# Netflix Exploratory Data Analysis

August 10, 2023

## 1 1) Exploratory Data Analysis Netflix

[35]:

```
#importing modules.

import numpy as np
import pandas as pd

#plots

import matplotlib.pyplot as plt
%matplotlib inline
import seaborn as sns

import datetime

#ignore the warnings

import warnings
warnings.filterwarnings('ignore')
```

[2]:

```

```

[3]:

```
#Read the file

df = pd.read_csv('Netflix Userbase.csv')
np.random.seed(0)
```

[4]:

```
print(f'The dataset have {df.shape[0]} rows and {df.shape[1]} columns')
```

```
The dataset have 2500 rows and 10 columns
```

[5]:

```
# Top 2 rows

df.head(2)
```

[5]:

```
   User ID Subscription Type  Monthly Revenue Join Date Last Payment Date  \
0        1             Basic               10  15-01-22          10-06-23
```

```
1        2           Premium               15  05-09-21          22-06-23

        Country  Age  Gender      Device Plan Duration
0  United States   28    Male  Smartphone      1 Month
1         Canada   35  Female      Tablet      1 Month
```

```
[6]: # Last 2 rows

     df.tail(2)
```

```
[6]:       User ID Subscription Type  Monthly Revenue Join Date Last Payment Date  \
     2498     2499          Standard               13  12-08-22          12-07-23
     2499     2500             Basic               15  13-08-22          12-07-23

                 Country  Age  Gender    Device Plan Duration
     2498         Canada   48  Female    Tablet      1 Month
     2499  United States   35  Female  Smart TV      1 Month
```

```
[7]: # we Don't want UserID So,we drop it

     df.drop('User ID',axis = 1,inplace=True)
```

```
[8]: df.head(2)
```

```
[8]:   Subscription Type  Monthly Revenue Join Date Last Payment Date  \
     0             Basic               10  15-01-22          10-06-23
     1           Premium               15  05-09-21          22-06-23

             Country  Age  Gender      Device Plan Duration
     0  United States   28    Male  Smartphone      1 Month
     1         Canada   35  Female      Tablet      1 Month
```

```
[9]: df.dtypes
```

```
[9]: Subscription Type    object
     Monthly Revenue       int64
     Join Date            object
     Last Payment Date    object
     Country              object
     Age                   int64
     Gender               object
     Device               object
     Plan Duration        object
     dtype: object
```

```
[10]: df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 2500 entries, 0 to 2499
Data columns (total 9 columns):
 #   Column             Non-Null Count  Dtype
---  ------             --------------  -----
 0   Subscription Type  2500 non-null   object
 1   Monthly Revenue    2500 non-null   int64
 2   Join Date          2500 non-null   object
 3   Last Payment Date  2500 non-null   object
 4   Country            2500 non-null   object
 5   Age                2500 non-null   int64
 6   Gender             2500 non-null   object
 7   Device             2500 non-null   object
 8   Plan Duration      2500 non-null   object
dtypes: int64(2), object(7)
memory usage: 175.9+ KB
```

[11]:

```
df.describe().transpose()
```

[11]:

```
                  count     mean       std   min   25%   50%   75%   max
Monthly Revenue  2500.0  12.5084  1.686851  10.0  11.0  12.0  14.0  15.0
Age              2500.0  38.7956  7.171778  26.0  32.0  39.0  45.0  51.0
```

[12]:

```
#Check if dataset have any na's.

df.isnull().sum()
```

[12]:

```
Subscription Type    0
Monthly Revenue      0
Join Date            0
Last Payment Date    0
Country              0
Age                  0
Gender               0
Device               0
Plan Duration        0
dtype: int64
```

- There is no null values in the dataset

[13]:

```
# Check the duplicate values.

duplicates = df[df.duplicated()]
if duplicates.empty:
    print("No Duplicates found")
else:
    print('Duplicates Found')
    print(duplicates)
```

```
No Duplicates found
```

[14]:
```
#Changing dates in the datetime format

df['Join Date'] = pd.to_datetime(df['Join Date'])

df['Last Payment Date'] = pd.to_datetime(df['Last Payment Date'])

# handling the datetime features

df['Join Year'] = df['Join Date'].dt.year
df['Join Month'] = df['Join Date'].dt.month
df['Last Payment Year'] = df['Last Payment Date'].dt.year
df['Last Payment Month'] = df['Last Payment Date'].dt.month
df['Account till'] = (pd.to_datetime('today') - df['Join Date']).dt.days
```

[15]:
```
df.head()
```

[15]:
```
  Subscription Type  Monthly Revenue  Join Date Last Payment Date  \
0             Basic               10 2022-01-15        2023-10-06
1           Premium               15 2021-05-09        2023-06-22
2          Standard               12 2023-02-28        2023-06-27
3          Standard               12 2022-10-07        2023-06-26
4             Basic               10 2023-01-05        2023-06-28

          Country  Age  Gender      Device Plan Duration  Join Year  \
0   United States   28    Male  Smartphone       1 Month       2022
1          Canada   35  Female      Tablet       1 Month       2021
2  United Kingdom   42    Male    Smart TV       1 Month       2023
3       Australia   51  Female      Laptop       1 Month       2022
4         Germany   33    Male  Smartphone       1 Month       2023

   Join Month  Last Payment Year  Last Payment Month  Account till
0           1               2023                  10           572
1           5               2023                   6           823
2           2               2023                   6           163
3          10               2023                   6           307
4           1               2023                   6           217
```

[16]:
```
df.rename(columns={'Plan Duration':'Plan Duration(months)'},inplace=True)

for i in range(len(df)):
    df['Plan Duration(months)'] = df['Plan Duration(months)'][i][0]
```

[17]:
```
df.head()
```

[17]:

```
  Subscription Type  Monthly Revenue  Join Date Last Payment Date  \
0             Basic               10 2022-01-15        2023-10-06
1           Premium               15 2021-05-09        2023-06-22
2          Standard               12 2023-02-28        2023-06-27
3          Standard               12 2022-10-07        2023-06-26
4             Basic               10 2023-01-05        2023-06-28

          Country  Age  Gender      Device Plan Duration(months)  Join Year  \
0   United States   28    Male  Smartphone                     1       2022
1          Canada   35  Female      Tablet                     1       2021
2  United Kingdom   42    Male    Smart TV                     1       2023
3       Australia   51  Female      Laptop                     1       2022
4         Germany   33    Male  Smartphone                     1       2023

   Join Month  Last Payment Year  Last Payment Month  Account till
0           1               2023                  10           572
1           5               2023                   6           823
2           2               2023                   6           163
3          10               2023                   6           307
4           1               2023                   6           217
```

[ ]:

[18]:

```
# Adding new columns are filled with dummy values based on previous features

# Feature encoding

subsciption_type_en = pd.get_dummies(df['Subscription Type'],prefix=␣
 ↪'Subsciption type')
#print(subsciption_type_en)
df = pd.concat([df,subsciption_type_en],axis = 1)

country_en = pd.get_dummies(df['Country'],prefix='Country type')
df = pd.concat([df,country_en],axis = 1)

gender_en = pd.get_dummies(df['Gender'],prefix='Gender type')
df = pd.concat([df,gender_en],axis = 1)

device_en = pd.get_dummies(df['Device'],prefix='Device type')
df = pd.concat([df,device_en],axis = 1)

# feature transform

df['Age Bins'] = pd.cut(df['Age'],bins = [0,18,28,38,48,58,100],
                        labels=['<18','18-27','28-37','38-47','48-57','58+'])
```

[19]:

```
df.head()
```

[19]:

```
  Subscription Type  Monthly Revenue  Join Date Last Payment Date  \
0             Basic               10 2022-01-15        2023-10-06
1           Premium               15 2021-05-09        2023-06-22
2          Standard               12 2023-02-28        2023-06-27
3          Standard               12 2022-10-07        2023-06-26
4             Basic               10 2023-01-05        2023-06-28

         Country  Age  Gender      Device Plan Duration(months)  Join Year  \
0  United States   28    Male  Smartphone                     1       2022
1         Canada   35  Female      Tablet                     1       2021
2 United Kingdom   42    Male    Smart TV                     1       2023
3      Australia   51  Female      Laptop                     1       2022
4        Germany   33    Male  Smartphone                     1       2023

   …  Country type_Spain  Country type_United Kingdom  \
0  …                   0                            0
1  …                   0                            0
2  …                   0                            1
3  …                   0                            0
4  …                   0                            0

   Country type_United States  Gender type_Female  Gender type_Male  \
0                           1                   0                 1
1                           0                   1                 0
2                           0                   0                 1
3                           0                   1                 0
4                           0                   0                 1

   Device type_Laptop  Device type_Smart TV  Device type_Smartphone  \
0                   0                     0                       1
1                   0                     0                       0
2                   0                     1                       0
3                   1                     0                       0
4                   0                     0                       1

   Device type_Tablet  Age Bins
0                   0     18-27
1                   1     28-37
2                   0     38-47
3                   0     48-57
4                   0     28-37

[5 rows x 34 columns]
```

[20]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
```

```
RangeIndex: 2500 entries, 0 to 2499
Data columns (total 34 columns):
 #   Column                        Non-Null Count  Dtype
---  ------                        --------------  -----
 0   Subscription Type             2500 non-null   object
 1   Monthly Revenue               2500 non-null   int64
 2   Join Date                     2500 non-null   datetime64[ns]
 3   Last Payment Date             2500 non-null   datetime64[ns]
 4   Country                       2500 non-null   object
 5   Age                           2500 non-null   int64
 6   Gender                        2500 non-null   object
 7   Device                        2500 non-null   object
 8   Plan Duration(months)         2500 non-null   object
 9   Join Year                     2500 non-null   int64
 10  Join Month                    2500 non-null   int64
 11  Last Payment Year             2500 non-null   int64
 12  Last Payment Month            2500 non-null   int64
 13  Account till                  2500 non-null   int64
 14  Subsciption type_Basic        2500 non-null   uint8
 15  Subsciption type_Premium      2500 non-null   uint8
 16  Subsciption type_Standard     2500 non-null   uint8
 17  Country type_Australia        2500 non-null   uint8
 18  Country type_Brazil           2500 non-null   uint8
 19  Country type_Canada           2500 non-null   uint8
 20  Country type_France           2500 non-null   uint8
 21  Country type_Germany          2500 non-null   uint8
 22  Country type_Italy            2500 non-null   uint8
 23  Country type_Mexico           2500 non-null   uint8
 24  Country type_Spain            2500 non-null   uint8
 25  Country type_United Kingdom   2500 non-null   uint8
 26  Country type_United States    2500 non-null   uint8
 27  Gender type_Female            2500 non-null   uint8
 28  Gender type_Male              2500 non-null   uint8
 29  Device type_Laptop            2500 non-null   uint8
 30  Device type_Smart TV          2500 non-null   uint8
 31  Device type_Smartphone        2500 non-null   uint8
 32  Device type_Tablet            2500 non-null   uint8
 33  Age Bins                      2500 non-null   category
dtypes: category(1), datetime64[ns](2), int64(7), object(5), uint8(19)
memory usage: 322.6+ KB
```

[ ]:

```
```

[21]:

```
df.describe().transpose()
```

[21]:

```
                              count     mean       std   min   25%  \
Monthly Revenue              2500.0  12.5084  1.686851  10.0  11.0
```

```
Age                          2500.0    38.7956   7.171778    26.0    32.0
Join Year                    2500.0  2022.0096   0.143931  2021.0  2022.0
Join Month                   2500.0     7.3232   2.712653     1.0     6.0
Last Payment Year            2500.0  2023.0000   0.000000  2023.0  2023.0
Last Payment Month           2500.0     6.2332   2.645150     1.0     5.0
Account till                 2500.0   375.6620  94.007452  -113.0   305.0
Subsciption type_Basic       2500.0     0.3996   0.489914     0.0     0.0
Subsciption type_Premium     2500.0     0.2932   0.455320     0.0     0.0
Subsciption type_Standard    2500.0     0.3072   0.461425     0.0     0.0
Country type_Australia       2500.0     0.0732   0.260517     0.0     0.0
Country type_Brazil          2500.0     0.0732   0.260517     0.0     0.0
Country type_Canada          2500.0     0.1268   0.332815     0.0     0.0
Country type_France          2500.0     0.0732   0.260517     0.0     0.0
Country type_Germany         2500.0     0.0732   0.260517     0.0     0.0
Country type_Italy           2500.0     0.0732   0.260517     0.0     0.0
Country type_Mexico          2500.0     0.0732   0.260517     0.0     0.0
Country type_Spain           2500.0     0.1804   0.384597     0.0     0.0
Country type_United Kingdom  2500.0     0.0732   0.260517     0.0     0.0
Country type_United States   2500.0     0.1804   0.384597     0.0     0.0
Gender type_Female           2500.0     0.5028   0.500092     0.0     0.0
Gender type_Male             2500.0     0.4972   0.500092     0.0     0.0
Device type_Laptop           2500.0     0.2544   0.435611     0.0     0.0
Device type_Smart TV         2500.0     0.2440   0.429579     0.0     0.0
Device type_Smartphone       2500.0     0.2484   0.432171     0.0     0.0
Device type_Tablet           2500.0     0.2532   0.434932     0.0     0.0

                                50%     75%     max
Monthly Revenue                12.0    14.0    15.0
Age                            39.0    45.0    51.0
Join Year                    2022.0  2022.0  2023.0
Join Month                      7.0    10.0    12.0
Last Payment Year            2023.0  2023.0  2023.0
Last Payment Month              6.0     8.0    12.0
Account till                  368.0   421.0   823.0
Subsciption type_Basic          0.0     1.0     1.0
Subsciption type_Premium        0.0     1.0     1.0
Subsciption type_Standard       0.0     1.0     1.0
Country type_Australia          0.0     0.0     1.0
Country type_Brazil             0.0     0.0     1.0
Country type_Canada             0.0     0.0     1.0
Country type_France             0.0     0.0     1.0
Country type_Germany            0.0     0.0     1.0
Country type_Italy              0.0     0.0     1.0
Country type_Mexico             0.0     0.0     1.0
Country type_Spain              0.0     0.0     1.0
Country type_United Kingdom     0.0     0.0     1.0
Country type_United States      0.0     0.0     1.0
```

```
Gender type_Female              1.0     1.0     1.0
Gender type_Male                0.0     1.0     1.0
Device type_Laptop              0.0     1.0     1.0
Device type_Smart TV            0.0     0.0     1.0
Device type_Smartphone          0.0     0.0     1.0
Device type_Tablet              0.0     1.0     1.0
```

[ ]:

```

```

[22]:

```
df.head()
```

[22]:

```
  Subscription Type  Monthly Revenue  Join Date Last Payment Date  \
0             Basic               10 2022-01-15        2023-10-06
1           Premium               15 2021-05-09        2023-06-22
2          Standard               12 2023-02-28        2023-06-27
3          Standard               12 2022-10-07        2023-06-26
4             Basic               10 2023-01-05        2023-06-28

          Country  Age  Gender      Device Plan Duration(months)  Join Year  \
0   United States   28    Male  Smartphone                     1       2022
1          Canada   35  Female      Tablet                     1       2021
2  United Kingdom   42    Male    Smart TV                     1       2023
3       Australia   51  Female      Laptop                     1       2022
4         Germany   33    Male  Smartphone                     1       2023

   …  Country type_Spain  Country type_United Kingdom  \
0  …                   0                            0
1  …                   0                            0
2  …                   0                            1
3  …                   0                            0
4  …                   0                            0

   Country type_United States  Gender type_Female  Gender type_Male  \
0                           1                   0                 1
1                           0                   1                 0
2                           0                   0                 1
3                           0                   1                 0
4                           0                   0                 1

   Device type_Laptop  Device type_Smart TV  Device type_Smartphone  \
0                   0                     0                       1
1                   0                     0                       0
2                   0                     1                       0
3                   1                     0                       0
4                   0                     0                       1

   Device type_Tablet  Age Bins
```

```
0                    0     18-27
1                    1     28-37
2                    0     38-47
3                    0     48-57
4                    0     28-37

[5 rows x 34 columns]
```

[ ]:

```

```

[23]:

```
df.shape
```

[23]:

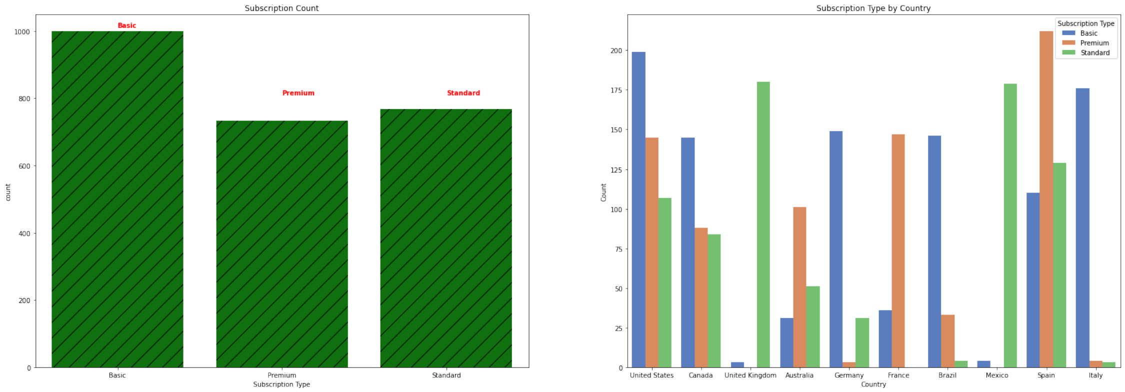
```
(2500, 34)
```

[ ]:

```

```

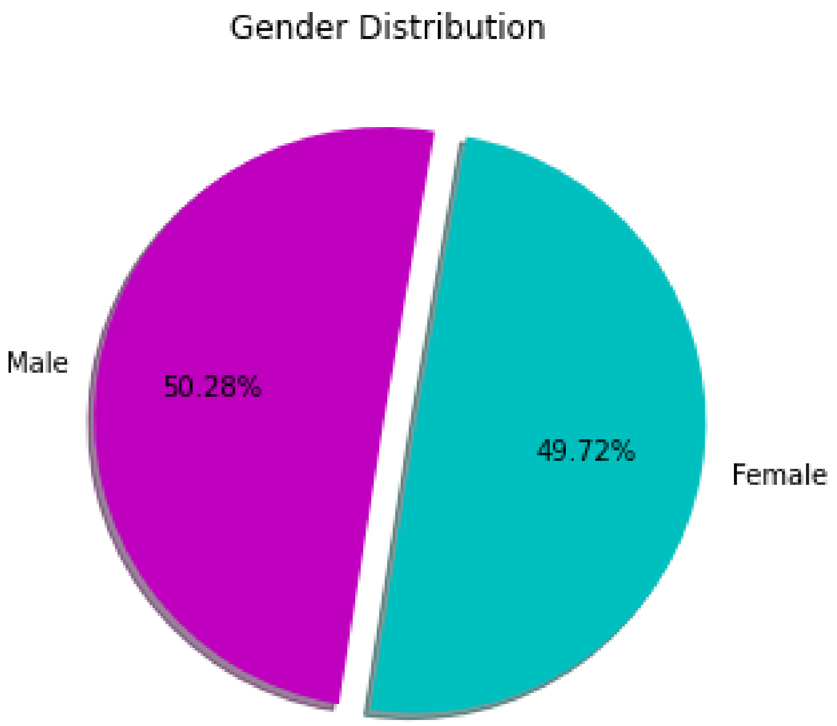
[24]:

```
# Check if which subscription is higher and subscription type.

plt.figure(figsize=(30,10))
plt.subplot(1,2,1)
plt.title("Subscription Count")
sns.countplot(x = 'Subscription Type',
             data = df,
             color = 'green',hatch = '/')

#apply text on plots

plt.text(0,1010,'Basic',fontsize = 10, fontweight = 'bold',color = 'red')
plt.text(1,810,'Premium',fontsize = 10, fontweight = 'bold',color = 'red')
plt.text(2,810,'Standard',fontsize = 10, fontweight = 'bold',color = 'red')

plt.subplot(1,2,2)
sns.countplot(data = df,x = 'Country',
             hue = 'Subscription Type',
             palette='muted')

plt.title('Subscription Type by Country')
plt.xlabel('Country')
plt.ylabel('Count')
plt.legend(title = 'Subscription Type')
plt.show()
```



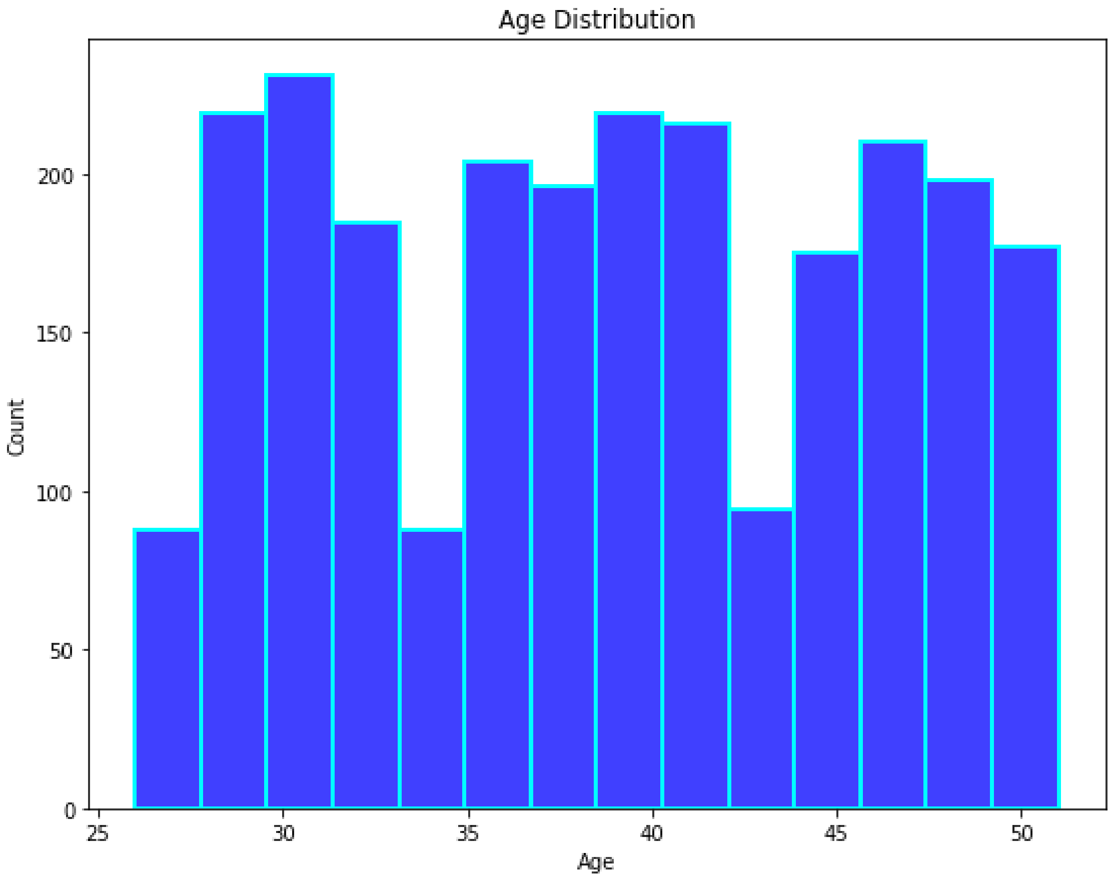
```
[ ]:
```

```
[25]: # Gender Distribution

plt.figure(figsize=(10,5))
gender = df.Gender.value_counts()
index = ['Male','Female']
color = ['m','c']
exp = [0.01,0.1]
values = gender.values.tolist()

plt.pie(values,
       labels=index,
       autopct='%.2f%%',
       colors=color,
       explode = exp,
       shadow=True,
       startangle=80)
plt.title("Gender Distribution")

plt.show()
```

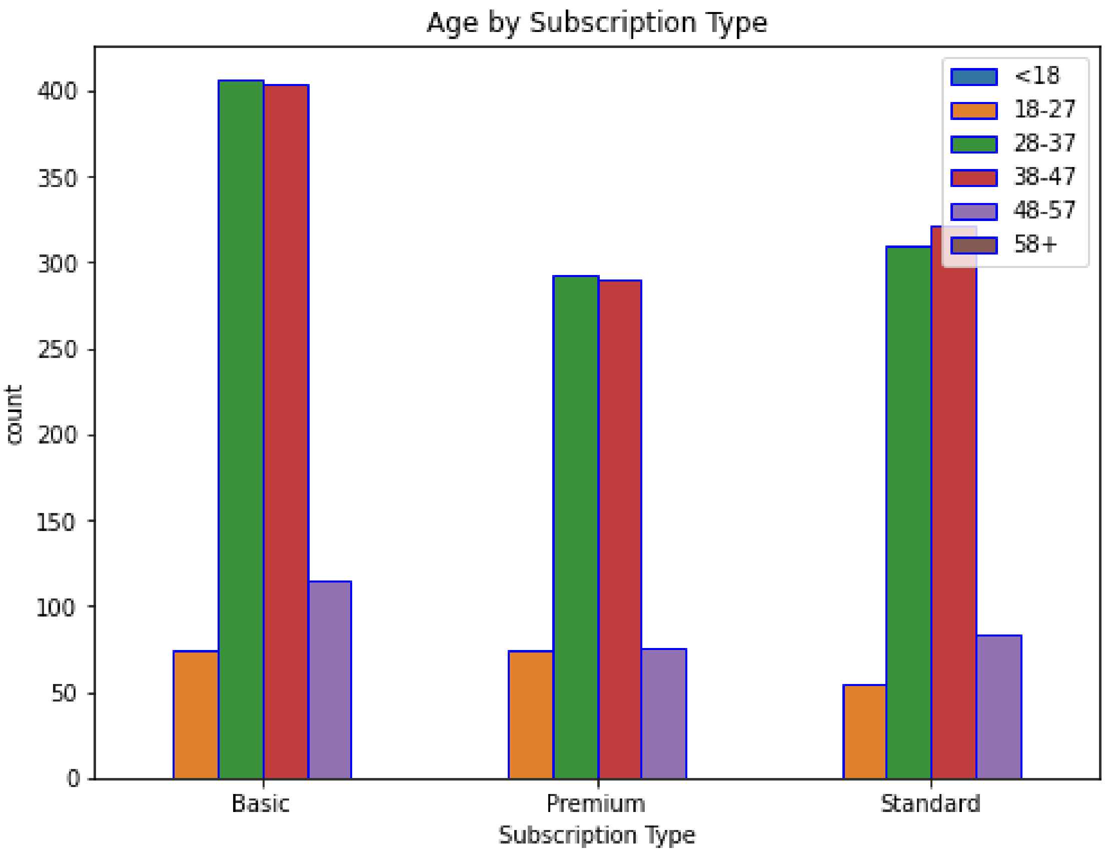


**# Age Distribution**

[26]:
```
plt.figure(figsize=(9,7))
sns.histplot(data = df,
             x = 'Age',
             stat = 'count',
             color = 'b',
             edgecolor = 'cyan',
             lw = 2)

plt.title("Age Distribution")
plt.show()
```



```
[27]: plt.figure(figsize=(8,6))
      sns.countplot(x = 'Subscription Type',
                   data = df,
                   hue = 'Age Bins',
                   edgecolor = 'blue',
                   lw = 1)

      plt.title('Age by Subscription Type')
      plt.legend(loc = 'upper right')
      plt.show()
```

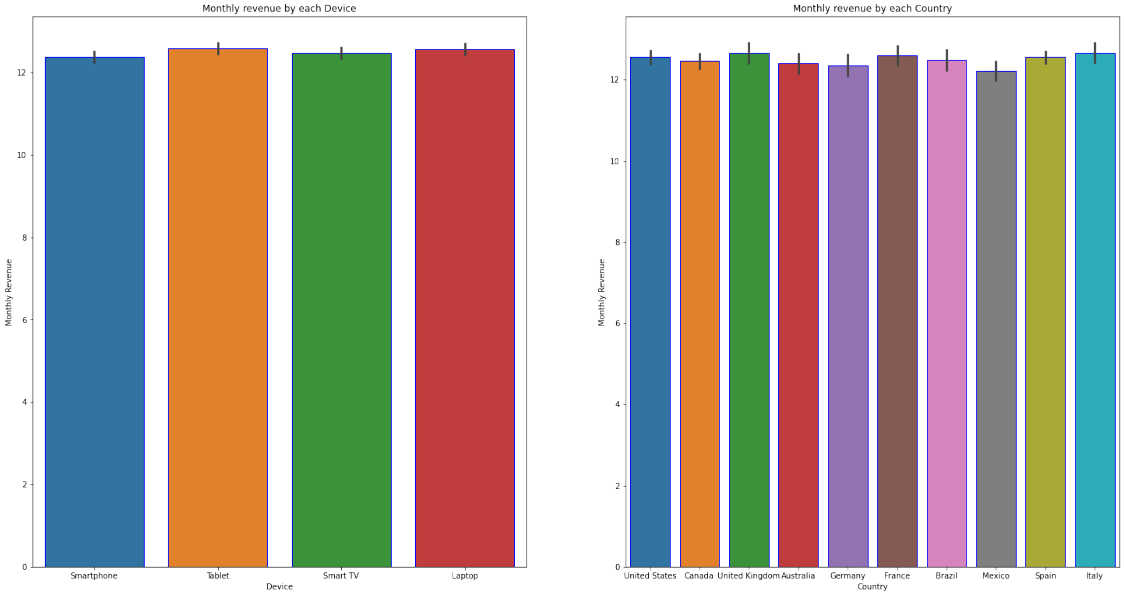


[ ]:

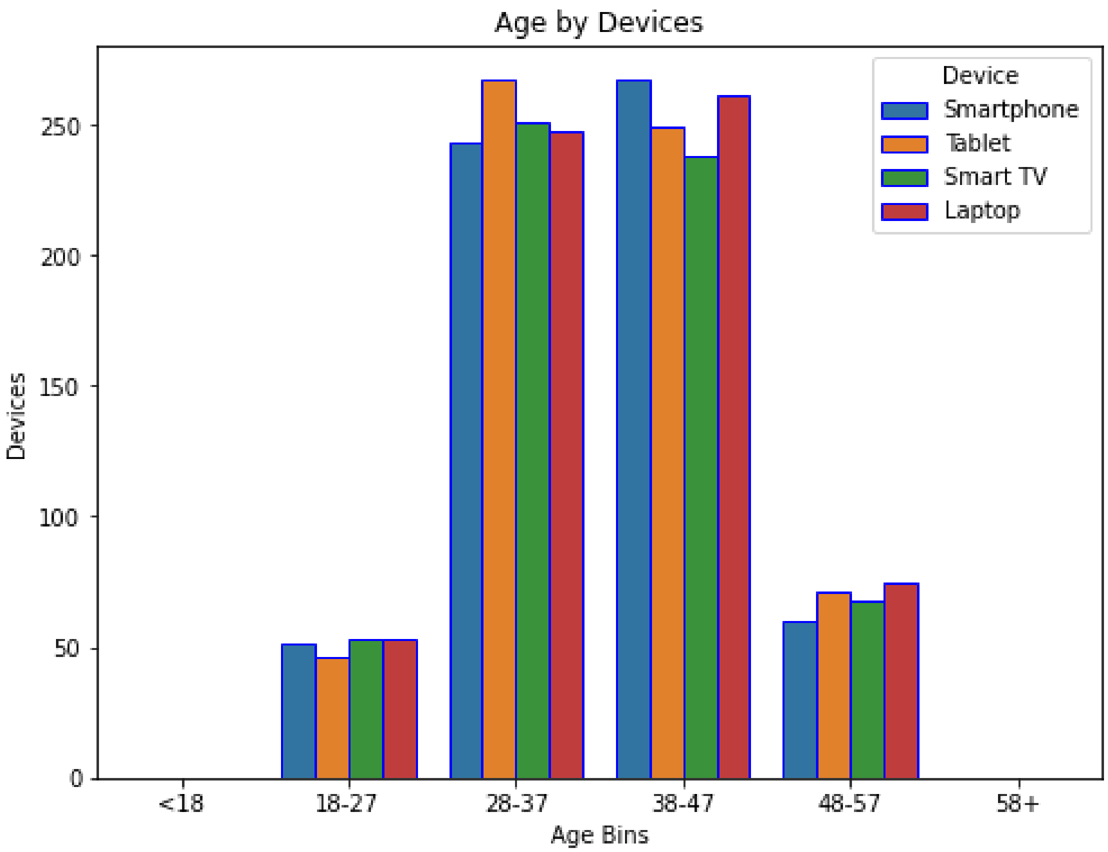
[28]:

```
# Monthly revenue by each devices and each country.

plt.figure(figsize=(25,13))
plt.subplot(1,2,1)

#device by revenue
sns.barplot(x = 'Device',
            y= 'Monthly Revenue',
            data = df,
            edgecolor = 'blue')
plt.title("Monthly revenue by each Device")

#Country by revenue
plt.subplot(1,2,2)
sns.barplot(x = 'Country',
            y = 'Monthly Revenue',
            data = df,
            edgecolor = 'blue')
```

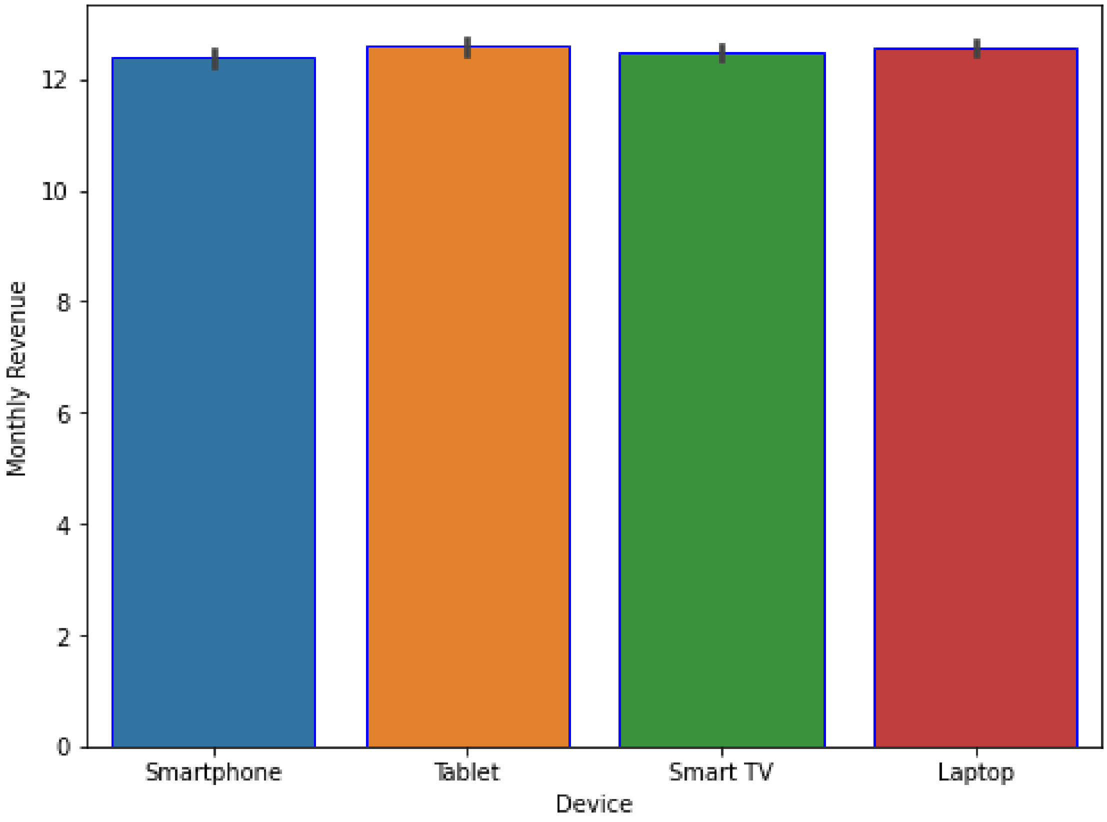
```
plt.title("Monthly revenue by each Country")
plt.show()
```



[29]:
```
# what age peoples using which devices.
plt.figure(figsize=(8,6))
sns.countplot(x = 'Age Bins',
             hue = 'Device',
             data = df,
             edgecolor = 'blue',
             lw = 1)
plt.title('Age by Devices')
plt.ylabel('Devices')
plt.show()
```

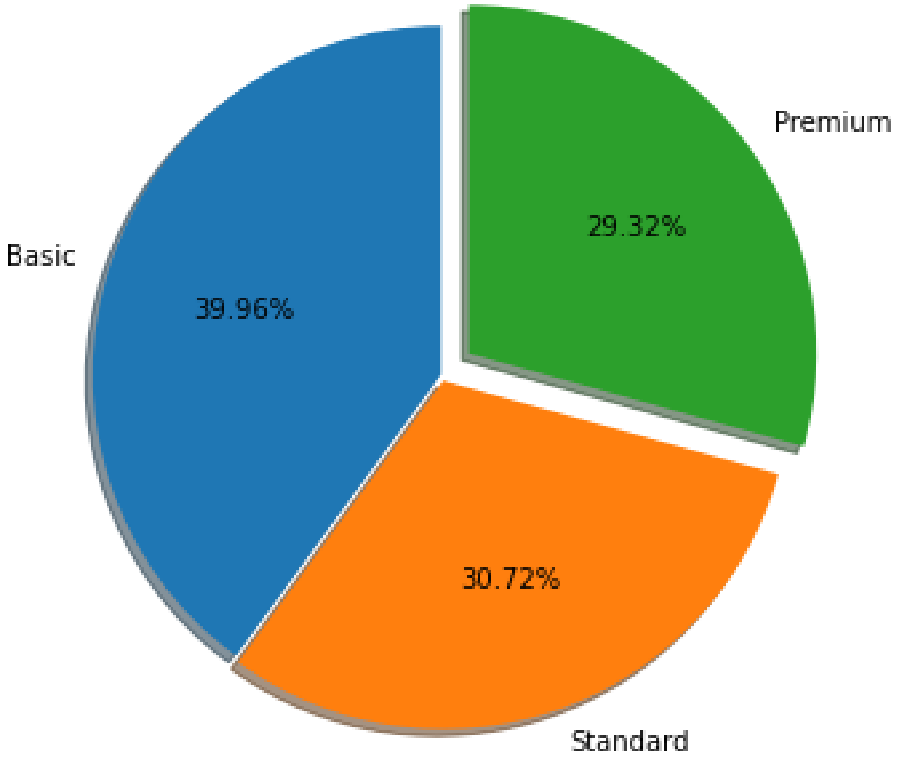


```
[30]: # Monthly revenue by devices
      plt.figure(figsize=(8,6))
      sns.barplot(x = 'Device',
                  y = 'Monthly Revenue',
                  data = df,
                  edgecolor = 'blue')
      plt.show()
```



[31]:

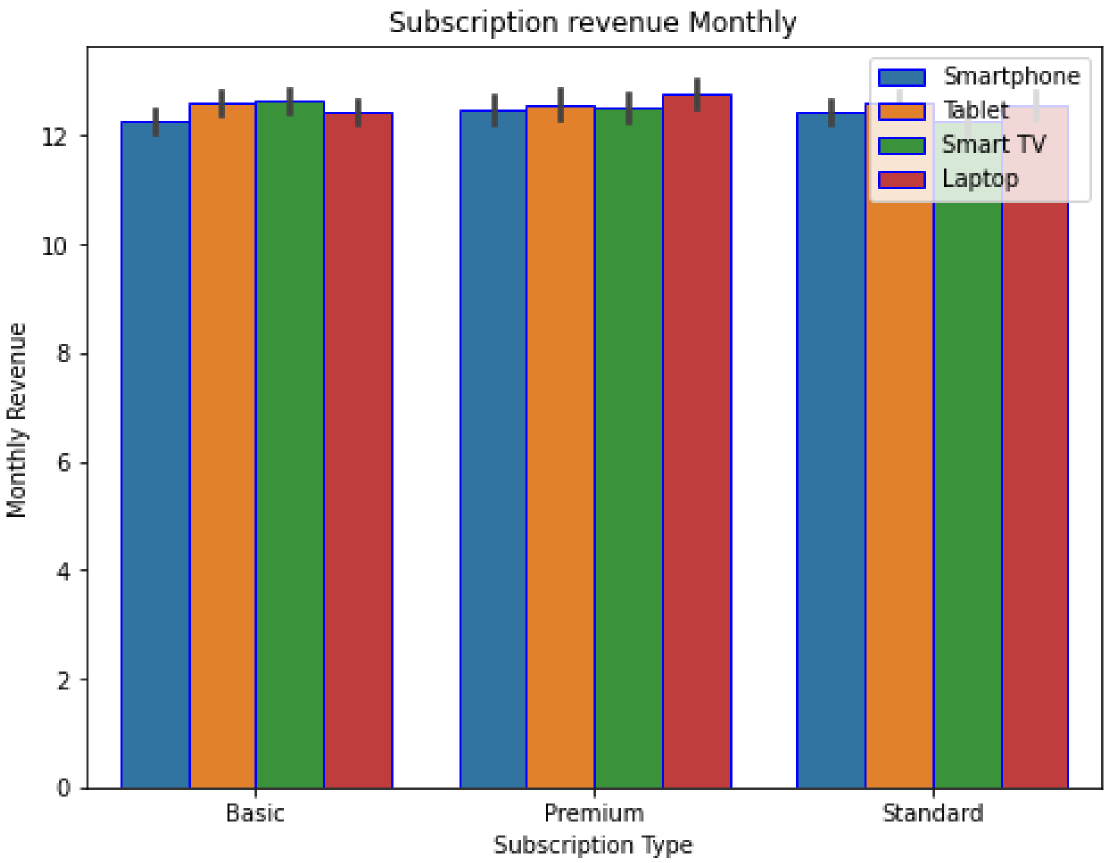
```
# Percentage of subscription

x = df['Subscription Type'].value_counts(ascending = False)
index = [i for i in x.index]
var = [0,0.02,0.1]
plt.figure(figsize=(8,6))
plt.pie(x.values,
       labels=index,
       autopct='%.2f%%',
       explode = var,
       shadow = True,
       startangle=90)

plt.show()
```



[ ]:

[32]:

```
# Subscription revenue every month
plt.figure(figsize=(8,6))
sns.barplot(x = 'Subscription Type',
           y = 'Monthly Revenue',
           hue = 'Device',
           data = df,
           edgecolor = 'blue',
           lw = 1)
plt.legend(loc = 'upper right')
plt.title('Subscription revenue Monthly')
plt.show()
```



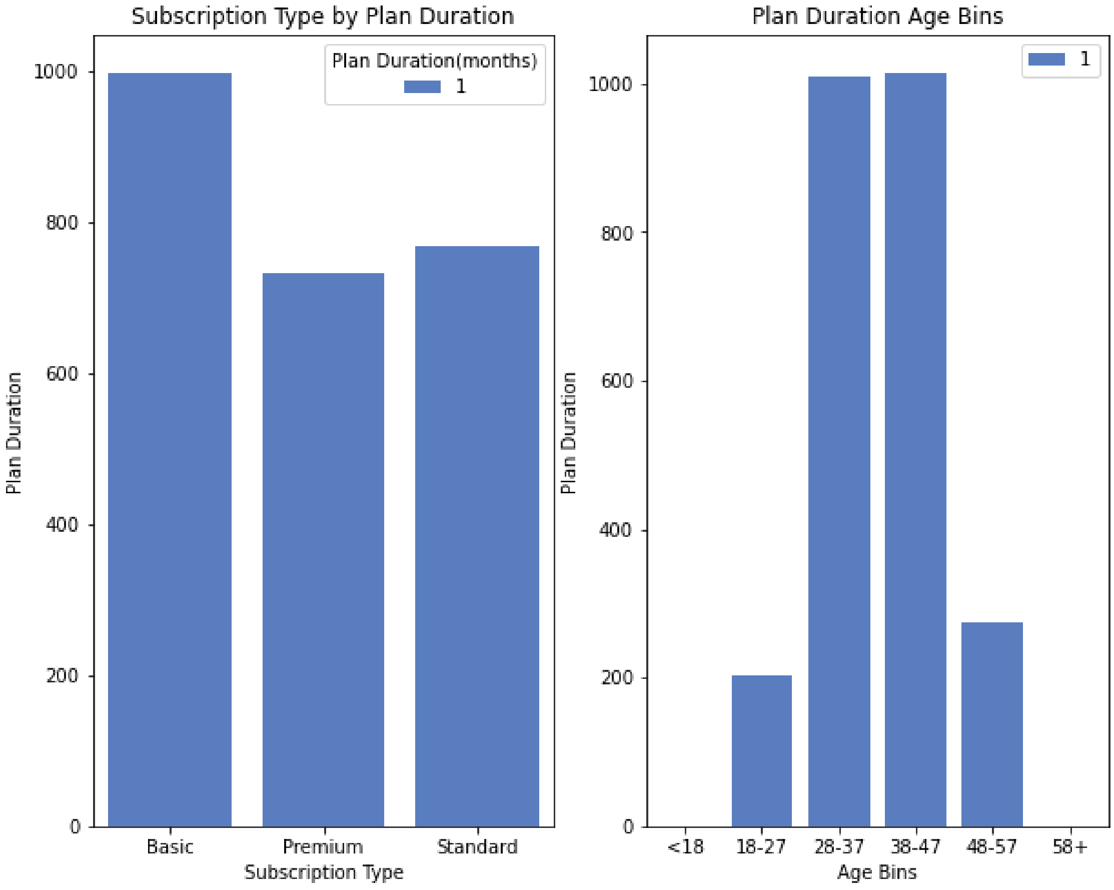
[ ]:

```
```

[33]:

```
# Subscription type by plan duration

plt.figure(figsize=(10,8))
plt.subplot(1,2,1)
sns.countplot(data = df,
             x = 'Subscription Type',
             hue = 'Plan Duration(months)',
             palette='muted')
plt.title('Subscription Type by Plan Duration')
plt.ylabel('Plan Duration')

#plan duration of ages

plt.subplot(1,2,2)
sns.countplot(data = df,
             x = 'Age Bins',
             hue = 'Plan Duration(months)',
             palette='muted')
```

```
plt.legend(loc = 'upper right')
plt.title('Plan Duration Age Bins')
plt.ylabel('Plan Duration')

plt.show()
```

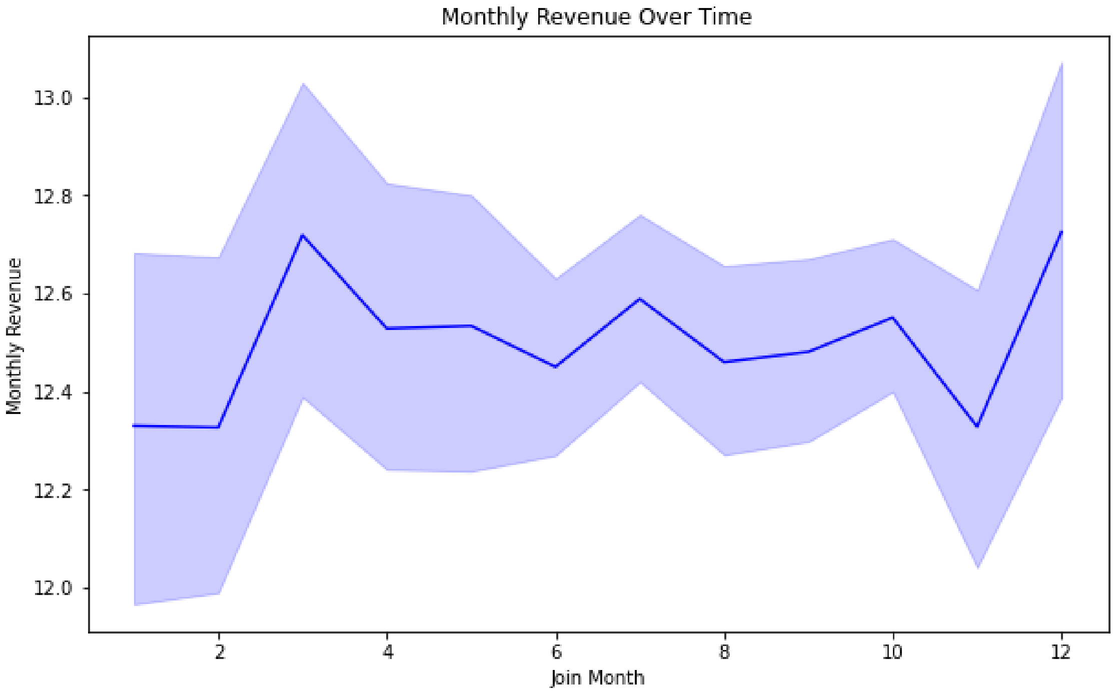


[ ]:

```

```

[34]:

```
#Monthly revenue

plt.figure(figsize=(10,6))
sns.lineplot(x = 'Join Month',
             y = 'Monthly Revenue',
             data = df,
             estimator='mean',
             color = 'blue')
plt.title('Monthly Revenue Over Time')
plt.show()
```


Monthly Revenue Over Time
Monthly Revenue
13.0
12.8
12.6
12.4
12.2
12.0
2
4
6
8
10
12
Join Month

```
[ ]:
```

## 2 Thank you

```
[ ]:
```