quantium

July 17, 2020

1 CONTENTS

[1]:
```python
import pandas as pd
import seaborn as sns
import matplotlib.pyplot as plt
transaction = pd.read_excel('S:/Intern/4.Quantitum/QVI_transaction_data.xlsx')
purchase_behaviour = pd.read_csv('S:/Intern/4.Quantitum/QVI_purchase_behaviour.
 →csv')
```

[2]:
```python
transaction.head()
```

[2]:
```
    DATE  STORE_NBR  LYLTY_CARD_NBR  TXN_ID  PROD_NBR  \
0  43390          1            1000       1         5
1  43599          1            1307     348        66
2  43605          1            1343     383        61
3  43329          2            2373     974        69
4  43330          2            2426    1038       108

                                  PROD_NAME  PROD_QTY  TOT_SALES
0    Natural Chip        Compny SeaSalt175g         2        6.0
1                  CCs Nacho Cheese    175g         3        6.3
2    Smiths Crinkle Cut  Chips Chicken 170g         2        2.9
3    Smiths Chip Thinly  S/Cream&Onion 175g         5       15.0
4  Kettle Tortilla ChpsHny&Jlpno Chili 150g         3       13.8
```

[3]:
```python
purchase_behaviour.head()
```

[3]:
```
   LYLTY_CARD_NBR               LIFESTAGE PREMIUM_CUSTOMER
0            1000   YOUNG SINGLES/COUPLES          Premium
1            1002   YOUNG SINGLES/COUPLES       Mainstream
2            1003          YOUNG FAMILIES           Budget
```

```
3             1004   OLDER SINGLES/COUPLES       Mainstream
4             1005  MIDAGE SINGLES/COUPLES       Mainstream
```

1.4.1 1.Checking Missing Values

[4]:
```
print('Null values of purchase_behaviour data are \n\n' ,purchase_behaviour.
 ↪isnull().sum())
```

```
Null values of purchase_behaviour data are

 LYLTY_CARD_NBR      0
LIFESTAGE           0
PREMIUM_CUSTOMER    0
dtype: int64
```

[5]:
```
print('Null values of purchase_behaviour data are \n\n' ,transaction.isnull().
 ↪sum())
```

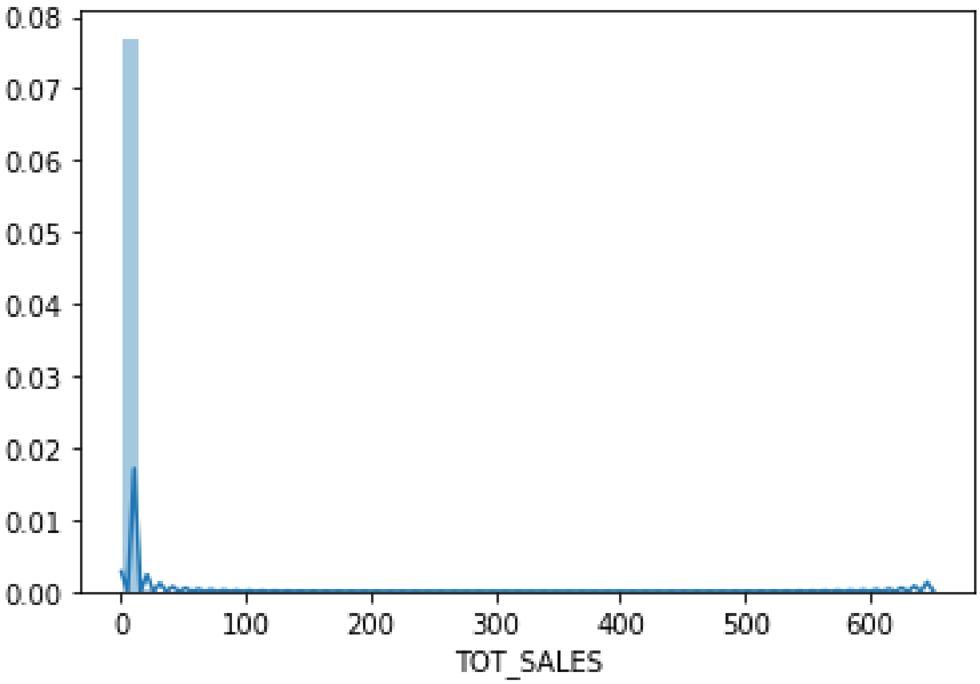
```
Null values of purchase_behaviour data are

 DATE              0
STORE_NBR         0
LYLTY_CARD_NBR    0
TXN_ID            0
PROD_NBR          0
PROD_NAME         0
PROD_QTY          0
TOT_SALES         0
dtype: int64
```

1.4.2 2.Treatment of Outliers

[6]:
```
import seaborn as sns
sns.distplot(transaction.TOT_SALES)
```

[6]:
```
<matplotlib.axes._subplots.AxesSubplot at 0x2385e8023c8>
```



[7]:
```
#Outliers
IQR = transaction.TOT_SALES.quantile(0.75) - transaction.TOT_SALES.quantile(0.
 ↪25)
Lower_fence = transaction.TOT_SALES.quantile(0.25) - (IQR * 3)
Upper_fence = transaction.TOT_SALES.quantile(0.75) + (IQR * 3)

Upper_fence, Lower_fence, IQR
```

[7]:
```
(20.599999999999994, -5.9999999999999964, 3.799999999999999)
```

[8]:
```
transaction.drop(transaction[transaction['TOT_SALES']>30].index,inplace = True)
```

1.4.3 3.Feature Generation

[9]:
```
print('Number of Unique Product Items are :',transaction.PROD_NAME.nunique())
```

```
Number of Unique Product Items are : 114
```

3.1) Chips Brand Feature

[10]:
```
transaction['brand'] = transaction.PROD_NAME.apply(lambda x : x.split()[0])
print('Number of Unique Brands are :',transaction.brand.nunique(),'␣
 ↪\n\n',transaction['brand'].unique())
```

```
Number of Unique Brands are : 29
```

```
['Natural' 'CCs' 'Smiths' 'Kettle' 'Old' 'Grain' 'Doritos' 'Twisties' 'WW'
'Thins' 'Burger' 'NCC' 'Cheezels' 'Infzns' 'Red' 'Pringles' 'Dorito'
'Infuzions' 'Smith' 'GrnWves' 'Tyrrells' 'Cobs' 'Woolworths' 'French'
'RRD' 'Tostitos' 'Cheetos' 'Snbts' 'Sunbites']
```

3.2) Weight of Chips Packets

[11]:

```
transaction['weight'] = transaction.PROD_NAME.apply(lambda x : [i for i in␣
 ↪list(x) if i.isdigit()])
transaction['weight'] = transaction.weight.apply(lambda x : int(''.join(x)))
```

3.3)Time transformation

[12]:

```
from datetime import datetime
datetime.fromordinal(693594)
offset = 693594
transaction['DATE'] = transaction['DATE']+offset
transaction['DATE'] = transaction['DATE'].apply(lambda x : datetime.
 ↪fromordinal(x))
```

[13]:

```
transaction.head()
```

[13]:

```
        DATE  STORE_NBR  LYLTY_CARD_NBR  TXN_ID  PROD_NBR  \
0 2018-10-17          1            1000       1         5
1 2019-05-14          1            1307     348        66
2 2019-05-20          1            1343     383        61
3 2018-08-17          2            2373     974        69
4 2018-08-18          2            2426    1038       108

                                  PROD_NAME  PROD_QTY  TOT_SALES    brand  \
0    Natural Chip        Compny SeaSalt175g         2        6.0  Natural
1                  CCs Nacho Cheese    175g         3        6.3      CCs
2    Smiths Crinkle Cut  Chips Chicken 170g         2        2.9   Smiths
3    Smiths Chip Thinly  S/Cream&Onion 175g         5       15.0   Smiths
4  Kettle Tortilla ChpsHny&Jlpno Chili 150g         3       13.8   Kettle

   weight
0     175
1     175
2     170
3     175
4     150
```

[14]:

```
data = pd.merge(transaction,purchase_behaviour,on = 'LYLTY_CARD_NBR')
```

2 4.Data Analysis,Insights and Recommendations on Customer Segments

2.0.1 4.1) Customer Type vs Their LifeStage

[15]:

```
customers = pd.crosstab(index = purchase_behaviour['LIFESTAGE'] , columns =␣
 ↪purchase_behaviour['PREMIUM_CUSTOMER'])
customers.sort_values('Premium',ascending=False).head()
```

[15]:

```
PREMIUM_CUSTOMER        Budget  Mainstream  Premium
LIFESTAGE
OLDER SINGLES/COUPLES     4929        4930     4750
RETIREES                  4454        6479     3872
YOUNG SINGLES/COUPLES     3779        8088     2574
YOUNG FAMILIES            4017        2728     2433
MIDAGE SINGLES/COUPLES    1504        3340     2431
```

2.0.2 4.2) Volume of Transactions Over TIME

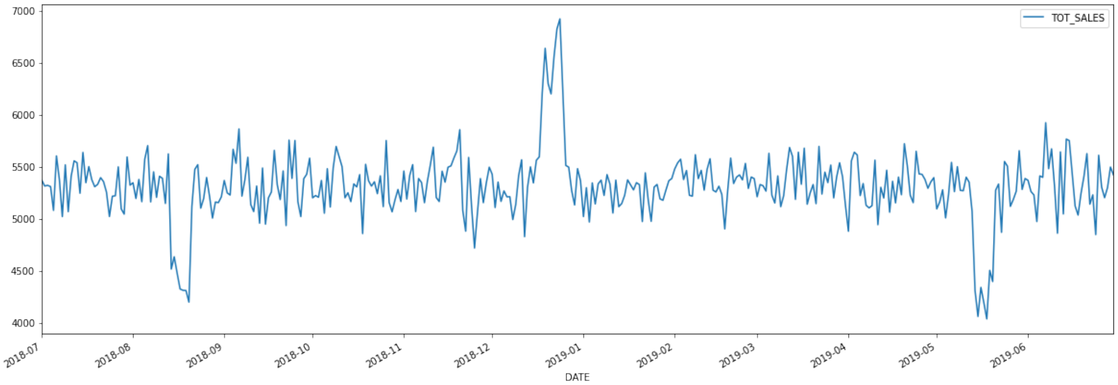
[16]:

```
transaction.index = pd.to_datetime(transaction.DATE)
plt.figure(figsize=(10,1))
transaction[['TOT_SALES']].groupby([transaction.index]).sum().
 ↪plot(figsize=(20,7))
```

[16]:

```
<matplotlib.axes._subplots.AxesSubplot at 0x2385e7f93c8>

<Figure size 720x72 with 0 Axes>
```



INSIGHTS :

1.At the end of year the sales has gone at its PEAK in a year.May be Christmas Would be the reason and there a lot of chance to increase more sales.

2.Theres downfall of Sales too between 5-6 and 8-9 months

RECOMMENDATIONS :

1.By Makeing a great display outside stores outlet window. Attracting more your customers with the decoration outside while keeping your interiors decorated too.

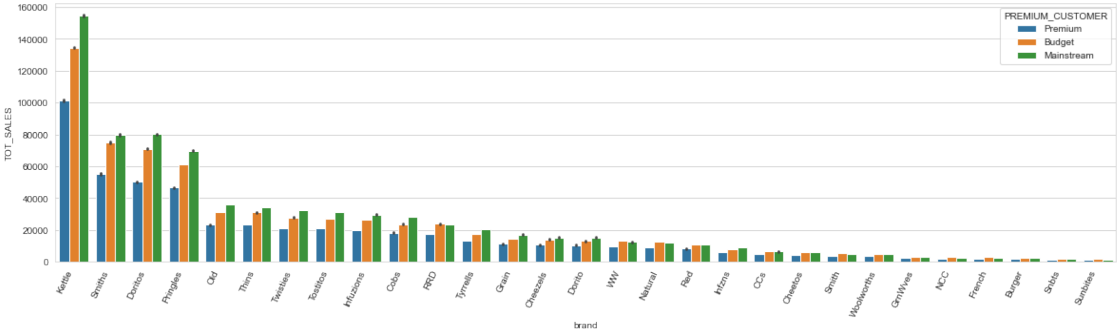
2.Appropiate Promotions and offers on old stock would help to increase sales

2.0.3 4.3) Most Saleable Chips Brands

[17]:
```
order = data.groupby(['brand']).sum()['TOT_SALES'].sort_values(ascending=False).
 ↪index

plt.figure(figsize=(20,5))
sns.set_style("whitegrid")
ax = sns.barplot(x = 'brand',y = 'TOT_SALES' ,data = data,hue =␣
 ↪'PREMIUM_CUSTOMER', estimator=sum,order = order)
plt.xticks(rotation=65, horizontalalignment='right')
```

[17]:
```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28]),
 <a list of 29 Text major ticklabel objects>)
```



INSIGHTS :

1.kettle Brand Outperformed all other brands with large margin.

2.Only 5-6 Brands have nearly 80% share in Total Sales

RECOMMENDATIONS :

1.Offers on Bundle Pack of low saleable brand chips packets may result in good sales

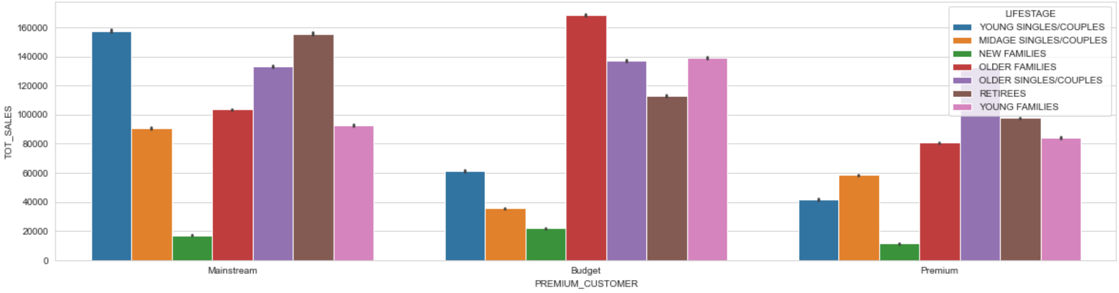
2.Optimal Pricing of Best Brand Chips would yeild high Amount of sales

2.0.4 4.4) Total Sales of Different Customer Segments grouped by LIFE_STAGE

[18]:

```
order = data.groupby(['PREMIUM_CUSTOMER']).sum()['TOT_SALES'].
 ↪sort_values(ascending=False).index

plt.figure(figsize=(20,5))
sns.set_style("whitegrid")
ax.set_xticklabels(ax.get_xticklabels(), rotation=90,␣
 ↪horizontalalignment='right')
ax = sns.barplot(x = 'PREMIUM_CUSTOMER',y = 'TOT_SALES' ,data = data,hue =␣
 ↪'LIFESTAGE', estimator=sum,order = order)
```



INSIGHTS :

1.Premium Customer spends less than Other Customers which is unexpected.

2.Older Families and Retirees spend more money than New Famalies and Midage Singles.

RECOMMENDATIONS :

1.Older Families and Retirees prefers stores near to them,so opening new stores according to geographical location or re-locating low performed Stores near to Old and Retirees will defnitely yield more sales

2.Coupons to less aged customer segment or according to low performed customer segments from above plot will result them to come again and again

2.0.5 4.5)Top 10 and Bottom 10 Products of Total Sales

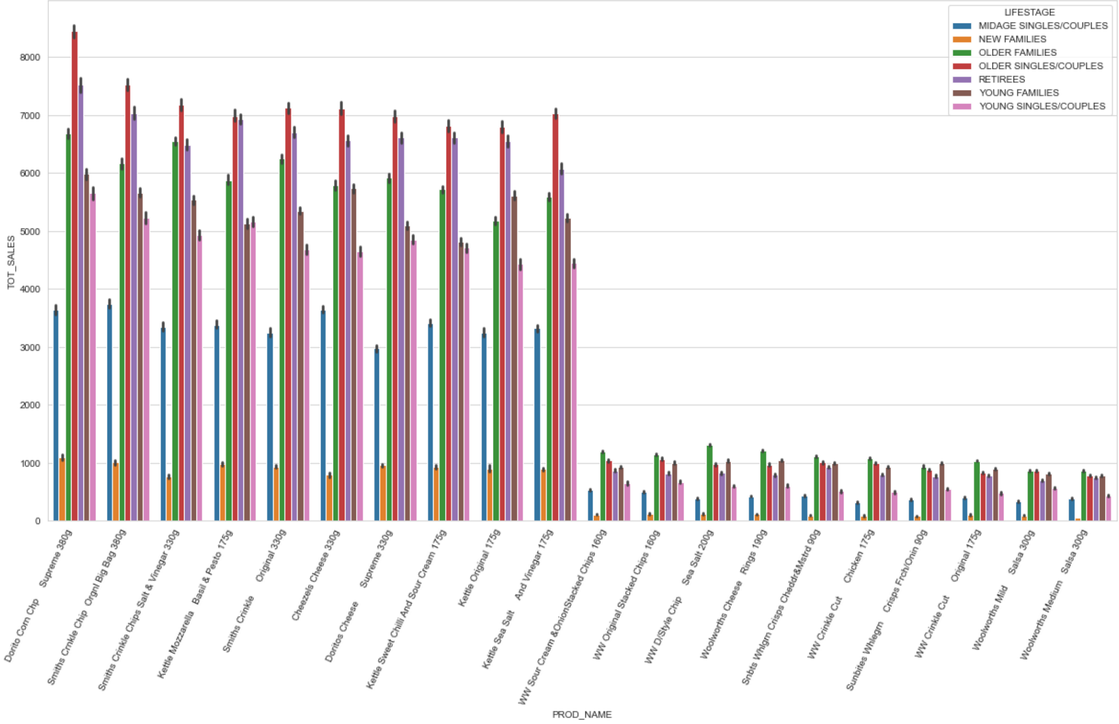
[19]:

```
b=[]
for i in data.groupby(['PROD_NAME']).sum()['TOT_SALES'].
 ↪sort_values(ascending=False).index[:10]:
    b.append(i)

for i in data.groupby(['PROD_NAME']).sum()['TOT_SALES'].
 ↪sort_values(ascending=False).index[-10:]:
    b.append(i)
plt.figure(figsize=(20,10))
```

```
sns.set_style("whitegrid")
sns.barplot(x = 'PROD_NAME',y = 'TOT_SALES' ,data = data[data['PROD_NAME'].
 ↪isin(b)],hue = 'LIFESTAGE',
                                                         estimator = sum,order␣
 ↪= b)
plt.xticks(rotation=65, horizontalalignment='right')
```

```
[19]: (array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
              17, 18, 19]), <a list of 20 Text major ticklabel objects>)
```



INSIGHTS :

1.Dorito corn chips,Smiths and Kettle brands are most valued and mostly brought by older singles/couples.

2.WW,Sunbites brands have very low sales.

RECOMMENDATIONS :

1.Its better to exclude all these top performing brands in Offers,promotions etc.

2.Having as much as low stock of poor performing products would be better.

2.0.6 4.6)Top 10 and Bottom 10 Stores of Total Sales

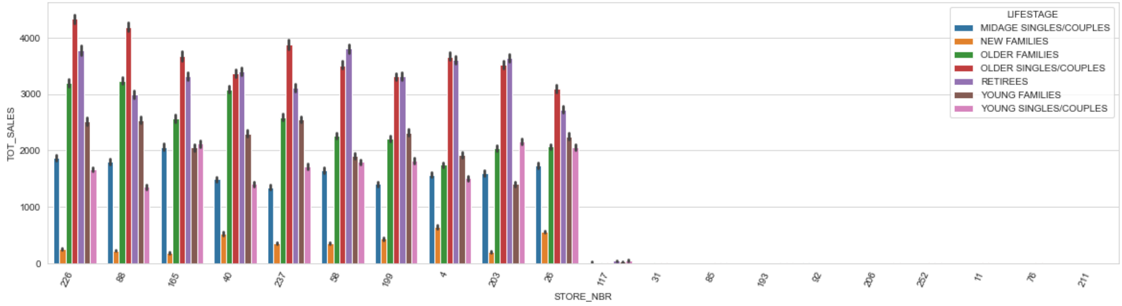
[20]:

```
a=[]
for i in data.groupby(['STORE_NBR']).sum()['TOT_SALES'].
 ↪sort_values(ascending=False).index[:10]:
    a.append(i)

for i in data.groupby(['STORE_NBR']).sum()['TOT_SALES'].
 ↪sort_values(ascending=False).index[-10:]:
    a.append(i)
plt.figure(figsize=(20,5))
sns.set_style("whitegrid")
sns.barplot(x = 'STORE_NBR',y = 'TOT_SALES' ,data = data[data['STORE_NBR'].
 ↪isin(a)],hue = 'LIFESTAGE',
                                                estimator = sum,order␣
 ↪= a)
plt.xticks(rotation=65, horizontalalignment='right')
```

[20]:

```
(array([ 0,  1,  2,  3,  4,  5,  6,  7,  8,  9, 10, 11, 12, 13, 14, 15, 16,
        17, 18, 19]), <a list of 20 Text major ticklabel objects>)
```



INSIGHTS :

1.Many poor performing stores are there we need to find a way to deal with them.

2.Customer Segments are making same propotion almost for every store.

RECOMMENDATIONS :

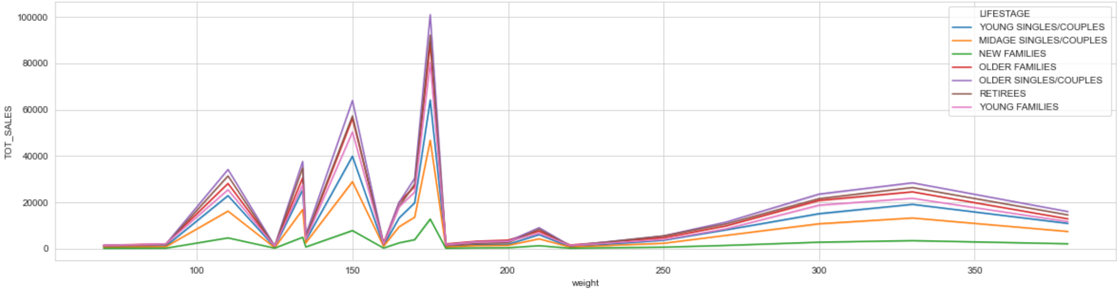
1.Need to relocate the stores performing worst.

2.0.7 4.7) Total Sales of Each Item vs Weight

[21]:

```
plt.figure(figsize=(20,5))
sns.set_style("whitegrid")
sns.lineplot(x = 'weight',y = 'TOT_SALES' ,data = data,hue =␣
 ↪'LIFESTAGE',estimator = sum)
```

```
[21]: <matplotlib.axes._subplots.AxesSubplot at 0x2385b5b2908>
```



INSIGHTS :

1.Average weighted chips packet have high sales that over weighted packets.