Black Friday Dataset

This dataset has been downloaded from kaggle for the purpose of exploratory data analysis and feature engineering. The data will be cleaned first and then will be prepared for model training

In [3]:
```
## dataset link: https://www.kaggle.com/sdolezel/black-friday?select=train.csv
import pandas as pd
import numpy as np
import matplotlib.pyplot as plt
import seaborn as sns
%matplotlib inline
```

Problem Statement

For understanding the purchase behavior of customers against various products of different categories, A company has shared the purchase summary of various customers for selected high volume products from last month. The data set also contains customer demographics (age, gender, marital status, city_type, stay_in_current_city), product details (product_id and product category) and Total purchase_amount from last month.

Now, they want to build a model to predict the purchase amount of customer against various products which will help them to create personalized offer for customers against different products.

In [2]:
```
#importing the train dataset
df_train=pd.read_csv('blackFriday_train.csv')
df_train.head()
```

Out[2]:

	User_ID	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Categ
0	1000001	P00069042	F	0-17	10	A	2	0	3	
1	1000001	P00248942	F	0-17	10	A	2	0	1	
2	1000001	P00087842	F	0-17	10	A	2	0	12	
3	1000001	P00085442	F	0-17	10	A	2	0	12	
4	1000002	P00285442	M	55+	16	C	4+	0	8	

In [4]:
```
##importing the test data
df_test=pd.read_csv('blackFriday_test.csv')
df_test.head()
```

Out[4]:

	User_ID	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Categ
0	1000004	P00128942	M	46-50	7	B	2	1	1	
1	1000009	P00113442	M	26-35	17	C	0	0	3	
2	1000010	P00288442	F	36-45	1	B	4+	1	5	
3	1000010	P00145342	F	36-45	1	B	4+	1	4	
4	1000011	P00053842	F	26-35	1	C	1	0	4	

In [5]:
```
##Merging both train and test data
df=df_train.append(df_test)
df.head()
```

Out[5]:

	User_ID	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Categ
0	1000001	P00069042	F	0-17	10	A	2	0	3	
1	1000001	P00248942	F	0-17	10	A	2	0	1	
2	1000001	P00087842	F	0-17	10	A	2	0	12	
3	1000001	P00085442	F	0-17	10	A	2	0	12	
4	1000002	P00285442	M	55+	16	C	4+	0	8	

In [6]:
```
##Basic
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 783667 entries, 0 to 233598
Data columns (total 12 columns):
 #   Column                      Non-Null Count   Dtype
---  ------                      --------------   -----
 0   User_ID                     783667 non-null  int64
 1   Product_ID                  783667 non-null  object
 2   Gender                      783667 non-null  object
 3   Age                         783667 non-null  object
 4   Occupation                  783667 non-null  int64
 5   City_Category               783667 non-null  object
 6   Stay_In_Current_City_Years  783667 non-null  object
 7   Marital_Status              783667 non-null  int64
 8   Product_Category_1          783667 non-null  int64
 9   Product_Category_2          537685 non-null  float64
 10  Product_Category_3          237858 non-null  float64
 11  Purchase                    550068 non-null  float64
dtypes: float64(3), int64(4), object(5)
memory usage: 77.7+ MB
```

In [7]:
```
df.describe()
```

Out[7]:

	User_ID	Occupation	Marital_Status	Product_Category_1	Product_Category_2	Product_Category_3	Purchase
count	7.836670e+05	783667.000000	783667.000000	783667.000000	537685.000000	237858.000000	550068.000000
mean	1.003029e+06	8.079300	0.409777	5.366196	9.844506	12.668605	9263.968713
std	1.727267e+03	6.522206	0.491793	3.878160	5.089093	4.125510	5023.065394
min	1.000001e+06	0.000000	0.000000	1.000000	2.000000	3.000000	12.000000
25%	1.001519e+06	2.000000	0.000000	1.000000	5.000000	9.000000	5823.000000
50%	1.003075e+06	7.000000	0.000000	5.000000	9.000000	14.000000	8047.000000
75%	1.004478e+06	14.000000	1.000000	8.000000	15.000000	16.000000	12054.000000
max	1.006040e+06	20.000000	1.000000	20.000000	18.000000	18.000000	23961.000000

In [8]:
```
df.drop(['User_ID'],axis=1,inplace=True)
```

In [9]:
```
df.head()
```

Out[9]:

	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Pro
0	P00069042	F	0-17	10	A	2	0	3	NaN	
1	P00248942	F	0-17	10	A	2	0	1	6.0	
2	P00087842	F	0-17	10	A	2	0	12	NaN	
3	P00085442	F	0-17	10	A	2	0	12	14.0	
4	P00285442	M	55+	16	C	4+	0	8	NaN	

In [11]:
```
df['Gender']=pd.get_dummies(df['Gender'],drop_first=1)
```

Out[11]:

	M
0	0
1	0
2	0
3	0
4	1
...	...
233594	0
233595	0
233596	0
233597	0
233598	0

783667 rows × 1 columns

In [12]:
```
##HAndling categorical feature Gender using map function()
df['Gender']=df['Gender'].map({'F':0,'M':1})
df.head()
```

Out[12]:

	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Pro
0	P00069042	0	0-17	10	A	2	0	3	NaN	
1	P00248942	0	0-17	10	A	2	0	1	6.0	
2	P00087842	0	0-17	10	A	2	0	12	NaN	
3	P00085442	0	0-17	10	A	2	0	12	14.0	
4	P00285442	1	55+	16	C	4+	0	8	NaN	

In [13]:
```
## Handling categorical feature Age
df['Age'].unique()
```

Out[13]:
```
array(['0-17', '55+', '26-35', '46-50', '51-55', '36-45', '18-25'],
      dtype=object)
```

In [17]:
```
##Handling categorical feature Age using map function()
df['Age']=df['Age'].map({'0-17':1,'18-25':2,'26-35':3,'36-45':4,'46-50':5,'51-55':6,'55+':7})
```

In [18]:
```
df.head()
```

Out[18]:

	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Pro
0	P00069042	0	1	10	A	2	0	3	NaN	
1	P00248942	0	1	10	A	2	0	1	6.0	
2	P00087842	0	1	10	A	2	0	12	NaN	
3	P00085442	0	1	10	A	2	0	12	14.0	
4	P00285442	1	7	16	C	4+	0	8	NaN	

In [20]:
```
##fixing categorical City_categort using get_dummies()
df_city=pd.get_dummies(df['City_Category'],drop_first=True)
```

In [21]:
```
df_city.head()
```

Out[21]:

	B	C
0	0	0
1	0	0
2	0	0
3	0	0
4	0	1

Merging both the df and df_city dataframes.

In [22]:
```
df=pd.concat([df,df_city],axis=1)
df.head()
```

Out[22]:

	Product_ID	Gender	Age	Occupation	City_Category	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Pro
0	P00069042	0	1	10	A	2	0	3	NaN	
1	P00248942	0	1	10	A	2	0	1	6.0	
2	P00087842	0	1	10	A	2	0	12	NaN	
3	P00085442	0	1	10	A	2	0	12	14.0	
4	P00285442	1	7	16	C	4+	0	8	NaN	

In [25]:
```
##drop City Category Feature
df.drop('City_Category',axis=1,inplace=True)
```

In [26]:
```
df.head()
```

Out[26]:

	Product_ID	Gender	Age	Occupation	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Product_Category_
0	P00069042	0	1	10	2	0	3	NaN	Na
1	P00248942	0	1	10	2	0	1	6.0	14.
2	P00087842	0	1	10	2	0	12	NaN	Na
3	P00085442	0	1	10	2	0	12	14.0	Na
4	P00285442	1	7	16	4+	0	8	NaN	Na

In [28]:
```
## Missing Values
df.isnull().sum()
```

Out[28]:
```
Product_ID                         0
Gender                             0
Age                                0
Occupation                         0
Stay_In_Current_City_Years         0
Marital_Status                     0
Product_Category_1                 0
Product_Category_2            245982
Product_Category_3            545809
Purchase                      233599
B                                  0
C                                  0
dtype: int64
```

In [30]:
```
## Focus on replacing missing values
df['Product_Category_2'].unique()
```

Out[30]:
```
array([nan,  6., 14.,  2.,  8., 15., 16., 11.,  5.,  3.,  4., 12.,  9.,
       10., 17., 13.,  7., 18.])
```

In [31]:
```
df['Product_Category_2'].value_counts()
```

Out[31]:
```
8.0     91317
14.0    78834
2.0     70498
16.0    61687
15.0    54114
5.0     37165
4.0     36705
6.0     23575
11.0    20230
17.0    19104
13.0    15054
9.0      8177
12.0     7801
10.0     4420
3.0      4123
18.0     4027
7.0       854
Name: Product_Category_2, dtype: int64
```

In [34]:
```
df['Product_Category_2'].mode()[0]
```

Out[34]:
```
8.0
```

In [35]:
```
## Replace the missing values with mode
df['Product_Category_2']=df['Product_Category_2'].fillna(df['Product_Category_2'].mode()[0])
```

In [36]:
```
df['Product_Category_2'].isnull().sum()
```

Out[36]:
```
0
```

In [37]:
```
## Product_category 3 replace missing values
df['Product_Category_3'].unique()
```

Out[37]:
```
array([nan, 14., 17.,  5.,  4., 16., 15.,  8.,  9., 13.,  6., 12.,  3.,
       18., 11., 10.])
```

In [38]:
```
df['Product_Category_3'].value_counts()
```

Out[38]:
```
16.0    46469
15.0    39968
14.0    26283
17.0    23818
5.0     23799
8.0     17861
9.0     16532
12.0    13115
13.0     7849
6.0      6888
18.0     6621
4.0      2691
11.0     2585
10.0     2501
3.0       878
Name: Product_Category_3, dtype: int64
```

In [39]:
```
## Replace the missing values with mode
df['Product_Category_3']=df['Product_Category_3'].fillna(df['Product_Category_3'].mode()[0])
```

In [40]:
```
df.head()
```

Out[40]:

	Product_ID	Gender	Age	Occupation	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Product_Category_
0	P00069042	0	1	10	2	0	3	8.0	16.
1	P00248942	0	1	10	2	0	1	6.0	14.
2	P00087842	0	1	10	2	0	12	8.0	16.
3	P00085442	0	1	10	2	0	12	14.0	16.
4	P00285442	1	7	16	4+	0	8	8.0	16.

In [41]:
```
df.shape
```

Out[41]:
```
(783667, 12)
```

In [42]:
```
df['Stay_In_Current_City_Years'].unique()
```

Out[42]:
```
array(['2', '4+', '3', '1', '0'], dtype=object)
```

In [44]:
```
df['Stay_In_Current_City_Years']=df['Stay_In_Current_City_Years'].str.replace('+','')
```

```
C:\Users\win10\AppData\Local\Temp/ipykernel_24288/2063355665.py:1: FutureWarning: The default value of regex wi
ll change from True to False in a future version. In addition, single character regular expressions will *not*
be treated as literal strings when regex=True.
  df['Stay_In_Current_City_Years']=df['Stay_In_Current_City_Years'].str.replace('+','')
```

In [45]:
```
df.head()
```

Out[45]:

	Product_ID	Gender	Age	Occupation	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Product_Category_
0	P00069042	0	1	10	2	0	3	8.0	16.
1	P00248942	0	1	10	2	0	1	6.0	14.
2	P00087842	0	1	10	2	0	12	8.0	16.
3	P00085442	0	1	10	2	0	12	14.0	16.
4	P00285442	1	7	16	4	0	8	8.0	16.

In [46]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 783667 entries, 0 to 233598
Data columns (total 12 columns):
 #   Column                      Non-Null Count   Dtype
---  ------                      --------------   -----
 0   Product_ID                  783667 non-null  object
 1   Gender                      783667 non-null  int64
 2   Age                         783667 non-null  int64
 3   Occupation                  783667 non-null  int64
 4   Stay_In_Current_City_Years  783667 non-null  object
 5   Marital_Status              783667 non-null  int64
 6   Product_Category_1          783667 non-null  int64
 7   Product_Category_2          783667 non-null  float64
 8   Product_Category_3          783667 non-null  float64
 9   Purchase                    550068 non-null  float64
 10  B                           783667 non-null  uint8
 11  C                           783667 non-null  uint8
dtypes: float64(3), int64(5), object(2), uint8(2)
memory usage: 67.3+ MB
```

In [47]:
```
##convert object into integers
df['Stay_In_Current_City_Years']=df['Stay_In_Current_City_Years'].astype(int)
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 783667 entries, 0 to 233598
Data columns (total 12 columns):
 #   Column                      Non-Null Count   Dtype
---  ------                      --------------   -----
 0   Product_ID                  783667 non-null  object
 1   Gender                      783667 non-null  int64
 2   Age                         783667 non-null  int64
 3   Occupation                  783667 non-null  int64
 4   Stay_In_Current_City_Years  783667 non-null  int32
 5   Marital_Status              783667 non-null  int64
 6   Product_Category_1          783667 non-null  int64
 7   Product_Category_2          783667 non-null  float64
 8   Product_Category_3          783667 non-null  float64
 9   Purchase                    550068 non-null  float64
 10  B                           783667 non-null  uint8
 11  C                           783667 non-null  uint8
dtypes: float64(3), int32(1), int64(5), object(1), uint8(2)
memory usage: 64.3+ MB
```

In [48]:
```
df['B']=df['B'].astype(int)
df['C']=df['C'].astype(int)
```

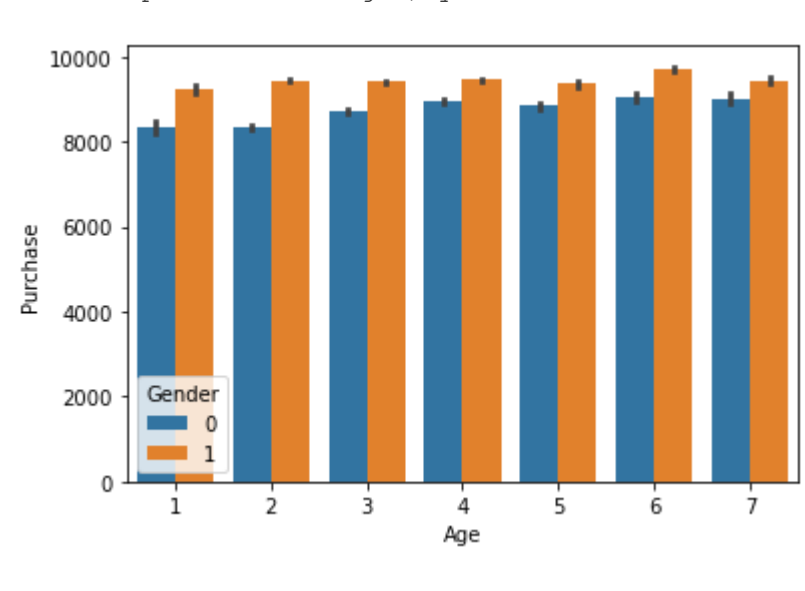
In [49]:
```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 783667 entries, 0 to 233598
Data columns (total 12 columns):
 #   Column                      Non-Null Count   Dtype
---  ------                      --------------   -----
 0   Product_ID                  783667 non-null  object
 1   Gender                      783667 non-null  int64
 2   Age                         783667 non-null  int64
 3   Occupation                  783667 non-null  int64
 4   Stay_In_Current_City_Years  783667 non-null  int32
 5   Marital_Status              783667 non-null  int64
 6   Product_Category_1          783667 non-null  int64
 7   Product_Category_2          783667 non-null  float64
 8   Product_Category_3          783667 non-null  float64
 9   Purchase                    550068 non-null  float64
 10  B                           783667 non-null  int32
 11  C                           783667 non-null  int32
dtypes: float64(3), int32(3), int64(5), object(1)
memory usage: 68.8+ MB
```

In [53]:
```
##Visualisation Age vs Purchased
sns.barplot('Age','Purchase',hue='Gender',data=df)
```

```
C:\Users\win10\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variabl
es as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing oth
er arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[53]:
```
<AxesSubplot:xlabel='Age', ylabel='Purchase'>
```

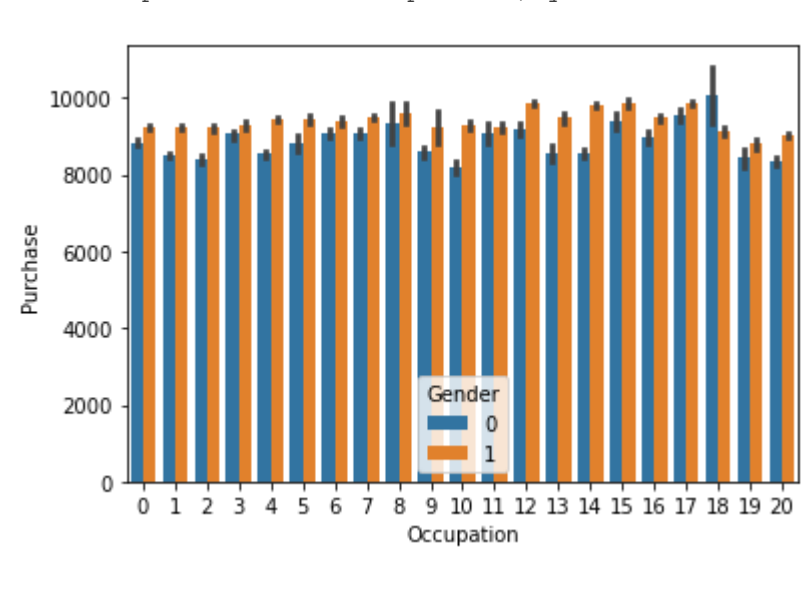


It is observed that the purchasing behaviour of different age groups is almost similar.It is also observed that males tends to make more purchases when compared to females.

In [54]:
```
## Visualization of Purchase with occupation
sns.barplot('Occupation','Purchase',hue='Gender',data=df)
```

```
C:\Users\win10\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variabl
es as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing oth
er arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[54]:
```
<AxesSubplot:xlabel='Occupation', ylabel='Purchase'>
```

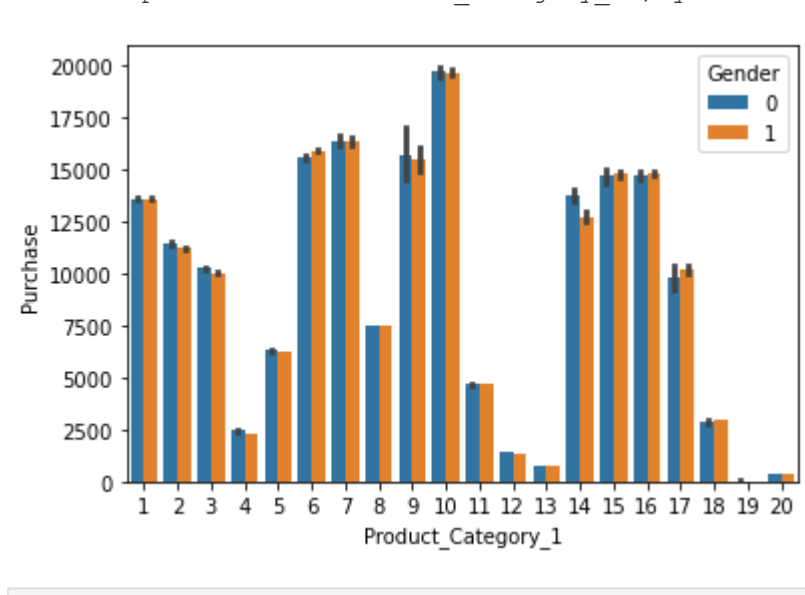


It is observed here that occupation has a very minimal impact on the purchasing behaviour of the people

In [57]:
```
sns.barplot('Product_Category_1','Purchase',hue='Gender',data=df)
```

```
C:\Users\win10\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variabl
es as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing oth
er arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

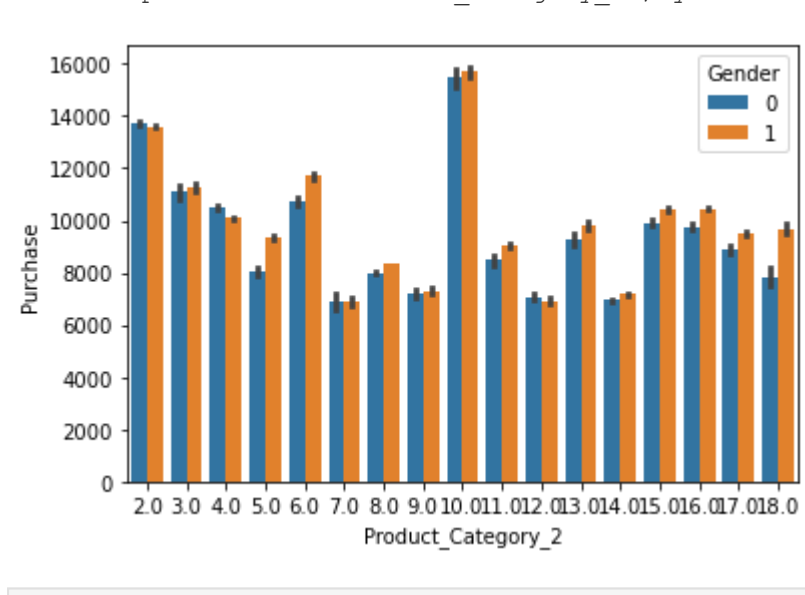
Out[57]:
```
<AxesSubplot:xlabel='Product_Category_1', ylabel='Purchase'>
```



In [58]:
```
sns.barplot('Product_Category_2','Purchase',hue='Gender',data=df)
```

```
C:\Users\win10\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variabl
es as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing oth
er arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

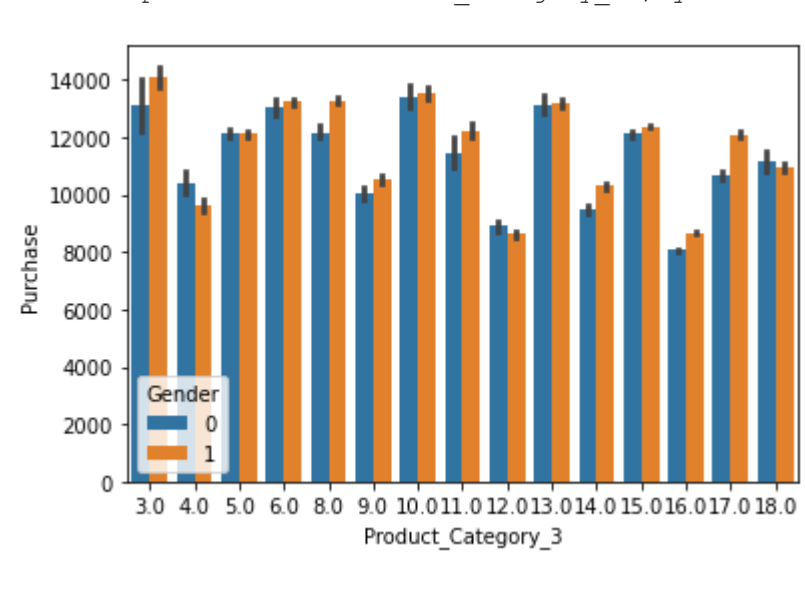
Out[58]:
```
<AxesSubplot:xlabel='Product_Category_2', ylabel='Purchase'>
```



In [59]:
```
sns.barplot('Product_Category_3','Purchase',hue='Gender',data=df)
```

```
C:\Users\win10\anaconda3\lib\site-packages\seaborn\_decorators.py:36: FutureWarning: Pass the following variabl
es as keyword args: x, y. From version 0.12, the only valid positional argument will be `data`, and passing oth
er arguments without an explicit keyword will result in an error or misinterpretation.
  warnings.warn(
```

Out[59]:
```
<AxesSubplot:xlabel='Product_Category_3', ylabel='Purchase'>
```



It is observed after visualization of all the three categories with respect ot purchase made that product_categor_1 products are purchased the most by the customers.

In [60]:
```
df.head()
```

Out[60]:

	Product_ID	Gender	Age	Occupation	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Product_Category_
0	P00069042	0	1	10	2	0	3	8.0	16.
1	P00248942	0	1	10	2	0	1	6.0	14.
2	P00087842	0	1	10	2	0	12	8.0	16.
3	P00085442	0	1	10	2	0	12	14.0	16.
4	P00285442	1	7	16	4	0	8	8.0	16.

In [64]:
```
##Feature Scaling
df_test=df[df['Purchase'].isnull()]
```

In [67]:
```
df_train=df[~df['Purchase'].isnull()]
```

In [84]:
```
X=df_train.drop('Purchase',axis=1)
```

In [85]:
```
X.head()
```

Out[85]:

	Product_ID	Gender	Age	Occupation	Stay_In_Current_City_Years	Marital_Status	Product_Category_1	Product_Category_2	Product_Category_
0	P00069042	0	1	10	2	0	3	8.0	16.
1	P00248942	0	1	10	2	0	1	6.0	14.
2	P00087842	0	1	10	2	0	12	8.0	16.
3	P00085442	0	1	10	2	0	12	14.0	16.
4	P00285442	1	7	16	4	0	8	8.0	16.

In [86]:
```
X.shape
```

Out[86]:
```
(550068, 11)
```

In [87]:
```
y=df_train['Purchase']
```

In [88]:
```
y.shape
```

Out[88]:
```
(550068,)
```

In [83]:
```
y
```

Out[83]:
```
0          8370.0
1         15200.0
2          1422.0
3          1057.0
4          7969.0
           ...
550063      368.0
550064      371.0
550065      137.0
550066      365.0
550067      490.0
Name: Purchase, Length: 550068, dtype: float64
```

In [89]:
```
from sklearn.model_selection import train_test_split
X_train, X_test, y_train, y_test = train_test_split(
     X, y, test_size=0.33, random_state=42)
```

In [91]:
```
X_train.drop('Product_ID',axis=1,inplace=True)
X_test.drop('Product_ID',axis=1,inplace=True)
```

```
C:\Users\win10\anaconda3\lib\site-packages\pandas\core\frame.py:4906: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame

See the caveats in the documentation: https://pandas.pydata.org/pandas-docs/stable/user_guide/indexing.html#ret
urning-a-view-versus-a-copy
  return super().drop(
```

In [92]:
```
## feature Scaling
from sklearn.preprocessing import StandardScaler
sc=StandardScaler()
X_train=sc.fit_transform(X_train)
X_test=sc.transform(X_test)
```

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In [ ]: