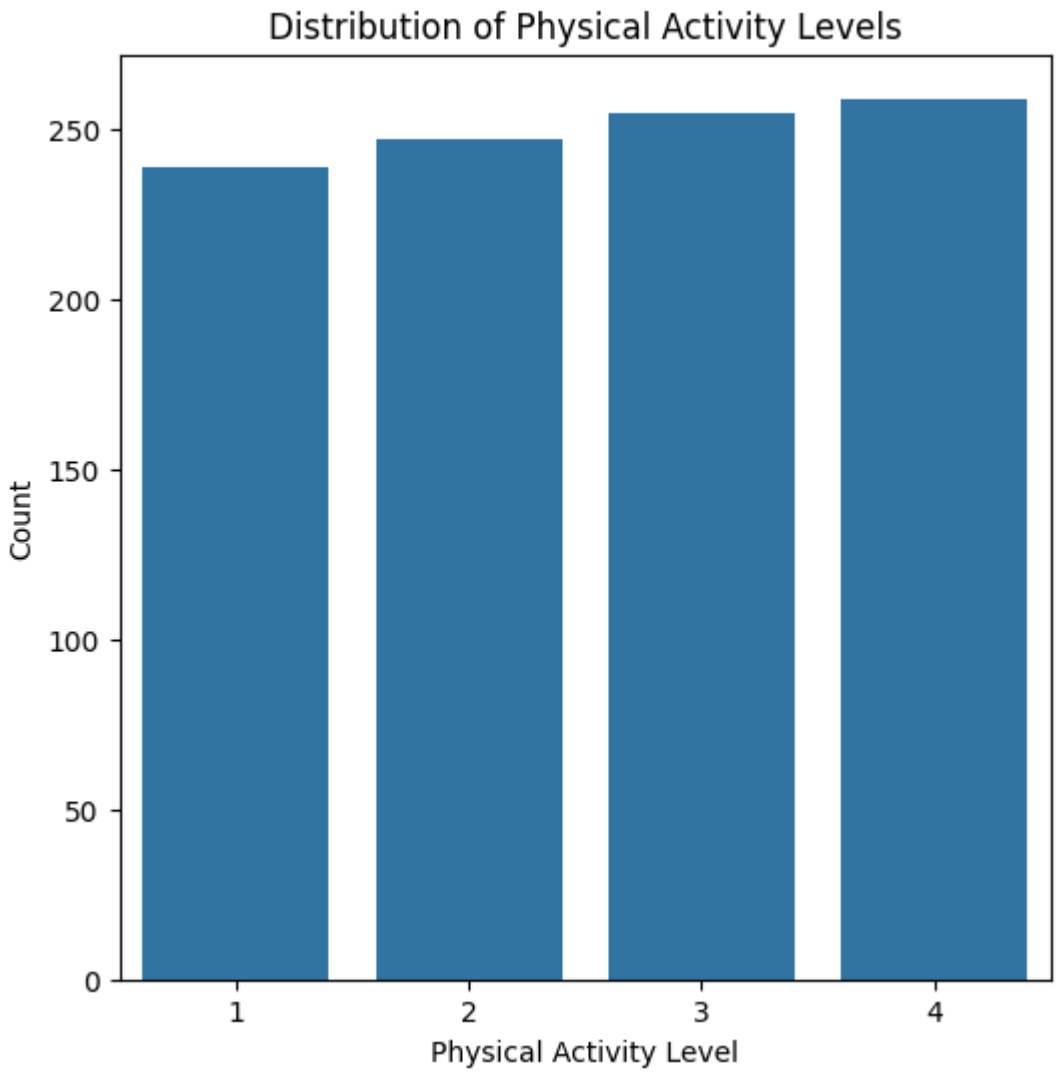
C- Weight Distribution by Obesity Category

In [ ]:
```
plt.figure(figsize=(6, 6))
sns.scatterplot(x='BMI', y='Weight', hue='ObesityCategory', data=data_obesity)
plt.title('Weight vs. BMI by Obesity Category')
plt.xlabel('BMI')
plt.ylabel('Weight')
plt.show()
```



D- Distribution of Physical Activity Levels

In [ ]:
```
plt.figure(figsize=(6, 6))
sns.countplot(x='PhysicalActivityLevel', data=data_obesity)
plt.title('Distribution of Physical Activity Levels')
plt.xlabel('Physical Activity Level')
plt.ylabel('Count')
plt.show()
```



4. Label Encoding:

A- Distribution of categorical data:

In [ ]:
```
print(data_obesity.Gender.value_counts())
print(data_obesity.ObesityCategory.value_counts())
```

```
Gender
Male      523
Female    477
Name: count, dtype: int64
ObesityCategory
Normal weight    371
Overweight       295
Obese            191
Underweight      143
Name: count, dtype: int64
```

B. Encoding the categorical data:

In [ ]:
```
data_obesity.replace({"Gender": {'Male':1,'Female':0 }}, inplace=True)
data_obesity.replace({"ObesityCategory": {'Normal weight':1 ,'Overweight':2 ,'Ob
data_obesity.head()
```

Out[ ]:

	Age	Gender	Height	Weight	BMI	PhysicalActivityLevel	ObesityCategor
0	56	1	173.575262	71.982051	23.891783	4	
1	69	1	164.127306	89.959256	33.395209	2	
2	46	0	168.072202	72.930629	25.817737	4	
3	32	1	168.459633	84.886912	29.912247	3	
4	60	1	183.568568	69.038945	20.487903	3	

In [ ]:
```
print(data_obesity.Gender.value_counts())
print(data_obesity.ObesityCategory.value_counts())
```

```
Gender
1    523
0    477
Name: count, dtype: int64
ObesityCategory
1    371
2    295
3    191
4    143
Name: count, dtype: int64
```

5. Train test split:

A- Separating data & lables:

In [ ]:
```
X = data_obesity.drop(columns= ['ObesityCategory'] , axis= 1)
Y = data_obesity['ObesityCategory']
```

B- Test Split

In [ ]:
```
X_train, X_test, Y_train, Y_test = train_test_split(X, Y, test_size = 0.2, randc
```

In [ ]:
```
print(X.shape,X_train.shape, X_test.shape)
```

```
(1000, 6) (800, 6) (200, 6)
```

6. Training the model (SVM):

A- Creating the model:

In [ ]:
```
model = svm.SVC(kernel= 'linear')
```

B- Training the model:

In [ ]:
```
model.fit(X_train , Y_train)
```

Out[ ]:
```
SVC
SVC(kernel='linear')
```

7. Model Evaluation :

A- Accuracy score of training data:

In [ ]:
```
X_train_prediction = model.predict(X_train)
data_accuracy = accuracy_score(X_train_prediction, Y_train)
print('Accuracy on training data : ', data_accuracy)
```

```
Accuracy on training data :  0.99375
```

B- Accuracy score of testing data:

In [ ]:
```
X_test_prediction = model.predict(X_test)
data_accuracy = accuracy_score(X_test_prediction, Y_test)
print('Accuracy on testing data : ', data_accuracy)
```

```
Accuracy on testing data :  0.975
```

In [ ]:
```
data_obesity.head()
```

Out[ ]:

	Age	Gender	Height	Weight	BMI	PhysicalActivityLevel	ObesityCategor
0	56	1	173.575262	71.982051	23.891783	4	
1	69	1	164.127306	89.959256	33.395209	2	
2	46	0	168.072202	72.930629	25.817737	4	
3	32	1	168.459633	84.886912	29.912247	3	
4	60	1	183.568568	69.038945	20.487903	3	

8. Example:

In [ ]:
```
def  prediction_obesity(Age,Gender,Height,Weight,BMI,PhysicalActivityLevel):
    input_data = (Age,Gender,Height,Weight,BMI,PhysicalActivityLevel)
    #Input the data into the numpy array:
    input_dataNumpuy = np.asarray(input_data)
    #Reshape the data:
    input_dataReshaped = input_dataNumpuy.reshape(1,-1)
    prediction = model.predict(input_dataReshaped)
    return prediction[0]



print("Welcome to our model")
Gender = int(input("Enter your gender (1: male, 0: female): "))
Age = int(input("Enter your age: "))
Height = float(input("Enter your height: "))
Weight = float(input("Enter your weight: "))
```

```
BMI = float(input("Enter the BMI : "))
PhysicalActivityLevel = float(input("Enter your physical activity level : "))

obs = prediction_obesity(Age,Gender,Height,Weight,BMI,PhysicalActivityLevel)
if obs == 1:
    test = 'Normal weight'
elif obs == 2:
    test = 'Overweight'
if obs == 3:
    test = 'Obese'
if obs == 1:
    test = 'Underweight'
print("Your obesity is: ", test)
```

```
Welcome to our model
Your obesity is:  Obese
```

```
c:\Users\HP\AppData\Local\Programs\Python\Python312\Lib\site-packages\sklearn\base.py:465: UserWarning: X does not have valid feature names, but SVC was fitted with feature names
  warnings.warn(
```

9. Deployment:

A- Saving the model:

In [ ]:
```
pickle.dump(model, open('obesity_model.sav','wb'))
```

B- Loading the model:

In [ ]:
```
load_model = pickle.load(open('obesity_model.sav' , 'rb'))
```

C- The main function of the stream:

In [ ]:
```
def main():
    st.title('Obesity Calories Web APP')
    Gender = int(input("Enter your gender (1: male, 0: female): "))
    Age = int(input("Enter your age: "))
    Height = float(input("Enter your height: "))
    Weight = float(input("Enter your weight: "))
    BMI = float(input("Enter the BMI : "))
    PhysicalActivityLevel = float(input("Enter your physical activity level : ")

    test = ''
    if st.button('Calories Test Result'):
        test =  prediction_obesity([Age,Gender,Height,Weight,BMI,PhysicalActivit
        st.success(test)


if (__name__ == '__main__') :
    main()
```

In [ ]:
```
!streamlit run 'C:/Machine_learning Python/projetso/besityPrediction/main.py'
```

```
Usage: streamlit run [OPTIONS] TARGET [ARGS]...
Try 'streamlit run --help' for help.

Error: Streamlit requires raw Python (.py) files, but the provided file has no ex
tension.
For more information, please see https://docs.streamlit.io
```