# case_study2

October 31, 2021

## 0.1 DDA Full Stack Interview

Project 2
Samir Farhoumand

### 0.1.1 Case Study 2

[1]:
```
#import pandas
import pandas as pd
import matplotlib.pyplot as plt
import seaborn as sns
import numpy as np

#downloaded file, had issue with encoding and so downloaded file
file = "casestudy.csv"

df = pd.read_csv(file)

df
```

[1]:
```
        Unnamed: 0         customer_email  net_revenue  year
0                0   nhknapwsbx@gmail.com       249.92  2015
1                1   joiuzbvcpn@gmail.com        87.61  2015
2                2   ukkjctepxt@gmail.com       168.38  2015
3                3   gykatilzrt@gmail.com        62.40  2015
4                4   mmsgsrtxah@gmail.com        43.08  2015
…              …                     …          …     …
685922      685922   qzqttwiftu@gmail.com       184.58  2017
685923      685923   pjodiifjop@gmail.com       133.03  2017
685924      685924   appaplmgko@gmail.com       200.98  2017
685925      685925   wvkpmwsgck@gmail.com       235.35  2017
685926      685926   aregboumbw@gmail.com       208.43  2017

[685927 rows x 4 columns]
```

Let's drop the unnamed column and perform summary.

[2]:
```
df = df.drop("Unnamed: 0", axis = 1)
#let's investigate our dataframe
```

```
def investigate(data):
    print(data.info())
    print(data.describe())

investigate(df)
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 685927 entries, 0 to 685926
Data columns (total 3 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
 0   customer_email  685927 non-null  object
 1   net_revenue     685927 non-null  float64
 2   year            685927 non-null  int64
dtypes: float64(1), int64(1), object(1)
memory usage: 15.7+ MB
None
         net_revenue           year
count  685927.000000  685927.000000
mean      125.647755    2016.027252
std        71.854528       0.837203
min         1.000000    2015.000000
25%        63.510000    2015.000000
50%       125.730000    2016.000000
75%       187.820000    2017.000000
max       250.000000    2017.000000
```

It looks like we have no null or missing values.

## 0.2 For each year we need the following information:

### 0.2.1 1) Total revenue for the current year

[3]:
```
#find customers in 2017
customers_2017 = df[df["year"]==2017]
#sum the net revenue for 2017 customers
customer_revenue_2017 = customers_2017["net_revenue"].sum()
print(f'Total Revenue from 2017: ${customer_revenue_2017:.2f}')
```

```
Total Revenue from 2017: $31417495.03
```

### 0.2.2 2) New Customer Revenue e.g., new customers not present in previous year only

[4]:
```
#create df for customers in 2016
customers_2016 = df[df["year"]== 2016]
#remove customers from customer_2017 that appear in customer_2016
df2 = customers_2017[np.logical_not(customers_2017["customer_email"]
                                            .isin(customers_2016['customer_email']))]
new_customer_revenue_2017 = df2["net_revenue"].sum()
print(f'New Customer Revenue from 2017: ${new_customer_revenue_2017:.2f}')
```

```
New Customer Revenue from 2017: $28776235.04
```

### 0.2.3 3) Existing Customer Growth. To calculate this, use the Revenue of existing customers for current year –(minus) Revenue of existing customers from the previous year

[5]:
```
#make dfs for customers that exist in both years
df3 = customers_2017[customers_2017['customer_email'].
                         isin(customers_2016['customer_email'])]
df4 = customers_2016[customers_2016['customer_email'].
                         isin(customers_2017['customer_email'])]
#sum their net revenues
existing_customer_revenue_2017 = df3["net_revenue"].sum()
existing_customer_revenue_2016 = df4["net_revenue"].sum()
#subtract their revenues
existing_customer_growth_2017 =␣
 ↪existing_customer_revenue_2017-existing_customer_revenue_2016
print(f'Existing Customer Revenue from 2017: ${existing_customer_growth_2017:.
 ↪2f}')
```

```
Existing Customer Revenue from 2017: $20611.34
```

### 0.2.4 4) Revenue lost from attrition

[6]:
```
#to calculate this, I will find total revenue from clients who purchased in
#2015 but did not purchase in 2016 or 2017, plus total revenue from clients
#who purchased 2016 and not 2017.
#make df for customers from 2015
customers_2015 = df[df["year"]== 2015]
#make df for 2015 customers who did not purchase in 2016 or 2017
df5 = customers_2015[np.logical_not(customers_2015["customer_email"]
                                            .isin(customers_2016['customer_email']))]
df5 = df5[np.logical_not(df5["customer_email"]
                              .isin(customers_2017['customer_email']))]
#make df for 2016 customers who did not purchase in 2017
df6 = customers_2016[np.logical_not(customers_2016["customer_email"]
                                            .isin(customers_2017['customer_email']))]
#sum revenues from two dfs
revenue_lost_from_2015cohort = df5["net_revenue"].sum()
revenue_lost_from_2016cohort = df6["net_revenue"].sum()
#combine revenues
revenue_lost_from_attrition = revenue_lost_from_2015cohort +␣
 ↪revenue_lost_from_2016cohort
print(f'Revenue Lost from Attrition: ${revenue_lost_from_attrition:.2f}')
```

```
Revenue Lost from Attrition: $44586295.64
```

### 0.2.5 5) Existing Customer Revenue Current Year

```
[7]: print(f'Existing Customer Revenue 2017: ${existing_customer_revenue_2017:.2f}')
```

```
Existing Customer Revenue 2017: $2641259.99
```

### 0.2.6 6) Existing Customer Revenue Prior Year

```
[8]: #Assuming this means customers in 2016 who also existed in 2015
     df7 = customers_2016[customers_2016['customer_email'].
                                isin(customers_2015['customer_email'])]
     existing_customer_revenue_2016b = df7["net_revenue"].sum()
     print(f'Existing Customer Revenue 2016: ${existing_customer_revenue_2016b:.2f}')
```

```
Existing Customer Revenue 2016: $7485452.58
```

### 0.2.7 7) Total Customers Current Year

```
[9]: np.unique(customers_2017["customer_email"]).shape[0]
```

```
[9]: 249987
```

### 0.2.8 8) Total Customers Previous Year

```
[10]: np.unique(customers_2016["customer_email"]).shape[0]
```

```
[10]: 204646
```

### 0.2.9 9) New Customers

```
[11]: #assuming this means a list of customers in 2017 who were
      #not customers in 2015 or 2016
      df8 = customers_2017[np.logical_not(customers_2017["customer_email"]
                                          .isin(customers_2015['customer_email']))]
      df8 = df8[np.logical_not(df8["customer_email"]
                                          .isin(customers_2016['customer_email']))]
      new_customers = np.unique(df8["customer_email"])
      new_customers
```

```
[11]: array([' aaaiekepot@gmail.com', ' aaampblnzo@gmail.com',
             ' aaanfhekoc@gmail.com', …, 'zzzmkaruhf@gmail.com',
             'zzznqseiwv@gmail.com', 'zzzoxtrfic@gmail.com'], dtype=object)
```

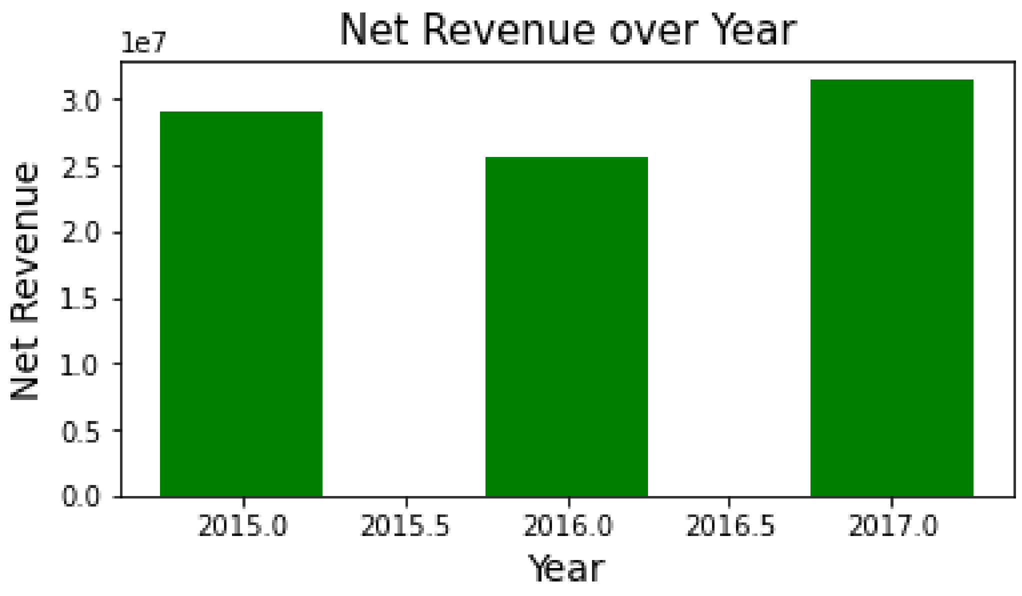
### 0.2.10 10) Lost Customers

```
[12]: #assuming this means clients from 2015 that haven't returned
      #in 2016 or 2017, and and clients from 2016 that haven't returned in 2017
      lost_customers2015 = np.unique(df5["customer_email"])
      lost_customers2016 = np.unique(df6["customer_email"])
      lost_customers = np.append(lost_customers2015, lost_customers2016)
      lost_customers
```

```
[12]: array([' aaagldjgdt@gmail.com', ' aaaicvtnzx@gmail.com',
             ' aaaihliwuo@gmail.com', …, 'zzysesrqck@gmail.com',
             'zzyyqigvjs@gmail.com', 'zzzwmlwwmn@gmail.com'], dtype=object)
```

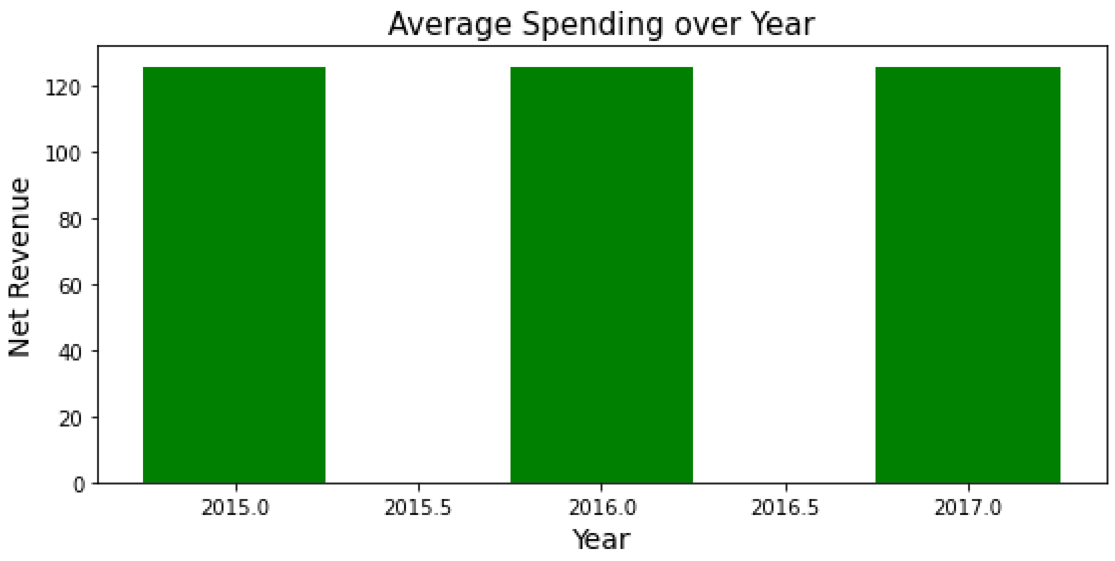
### 0.2.11 11) Unique Plots

```
[13]: results = df.groupby("year").sum()
      years = [year for year, df in df.groupby("year")]
      plt.figure(figsize = (6,3))
      plt.bar(years, results["net_revenue"], color = "green",
              width = .5)
      plt.ylabel("Net Revenue", fontsize = 14)
      plt.xlabel("Year", fontsize = 14)
      plt.title("Net Revenue over Year", fontsize = 15)
      plt.show()
```



Revenue dipped a little in 2017 before picking back up in 2017.

[14]:
```python
results = df.groupby("year").mean()
years = [year for year, df in df.groupby("year")]
plt.figure(figsize = (9,4))
plt.bar(years, results["net_revenue"], color = "green",
       width = .5)
plt.ylabel("Net Revenue", fontsize = 14)
plt.xlabel("Year", fontsize = 14)
plt.title("Average Spending over Year", fontsize = 15)
plt.show()
```



Average spending did not change from year to year.