Potato-Chip-Wrangle

May 9, 2021

[1]:
```
#importing libraries

import pandas as pd
import numpy as np
import seaborn as sns
import matplotlib.pyplot as plt

sns.set()
```

[2]:
```
#reading in excel file

df1 = pd.read_excel('QVI_transaction_data.xlsx')
df1.head()
```

[2]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
0	43390	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0
1	43599	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3
2	43605	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9
3	43329	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	15.0
4	43330	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8

[3]:
```
#info on first dataframe datatypes and non-nulls

df1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 264836 entries, 0 to 264835
Data columns (total 8 columns):
 #   Column          Non-Null Count   Dtype
---  ------          --------------   -----
 0   DATE            264836 non-null  int64
```

```
 1   STORE_NBR       264836 non-null  int64
 2   LYLTY_CARD_NBR  264836 non-null  int64
 3   TXN_ID          264836 non-null  int64
 4   PROD_NBR        264836 non-null  int64
 5   PROD_NAME       264836 non-null  object
 6   PROD_QTY        264836 non-null  int64
 7   TOT_SALES       264836 non-null  float64
dtypes: float64(1), int64(6), object(1)
memory usage: 16.2+ MB
```

[4]:
```
#reading in second dataframe

df2 = pd.read_csv('QVI_purchase_behaviour.csv')
df2.head()
```

[4]:

	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

[5]:
```
#looking at second dataframe datatypes and non-nulls

df2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 72637 entries, 0 to 72636
Data columns (total 3 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   LYLTY_CARD_NBR    72637 non-null  int64
 1   LIFESTAGE         72637 non-null  object
 2   PREMIUM_CUSTOMER  72637 non-null  object
dtypes: int64(1), object(2)
memory usage: 1.7+ MB
```

[6]:
```
#merging both dataframes on loyalty card number

df_main = df1.merge(df2, on='LYLTY_CARD_NBR')
df_main.head()
```

[6]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	\
0	43390	1	1000	1	5	
1	43599	1	1307	348	66	
2	43414	1	1307	346	96	
3	43533	1	1307	347	54	
4	43605	1	1343	383	61	

```
                                PROD_NAME  PROD_QTY  TOT_SALES  \
0  Natural Chip        Compny SeaSalt175g         2        6.0
1                CCs Nacho Cheese    175g         3        6.3
2          WW Original Stacked Chips 160g         2        3.8
3                       CCs Original 175g         1        2.1
4  Smiths Crinkle Cut  Chips Chicken 170g         2        2.9

               LIFESTAGE PREMIUM_CUSTOMER
0   YOUNG SINGLES/COUPLES          Premium
1  MIDAGE SINGLES/COUPLES           Budget
2  MIDAGE SINGLES/COUPLES           Budget
3  MIDAGE SINGLES/COUPLES           Budget
4  MIDAGE SINGLES/COUPLES           Budget
```

[7]:
```
#looking at merged dataframe

df_main.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 264836 entries, 0 to 264835
Data columns (total 10 columns):
 #   Column            Non-Null Count   Dtype  
---  ------            --------------   -----  
 0   DATE              264836 non-null  int64  
 1   STORE_NBR         264836 non-null  int64  
 2   LYLTY_CARD_NBR    264836 non-null  int64  
 3   TXN_ID            264836 non-null  int64  
 4   PROD_NBR          264836 non-null  int64  
 5   PROD_NAME         264836 non-null  object 
 6   PROD_QTY          264836 non-null  int64  
 7   TOT_SALES         264836 non-null  float64
 8   LIFESTAGE         264836 non-null  object 
 9   PREMIUM_CUSTOMER  264836 non-null  object 
dtypes: float64(1), int64(6), object(3)
memory usage: 22.2+ MB
```

[8]:
```
#copying main dataframe for wrangling (df_wrangle)

df_wrangle = df_main.copy()
```

[9]:
```
#converting store number to string values

df_wrangle['STORE_NBR'] = df_wrangle['STORE_NBR'].astype(str)
```

[10]:
```
#converting dates from default excel format to pandas datetime format

```

```
df_wrangle['DATE'] = pd.to_datetime(df_wrangle['DATE'], unit='D',␣
↪origin='12-30-1899')
df_wrangle.head()
```

[10]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES	LIFESTAGE	PREMIUM_CUSTOMER
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0	YOUNG SINGLES/COUPLES	Premium
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3	MIDAGE SINGLES/COUPLES	Budget
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips 160g	2	3.8	MIDAGE SINGLES/COUPLES	Budget
3	2019-03-09	1	1307	347	54	CCs Original 175g	1	2.1	MIDAGE SINGLES/COUPLES	Budget
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9	MIDAGE SINGLES/COUPLES	Budget

[11]:
```
#creating date dataframe grouping by date and counting transaction ids

df_date = df_wrangle[['DATE', 'TXN_ID']].groupby(by='DATE', as_index=False).
↪count()
df_date.head()
```

[11]:

	DATE	TXN_ID
0	2018-07-01	724
1	2018-07-02	711
2	2018-07-03	722
3	2018-07-04	714
4	2018-07-05	712

[12]:
```
#looking at size of dataframe -- showing 364 entries, so one missing date

df_date.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 364 entries, 0 to 363
Data columns (total 2 columns):
 #   Column  Non-Null Count  Dtype
---  ------  --------------  -----
 0   DATE    364 non-null    datetime64[ns]
```

```
 1   TXN_ID  364 non-null    int64
dtypes: datetime64[ns](1), int64(1)
memory usage: 8.5 KB
```

[13]:
```
#looking at quantities of certain types of chips sold

df_wrangle['PROD_NAME'].value_counts()
```

[13]:
```
Kettle Mozzarella   Basil & Pesto 175g      3304
Kettle Tortilla ChpsHny&Jlpno Chili 150g    3296
Cobs Popd Swt/Chlli &Sr/Cream Chips 110g    3269
Tyrrells Crisps     Ched & Chives 165g      3268
Cobs Popd Sea Salt  Chips 110g              3265
                                            …
RRD Pc Sea Salt     165g                    1431
Woolworths Medium   Salsa 300g              1430
NCC Sour Cream &    Garden Chives 175g      1419
French Fries Potato Chips 175g              1418
WW Crinkle Cut      Original 175g           1410
Name: PROD_NAME, Length: 114, dtype: int64
```

[14]:
```
#using regional expression to extract the brand name (first word up to space)␣
 ↪and bag size (numbers in entry)

df_wrangle['BAG_SIZE'] = df_wrangle['PROD_NAME'].str.extract(r'(\d+)')
df_wrangle['BRAND_NAME'] = df_wrangle['PROD_NAME'].str.extract(r'(\w+)')
```

[15]:
```
#putting brand name extracted from prod_name into all caps

df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].str.upper()
```

[16]:
```
#reviewing datatypes of wrangled dataframe so far

df_wrangle.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 264836 entries, 0 to 264835
Data columns (total 12 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   DATE              264836 non-null  datetime64[ns]
 1   STORE_NBR         264836 non-null  object
 2   LYLTY_CARD_NBR    264836 non-null  int64
 3   TXN_ID            264836 non-null  int64
 4   PROD_NBR          264836 non-null  int64
 5   PROD_NAME         264836 non-null  object
 6   PROD_QTY          264836 non-null  int64
 7   TOT_SALES         264836 non-null  float64
```

```
 8   LIFESTAGE         264836 non-null  object
 9   PREMIUM_CUSTOMER  264836 non-null  object
 10  BAG_SIZE          264836 non-null  object
 11  BRAND_NAME        264836 non-null  object
dtypes: datetime64[ns](1), float64(1), int64(4), object(6)
memory usage: 26.3+ MB
```

[17]:
```
#looking at first 10 entries, noticed salsa as one entry

df_wrangle.head(10)
```

[17]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES	LIFESTAGE	PREMIUM_CUSTOMER	BAG_SIZE	BRAND_NAME
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0	YOUNG SINGLES/COUPLES	Premium	175	NATURAL
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3	MIDAGE SINGLES/COUPLES	Budget	175	CCS
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips 160g	2	3.8	MIDAGE SINGLES/COUPLES	Budget	160	WW
3	2019-03-09	1	1307	347	54	CCs Original 175g	1	2.1	MIDAGE SINGLES/COUPLES	Budget	175	CCS
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	2.9	MIDAGE SINGLES/COUPLES	Budget	170	SMITHS
5	2018-08-17	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	15.0	MIDAGE SINGLES/COUPLES	Budget	175	SMITHS
6	2018-08-18	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	13.8	MIDAGE SINGLES/COUPLES	Budget	150	KETTLE
7	2019-05-19	4	4074	2982	57	Old El Paso Salsa Dip Tomato Mild 300g	1	5.1	MIDAGE SINGLES/COUPLES	Budget	300	OLD
8	2018-08-06	4	4074	2978	70	Tyrrells Crisps Lightly Salted 165g	2	8.4	MIDAGE SINGLES/COUPLES	Budget	165	TYRRELLS
9	2018-08-09	4	4074	2979	60	Kettle Tortilla ChpsFeta&Garlic 150g	2	9.2	MIDAGE SINGLES/COUPLES	Budget	150	KETTLE

[18]:
```
#printing value_counts of brand name as well as bag_size

print(df_wrangle['BAG_SIZE'].value_counts())
print(df_wrangle['BRAND_NAME'].value_counts())
```

```
175    66390
150    43131
134    25102
110    22387
170    19983
165    15297
300    15166
330    12540
380     6418
270     6285
210     6272
200     4473
135     3257
250     3169
90      3008
190     2995
160     2970
220     1564
70      1507
180     1468
125     1454
Name: BAG_SIZE, dtype: int64
KETTLE        41288
SMITHS        28860
PRINGLES      25102
DORITOS       24962
THINS         14075
RRD           11894
INFUZIONS     11057
WW            10320
COBS           9693
TOSTITOS       9471
TWISTIES       9454
OLD            9324
TYRRELLS       6442
GRAIN          6272
NATURAL        6050
RED            5885
CHEEZELS       4603
CCS            4551
WOOLWORTHS     4437
DORITO         3185
INFZNS         3144
```

```
SMITH          2963
CHEETOS        2927
SNBTS          1576
BURGER         1564
GRNWVES        1468
SUNBITES       1432
NCC            1419
FRENCH         1418
Name: BRAND_NAME, dtype: int64
```

[19]:
```
#merging brand names that are similar into one brand name

df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'RRD':'RED'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'DORITO':
 ↪'DORITOS'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'WW':'WOOLWORTHS'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'GRAIN':'GRNWVES'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'INFZNS':
 ↪'INFUZIONS'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'SMITH':'SMITHS'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'SNBTS':
 ↪'SUNBITES'})
df_wrangle['BRAND_NAME'] = df_wrangle['BRAND_NAME'].replace({'NCC':'NATURAL'})
```

[20]:
```
#splitting each entry of the prod_name column into a words list

words = df_wrangle['PROD_NAME'].str.split()
```

[21]:
```
#displaying the first 10 sublists of the words list

print(words[:10])
```

```
0               [Natural, Chip, Compny, SeaSalt175g]
1                         [CCs, Nacho, Cheese, 175g]
2               [WW, Original, Stacked, Chips, 160g]
3                            [CCs, Original, 175g]
4       [Smiths, Crinkle, Cut, Chips, Chicken, 170g]
5        [Smiths, Chip, Thinly, S/Cream&Onion, 175g]
6     [Kettle, Tortilla, ChpsHny&Jlpno, Chili, 150g]
7    [Old, El, Paso, Salsa, Dip, Tomato, Mild, 300g]
8          [Tyrrells, Crisps, Lightly, Salted, 165g]
9          [Kettle, Tortilla, ChpsFeta&Garlic, 150g]
Name: PROD_NAME, dtype: object
```

[22]:
```
#this block will create a row_list to find all rows that contain the word salsa.
 ↪  It will iterate through each row and then
#iterate through each word in the list for that row.  It will display the rows␣
 ↪that contain the word 'salsa'
```

```
row_list = []

for i in range(df_wrangle.shape[0]):
    for j in words[i]:
        if j.lower() == 'salsa':
            row_list.append(i)
row_list
```

[22]:
```
[7,
 17,
 50,
 72,
 83,
 87,
 91,
 93,
 99,
 129,
 169,
 170,
 187,
 192,
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 194,
 209,
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 217,
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670,
671,
700,
703,
755,
766,
771,
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797,
807,
818,
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840,
847,
857,
879,
885,
889,
892,
900,
913,
914,
924,
959,
961,
976,
983,
986,
993,
1051,
1056,
1061,
1070,
1077,
1105,
1108,
1141,

1143,
1151,
1168,
1196,
1199,
1208,
1231,
1242,
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1267,
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1387,
1393,
1402,
1413,
1424,
1442,
1466,
1471,
1477,
1501,
1564,
1585,
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1657,
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1713,
1769,
1774,
1775,
1798,
1799,
1800,
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1911,
1956,
1968,
1983,
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1991,
2032,
2039,
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2123,
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2143,
2149,
2152,
2176,
2181,
2209,
2210,
2247,
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2308,
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2574,
2581,
2617,

2619,
2641,
2643,
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2699,
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2733,
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2763,
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2880,
2892,
2898,
2916,
2937,
2964,
2974,
2977,
2981,
2991,
3098,
3111,
3115,
3130,
3131,
3152,
3160,
3163,
3164,
3220,
3227,
3265,
3289,
3356,
3381,
3427,
3454,
3459,
3461,
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3490,

3492,
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3530,
3552,
3568,
3574,
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3587,
3598,
3603,
3617,
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3629,
3670,
3674,
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3751,
3763,
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5478,
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```

[23]:
```
#this block will drop the rows that contain the word salsa then reset the index.
 ↪  The first 10 rows are displayed to ensure
#row 7 has an entry

df_wrangle = df_wrangle.drop(df_wrangle.index[row_list])
df_wrangle = df_wrangle.reset_index(drop=True)
df_wrangle.head(10)
```

[23]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	6.0
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	6.3
2	2018-11-10	1	1307	346	96			
3	2019-03-09	1	1307	347	54			
4	2019-05-20	1	1343	383	61			
5	2018-08-17	2	2373	974	69			
6	2018-08-18	2	2426	1038	108			
7	2018-08-06	4	4074	2978	70			
8	2018-08-09	4	4074	2979	60			
9	2018-12-12	4	4074	2980	4			

```
2            WW Original Stacked Chips 160g         2        3.8
3                        CCs Original 175g          1        2.1
4    Smiths Crinkle Cut  Chips Chicken 170g         2        2.9
5    Smiths Chip Thinly  S/Cream&Onion 175g         5       15.0
6  Kettle Tortilla ChpsHny&Jlpno Chili 150g         3       13.8
7   Tyrrells Crisps     Lightly Salted 165g         2        8.4
8      Kettle Tortilla ChpsFeta&Garlic 150g         2        9.2
9          Dorito Corn Chp     Supreme 380g         2       13.0

                LIFESTAGE PREMIUM_CUSTOMER BAG_SIZE  BRAND_NAME
0   YOUNG SINGLES/COUPLES          Premium      175     NATURAL
1  MIDAGE SINGLES/COUPLES           Budget      175         CCS
2  MIDAGE SINGLES/COUPLES           Budget      160  WOOLWORTHS
3  MIDAGE SINGLES/COUPLES           Budget      175         CCS
4  MIDAGE SINGLES/COUPLES           Budget      170      SMITHS
5  MIDAGE SINGLES/COUPLES           Budget      175      SMITHS
6  MIDAGE SINGLES/COUPLES           Budget      150      KETTLE
7  MIDAGE SINGLES/COUPLES           Budget      165    TYRRELLS
8  MIDAGE SINGLES/COUPLES           Budget      150      KETTLE
9  MIDAGE SINGLES/COUPLES           Budget      380     DORITOS
```

[24]:
```
#looking at the size of the dataframe so far, it is reduced down to 246742 entries

df_wrangle.info()
```

```
<class 'pandas.core.frame.DataFrame'>
RangeIndex: 246742 entries, 0 to 246741
Data columns (total 12 columns):
 #   Column            Non-Null Count   Dtype
---  ------            --------------   -----
 0   DATE              246742 non-null  datetime64[ns]
 1   STORE_NBR         246742 non-null  object
 2   LYLTY_CARD_NBR    246742 non-null  int64
 3   TXN_ID            246742 non-null  int64
 4   PROD_NBR          246742 non-null  int64
 5   PROD_NAME         246742 non-null  object
 6   PROD_QTY          246742 non-null  int64
 7   TOT_SALES         246742 non-null  float64
 8   LIFESTAGE         246742 non-null  object
 9   PREMIUM_CUSTOMER  246742 non-null  object
 10  BAG_SIZE          246742 non-null  object
 11  BRAND_NAME        246742 non-null  object
dtypes: datetime64[ns](1), float64(1), int64(4), object(6)
memory usage: 22.6+ MB
```

[25]:
```
#looking at numeric values and statistics for the dataframe

df_wrangle.describe()
```

[25]:

	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY
count	2.467420e+05	2.467420e+05	246742.000000	246742.000000
mean	1.355310e+05	1.351311e+05	56.351789	1.908062
std	8.071528e+04	7.814772e+04	33.695428	0.659831
min	1.000000e+03	1.000000e+00	1.000000	1.000000
25%	7.001500e+04	6.756925e+04	26.000000	2.000000
50%	1.303670e+05	1.351830e+05	53.000000	2.000000
75%	2.030840e+05	2.026538e+05	87.000000	2.000000
max	2.373711e+06	2.415841e+06	114.000000	200.000000

	TOT_SALES
count	246742.000000
mean	7.321322
std	3.077828
min	1.700000
25%	5.800000
50%	7.400000
75%	8.800000
max	650.000000

[26]:
```
#investigating which rows contain 650 in tot_sales

df_wrangle.query('TOT_SALES == 650')
```

[26]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TOT_SALES	LIFESTAGE	PREMIUM_CUSTOMER	BAG_SIZE	BRAND_NAME
66506	2018-08-19	226	226000	226201	4	Dorito Corn Chp Supreme 380g	200	650.0	OLDER FAMILIES	Premium	380	DORITOS
66507	2019-05-20	226	226000	226210	4	Dorito Corn Chp Supreme 380g	200	650.0	OLDER FAMILIES	Premium	380	DORITOS

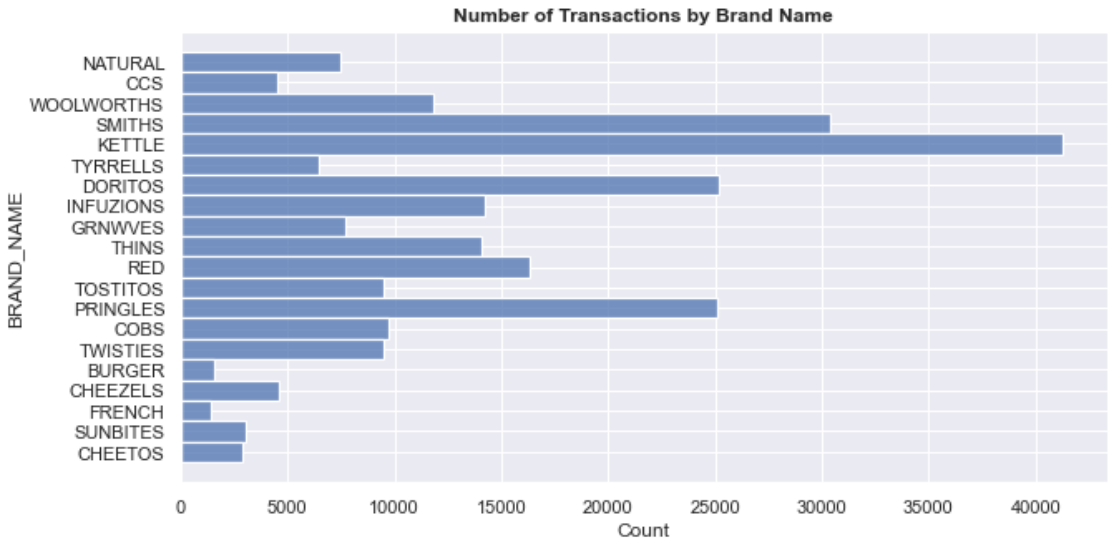
[27]:
```
#since rows are similar, these rows will be dropped from the wrangled dataframe␣
 ↪by querying the dataframe where total_sales
#is not equal to 650

df_wrangle = df_wrangle.query('TOT_SALES != 650')
```

[28]:
```
#looking at numeric statistics after those two rows have been dropped

df_wrangle.describe()
```

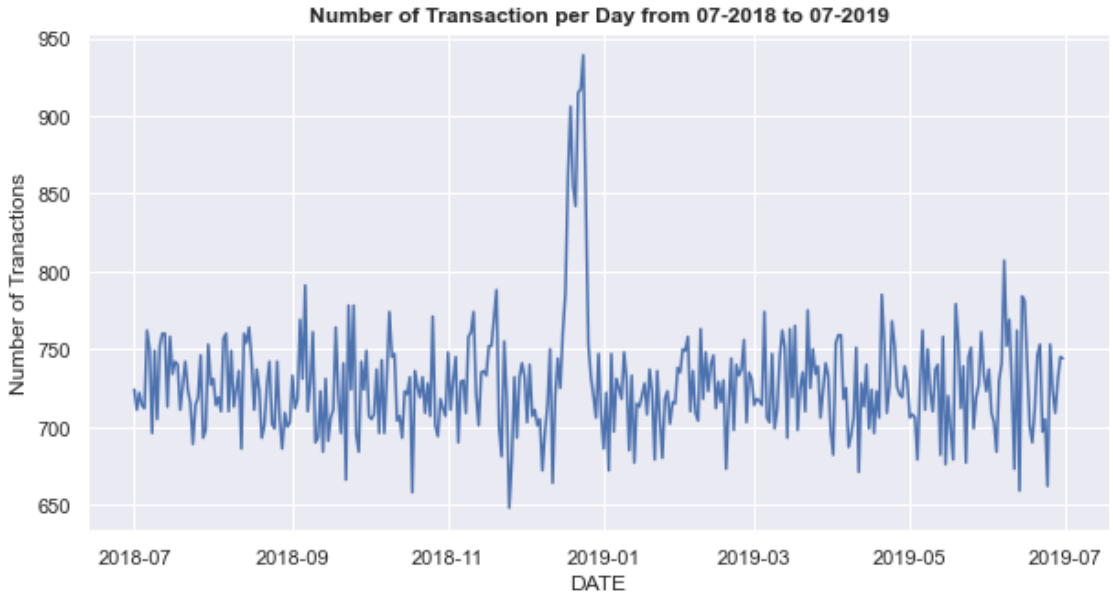
[28]:

	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY	TOT_SALES
count	2.467400e+05	2.467400e+05	246740.000000	246740.000000	246740.000000
mean	1.355303e+05	1.351304e+05	56.352213	1.906456	7.316113
std	8.071520e+04	7.814760e+04	33.695235	0.342499	2.474897
min	1.000000e+03	1.000000e+00	1.000000	1.000000	1.700000
25%	7.001500e+04	6.756875e+04	26.000000	2.000000	5.800000
50%	1.303670e+05	1.351815e+05	53.000000	2.000000	7.400000
75%	2.030832e+05	2.026522e+05	87.000000	2.000000	8.800000
max	2.373711e+06	2.415841e+06	114.000000	5.000000	29.500000

[142]:
```
#this will plot a histogram looking at number of transactions per brand name

plt.figure(figsize=[10,5])

ax = sns.histplot(data = df_wrangle, y='BRAND_NAME')
ax.set_title('Number of Transactions by Brand Name', weight='bold');
```



[30]:
```
#this lineplot looks at number of transactions per day for the entire year

plt.figure(figsize = [10,5])
ax = sns.lineplot(data = df_date, x='DATE', y='TXN_ID')
ax.set_title('Number of Transaction per Day from 07-2018 to 07-2019',␣
 ↪weight='bold')
plt.ylabel('Number of Tranactions');
```



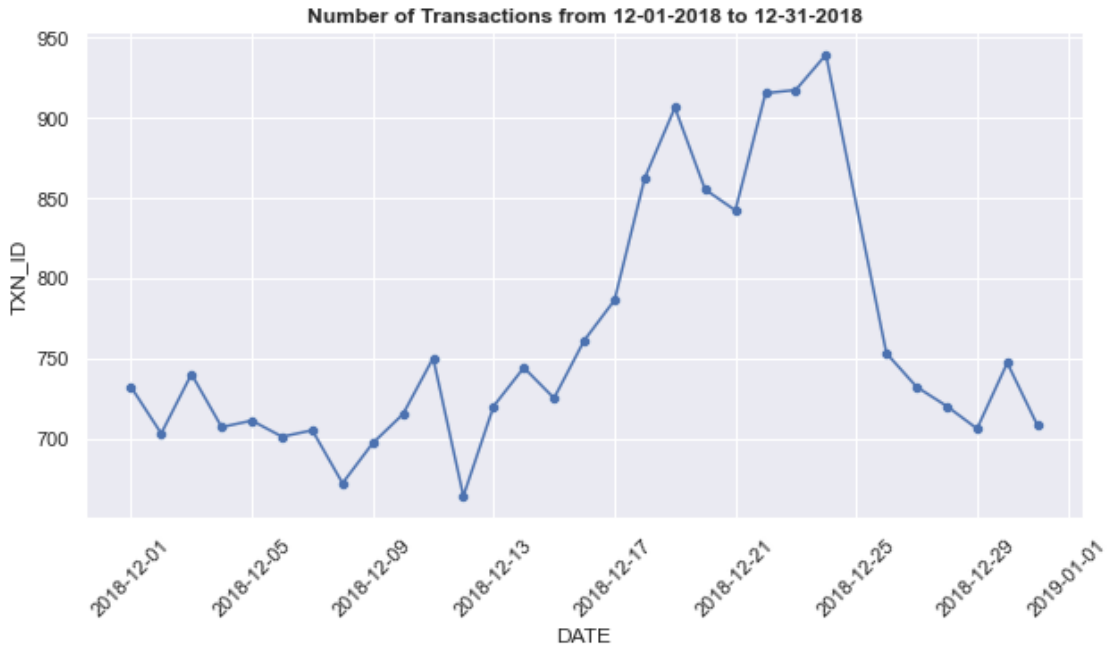
[31]:
```
#this second dataframe focuses on December as there is a spike in transactions.␣
 ↪ Noticed 12-25 is missing, which might
#explain why there is only 364 values.

df_date2 = df_date.query('DATE >= "2018-12-01" & DATE <= "2018-12-31"')
df_date2
```

[31]:

	DATE	TXN_ID
153	2018-12-01	732
154	2018-12-02	703
155	2018-12-03	740
156	2018-12-04	707
157	2018-12-05	711
158	2018-12-06	701
159	2018-12-07	705
160	2018-12-08	672
161	2018-12-09	697

```
162 2018-12-10     715
163 2018-12-11     750
164 2018-12-12     664
165 2018-12-13     720
166 2018-12-14     744
167 2018-12-15     725
168 2018-12-16     761
169 2018-12-17     786
170 2018-12-18     862
171 2018-12-19     906
172 2018-12-20     855
173 2018-12-21     842
174 2018-12-22     915
175 2018-12-23     917
176 2018-12-24     939
177 2018-12-26     753
178 2018-12-27     732
179 2018-12-28     720
180 2018-12-29     706
181 2018-12-30     747
182 2018-12-31     708
```

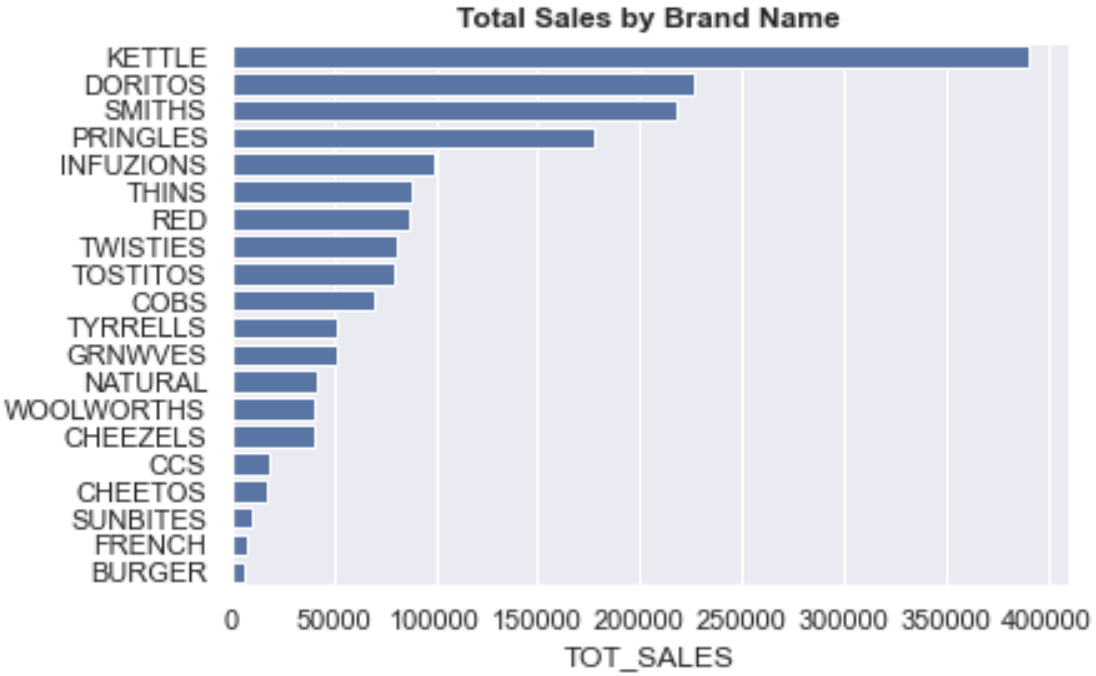
[32]:
```
#this combines a scatterplot labeling each day as well as a line graph showing␣
 ↪the number of transactions
#per day in December

plt.figure(figsize = [10,5])
ax = sns.scatterplot(data = df_date2, x='DATE', y='TXN_ID')
ax.set_title('Number of Transactions from 12-01-2018 to 12-31-2018',␣
 ↪weight='bold')
sns.lineplot(data = df_date2, x='DATE', y='TXN_ID')
plt.xticks(rotation=45);
```



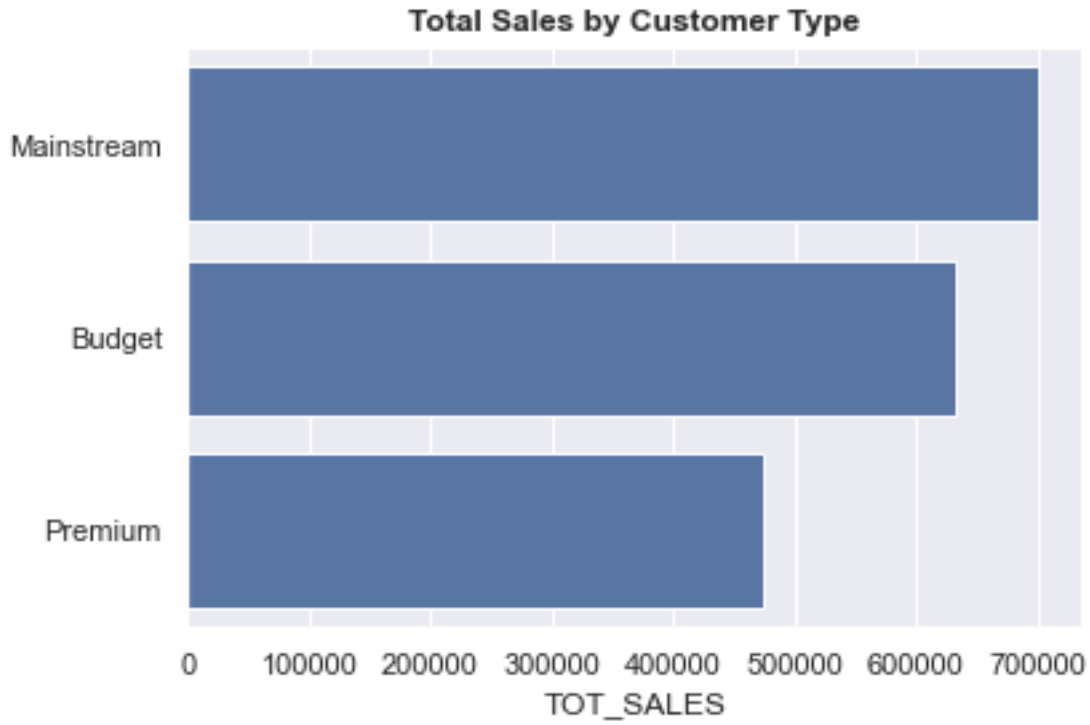
[33]:
```
#this function looks at bivariate analysis between total sales and a certain␣
 ↪column name going into the function
#if the column name is PROD_NAME or STORE_NBR, it will create a top 10 and␣
 ↪bottom 10 as well as a linegraph
#Finally, it will return the graph

def sales_graph(col_name):
    df_sales = df_wrangle[[col_name, 'TOT_SALES']]
    df_sales = df_sales.groupby(by=col_name, as_index=False).sum()
    df_sales = df_sales.sort_values(by='TOT_SALES', ascending = False)
    df_sales = df_sales.reset_index(drop=True)

    blue = sns.color_palette()[0]

    if col_name == 'PROD_NAME' or col_name =='STORE_NBR':
        fig = plt.figure(figsize=[14,8])
        plt.subplot(2,2,1)
        ax = sns.barplot(data = df_sales[df_sales.shape[0]-10:df_sales.
 ↪shape[0]], y=col_name, x='TOT_SALES', color=blue)
        ax.set_title('Bottom 10 ' + col_name, weight='bold')
        plt.ylabel('')

        plt.subplot(2,2,2)
        ax = sns.barplot(data = df_sales[:10], y=col_name, x='TOT_SALES',␣
 ↪color=blue)
```

```
        ax.set_title('Top 10 ' + col_name, weight='bold')
        plt.ylabel('')

        plt.subplot(2,2,3)
        ax = sns.lineplot(data = df_sales, x=col_name, y='TOT_SALES',␣
↪color=blue)
        ax.set_title('Line Plot of ' + col_name, weight='bold')
        plt.xticks([])
        plt.ylabel('')

        plt.subplots_adjust(wspace=0.8, hspace=0.4)
        return fig

    else:
        g = sns.barplot(data = df_sales, y=col_name, x='TOT_SALES', color=blue)
        plt.ylabel('');
        return g
```

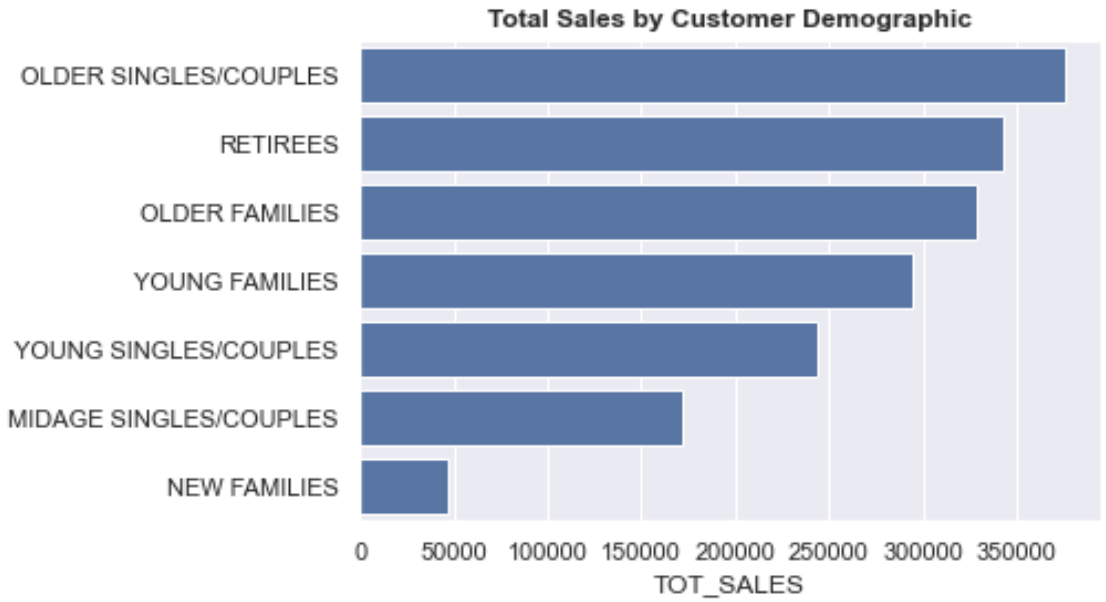
[34]:
```
#Looking at Brand Name using the sales_graph function showing total sales per␣
↪brand name

g1 = sales_graph('BRAND_NAME')
g1.set_title('Total Sales by Brand Name', weight='bold');
```



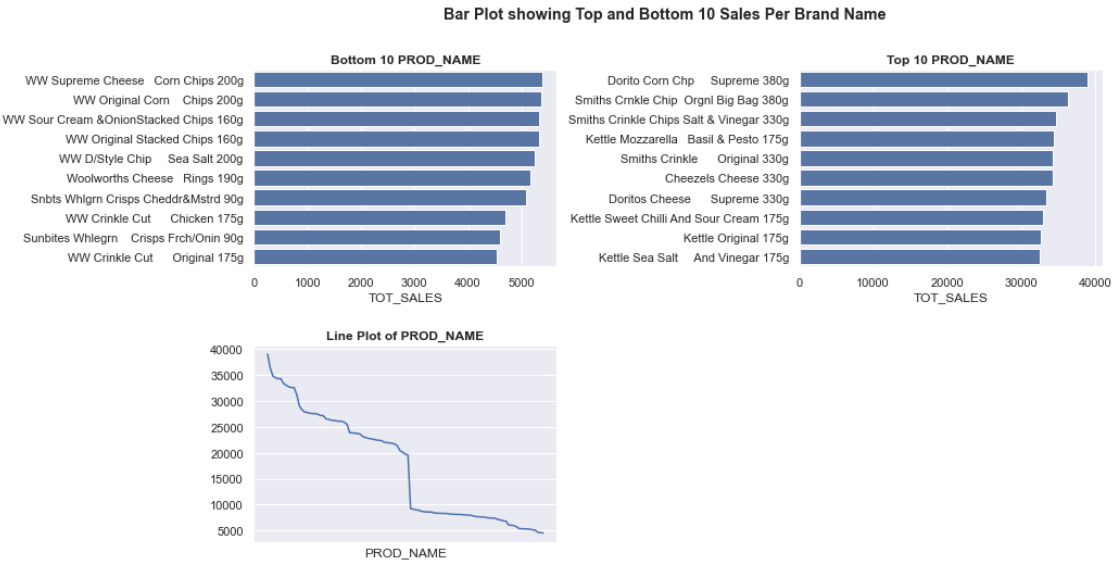
[35]:
```
#looking at which type of customer creates the most sales

g2 = sales_graph('PREMIUM_CUSTOMER')
g2.set_title('Total Sales by Customer Type', weight='bold');
```



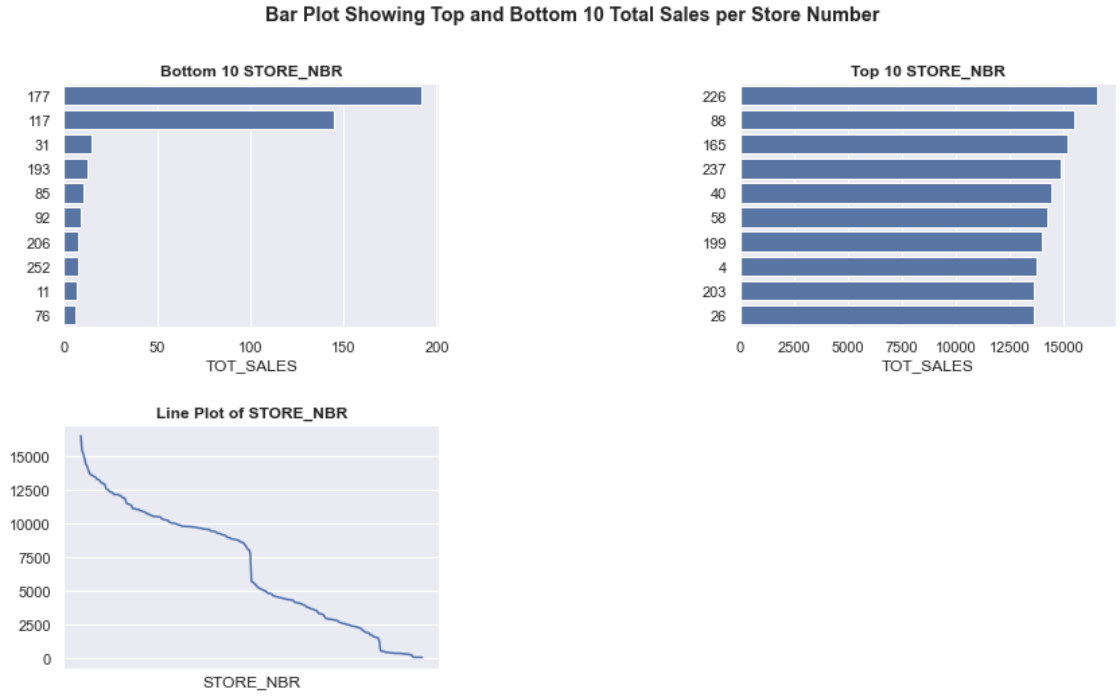
[36]:
```
#this graph shows total sales by customer demographic

g3 = sales_graph('LIFESTAGE')
g3.set_title('Total Sales by Customer Demographic', weight='bold');
```



[37]:
```
#this shows the bottom and top performing chips as well as having a linegraph␣
↪showing range of sales

g4 = sales_graph('PROD_NAME')
g4.suptitle('Bar Plot showing Top and Bottom 10 Sales Per Brand Name',␣
↪weight='bold');
```



[38]:
```
#these graphs focus on the top and bottom performing stores as well as show the␣
 ↪range of total sales on chips per store

g5 = sales_graph('STORE_NBR');
g5.suptitle('Bar Plot Showing Top and Bottom 10 Total Sales per Store Number',␣
 ↪weight='bold');
```

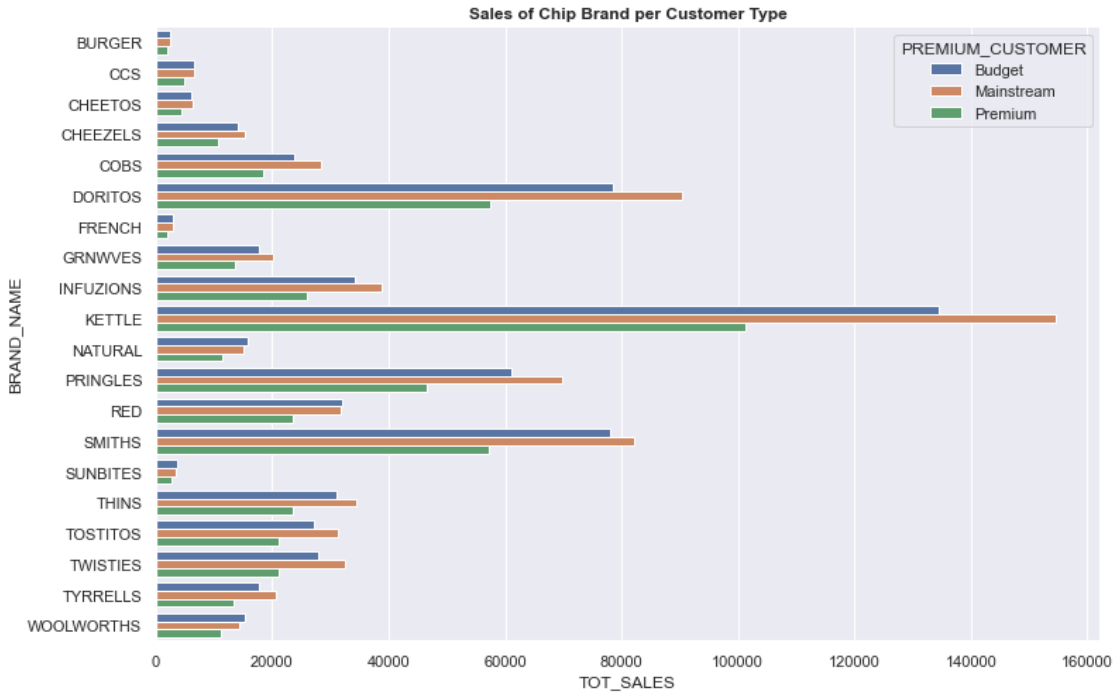


[39]:
```
#this dataframe grabs brand_name, premium_customer, and total_sales and groups␣
 ↪by brand_name and premium customer by taking
#the sum of total_sales

df_group1 = df_wrangle[['BRAND_NAME', 'PREMIUM_CUSTOMER', 'TOT_SALES']]
df_group1 = df_group1.groupby(by=['BRAND_NAME', 'PREMIUM_CUSTOMER'],␣
 ↪as_index=False).sum()
df_group1.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 60 entries, 0 to 59
Data columns (total 3 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   BRAND_NAME        60 non-null     object
 1   PREMIUM_CUSTOMER  60 non-null     object
 2   TOT_SALES         60 non-null     float64
dtypes: float64(1), object(2)
```

```
memory usage: 1.9+ KB
```

[144]:
```
#this graphs all the brands of chips and shows sales per customer type

plt.figure(figsize=[12,8])

g6 = sns.barplot(data=df_group1, y='BRAND_NAME', x='TOT_SALES',␣
↪hue='PREMIUM_CUSTOMER', ci=None)
g6.set_title('Sales of Chip Brand per Customer Type', weight='bold');
```



[41]:
```
#the second group, grabs premium customer, lifestage, and total sales then␣
↪groups by premium customer and lifestage
#by taking the sum of tot_sales

df_group2 = df_wrangle[['PREMIUM_CUSTOMER', 'LIFESTAGE', 'TOT_SALES']]
df_group2 = df_group2.groupby(by=['PREMIUM_CUSTOMER', 'LIFESTAGE'],␣
↪as_index=False).sum()
df_group2.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 21 entries, 0 to 20
Data columns (total 3 columns):
 #   Column            Non-Null Count  Dtype
---  ------            --------------  -----
 0   PREMIUM_CUSTOMER  21 non-null     object
```

```
 1   LIFESTAGE         21 non-null     object
 2   TOT_SALES         21 non-null     float64
dtypes: float64(1), object(2)
memory usage: 672.0+ bytes
```

[44]:
```
#this adds up all total sales in the tot_sales column

total_sales = df_group2['TOT_SALES'].sum()
total_sales
```

[44]:
```
1805177.699999998
```

[50]:
```
#this creates a prop column by dividing each value in that column by␣
↪total_sales and multiplying it by 100

df_group2['PROP'] = (df_group2['TOT_SALES'] / total_sales) * 100
```

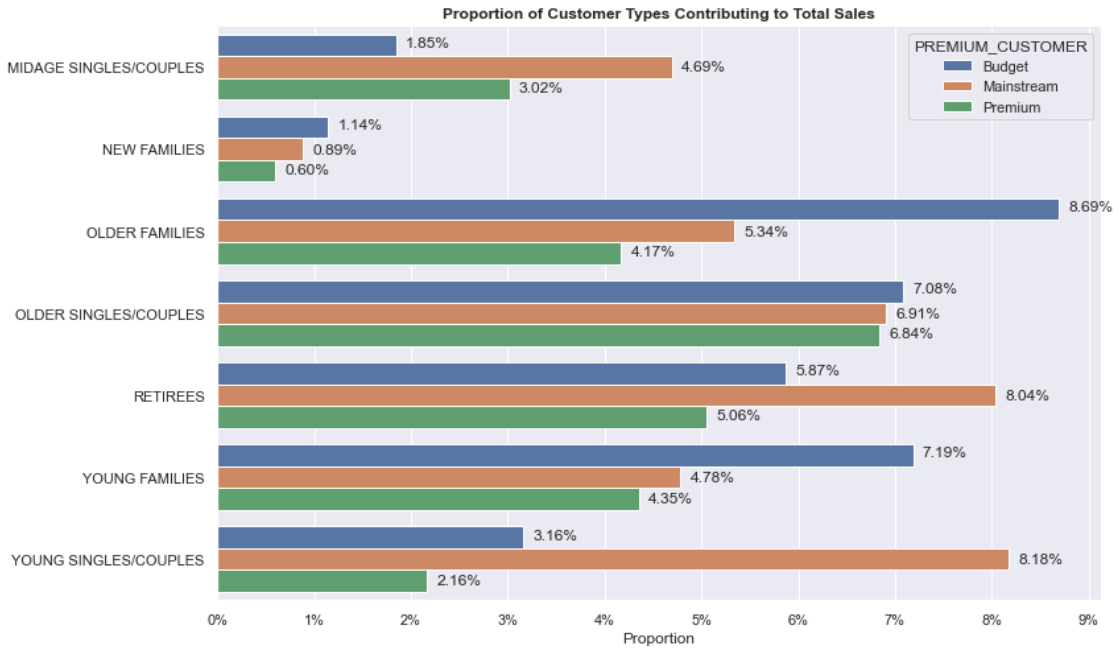
[62]:
```
#displaying df_group2 dataframe

df_group2
```

[62]:

	PREMIUM_CUSTOMER	LIFESTAGE	TOT_SALES	PROP
0	Budget	MIDAGE SINGLES/COUPLES	33345.70	1.847225
1	Budget	NEW FAMILIES	20607.45	1.141575
2	Budget	OLDER FAMILIES	156863.75	8.689657
3	Budget	OLDER SINGLES/COUPLES	127833.60	7.081497
4	Budget	RETIREES	105916.30	5.867361
5	Budget	YOUNG FAMILIES	129717.95	7.185883
6	Budget	YOUNG SINGLES/COUPLES	57122.10	3.164348
7	Mainstream	MIDAGE SINGLES/COUPLES	84734.25	4.693956
8	Mainstream	NEW FAMILIES	15979.70	0.885215
9	Mainstream	OLDER FAMILIES	96413.55	5.340945
10	Mainstream	OLDER SINGLES/COUPLES	124648.50	6.905054
11	Mainstream	RETIREES	145168.95	8.041809
12	Mainstream	YOUNG FAMILIES	86338.25	4.782812
13	Mainstream	YOUNG SINGLES/COUPLES	147582.20	8.175494
14	Premium	MIDAGE SINGLES/COUPLES	54443.85	3.015983
15	Premium	NEW FAMILIES	10760.80	0.596108
16	Premium	OLDER FAMILIES	75242.60	4.168155
17	Premium	OLDER SINGLES/COUPLES	123537.55	6.843512
18	Premium	RETIREES	91296.65	5.057488
19	Premium	YOUNG FAMILIES	78571.70	4.352574
20	Premium	YOUNG SINGLES/COUPLES	39052.30	2.163349

[83]:
```
#creating bar graph showing proportion of customers contributing to total sales
#top 3 include older families-budget, mainstream-retirees, and budget-young␣
↪families
```

```
#it also displays a text value showing each percentage for each customer␣
 ↪demographic and group

plt.figure(figsize=[12,8])

prop = np.arange(0, 10, 1)
prop_label = [str(x)+'%' for x in prop]

g = sns.barplot(data=df_group2, x='PROP', y='LIFESTAGE', hue='PREMIUM_CUSTOMER')
g.set_title('Proportion of Customer Types Contributing to Total Sales',␣
 ↪weight='bold')
plt.xlabel('Proportion')
plt.ylabel('')
plt.xticks(prop, prop_label)

for x in range(21):
    prop = df_group2['PROP'][x]
    prop_str = '{:0.2f}%'.format(prop)
    if x < 7:
        plt.text(prop+0.1, x - 0.25, prop_str)
    elif x < 14 and x >= 7:
        plt.text(prop+0.1, x%7 + 0.05, prop_str)
    else:
        plt.text(prop+0.1, x%7 + 0.3, prop_str)
```



[107]:
```
#creating third grouping dataframe extracting premium customer, lifestage, and␣
 ↪loyalty card number
#next is drops any duplicate loyalty card number focusing on number of␣
 ↪different customers
#then it groups by premium customer and lifestage by counting the number of␣
 ↪unique customers
#finally it renames the lylty_card_nbr column to count then displays the␣
 ↪dataframe

df_group3 = df_wrangle[['PREMIUM_CUSTOMER', 'LIFESTAGE', 'LYLTY_CARD_NBR']]
df_group3 = df_group3.drop_duplicates('LYLTY_CARD_NBR')
df_group3 = df_group3.groupby(by=['PREMIUM_CUSTOMER', 'LIFESTAGE'],␣
 ↪as_index=False).count()
df_group3 = df_group3.rename(columns={'LYLTY_CARD_NBR':'COUNT'})
df_group3
```

[107]:

	PREMIUM_CUSTOMER	LIFESTAGE	COUNT
0	Budget	MIDAGE SINGLES/COUPLES	1474
1	Budget	NEW FAMILIES	1087
2	Budget	OLDER FAMILIES	4611
3	Budget	OLDER SINGLES/COUPLES	4849
4	Budget	RETIREES	4385
5	Budget	YOUNG FAMILIES	3953
6	Budget	YOUNG SINGLES/COUPLES	3647
7	Mainstream	MIDAGE SINGLES/COUPLES	3298
8	Mainstream	NEW FAMILIES	830
9	Mainstream	OLDER FAMILIES	2788
10	Mainstream	OLDER SINGLES/COUPLES	4858
11	Mainstream	RETIREES	6358
12	Mainstream	YOUNG FAMILIES	2685
13	Mainstream	YOUNG SINGLES/COUPLES	7917
14	Premium	MIDAGE SINGLES/COUPLES	2369
15	Premium	NEW FAMILIES	575
16	Premium	OLDER FAMILIES	2231
17	Premium	OLDER SINGLES/COUPLES	4682
18	Premium	RETIREES	3812
19	Premium	YOUNG FAMILIES	2398
20	Premium	YOUNG SINGLES/COUPLES	2480

[108]:
```
#summing up total count of unique customers

total_count = df_group3['COUNT'].sum()
total_count
```

[108]: 71287

[111]:
```
#calculating a proportion dividing the count values in that column by␣
 ↪total_count then multiplying by 100

df_group3['PROP'] = (df_group3['COUNT'] / total_count)*100
```

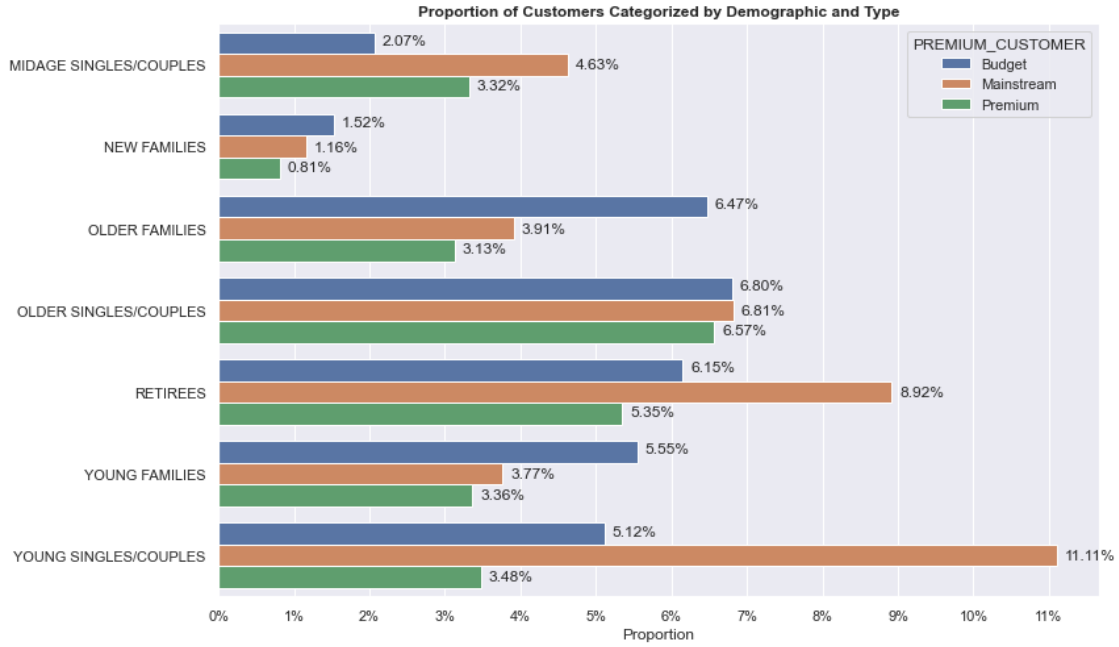
[112]:
```
#displaying the third dataframe

df_group3
```

[112]:

	PREMIUM_CUSTOMER	LIFESTAGE	COUNT	PROP
0	Budget	MIDAGE SINGLES/COUPLES	1474	2.067698
1	Budget	NEW FAMILIES	1087	1.524822
2	Budget	OLDER FAMILIES	4611	6.468220
3	Budget	OLDER SINGLES/COUPLES	4849	6.802082
4	Budget	RETIREES	4385	6.151192
5	Budget	YOUNG FAMILIES	3953	5.545191
6	Budget	YOUNG SINGLES/COUPLES	3647	5.115940
7	Mainstream	MIDAGE SINGLES/COUPLES	3298	4.626369
8	Mainstream	NEW FAMILIES	830	1.164308
9	Mainstream	OLDER FAMILIES	2788	3.910952
10	Mainstream	OLDER SINGLES/COUPLES	4858	6.814707
11	Mainstream	RETIREES	6358	8.918877
12	Mainstream	YOUNG FAMILIES	2685	3.766465
13	Mainstream	YOUNG SINGLES/COUPLES	7917	11.105812
14	Premium	MIDAGE SINGLES/COUPLES	2369	3.323187
15	Premium	NEW FAMILIES	575	0.806599
16	Premium	OLDER FAMILIES	2231	3.129603
17	Premium	OLDER SINGLES/COUPLES	4682	6.567817
18	Premium	RETIREES	3812	5.347399
19	Premium	YOUNG FAMILIES	2398	3.363867
20	Premium	YOUNG SINGLES/COUPLES	2480	3.478895

[116]:
```
#similar to the previous barplot, it displays the proportion of customers by␣
 ↪type and demographic then displays
#the percentage to each group. Mainstream young singles/couples account for␣
 ↪most of the customers followed by mainstream
#retirees

plt.figure(figsize=[12,8])

prop = np.arange(0, 12, 1)
prop_label = [str(x)+'%' for x in prop]

g = sns.barplot(data=df_group3, x='PROP', y='LIFESTAGE', hue='PREMIUM_CUSTOMER')
g.set_title('Proportion of Customers Categorized by Demographic and Type',␣
 ↪weight='bold')
plt.xlabel('Proportion')
```

```
plt.ylabel('')
plt.xticks(prop, prop_label)

for x in range(21):
    prop = df_group3['PROP'][x]
    prop_str = '{:0.2f}%'.format(prop)
    if x < 7:
        plt.text(prop+0.1, x - 0.25, prop_str)
    elif x < 14 and x >= 7:
        plt.text(prop+0.1, x%7 + 0.05, prop_str)
    else:
        plt.text(prop+0.1, x%7 + 0.3, prop_str)
```



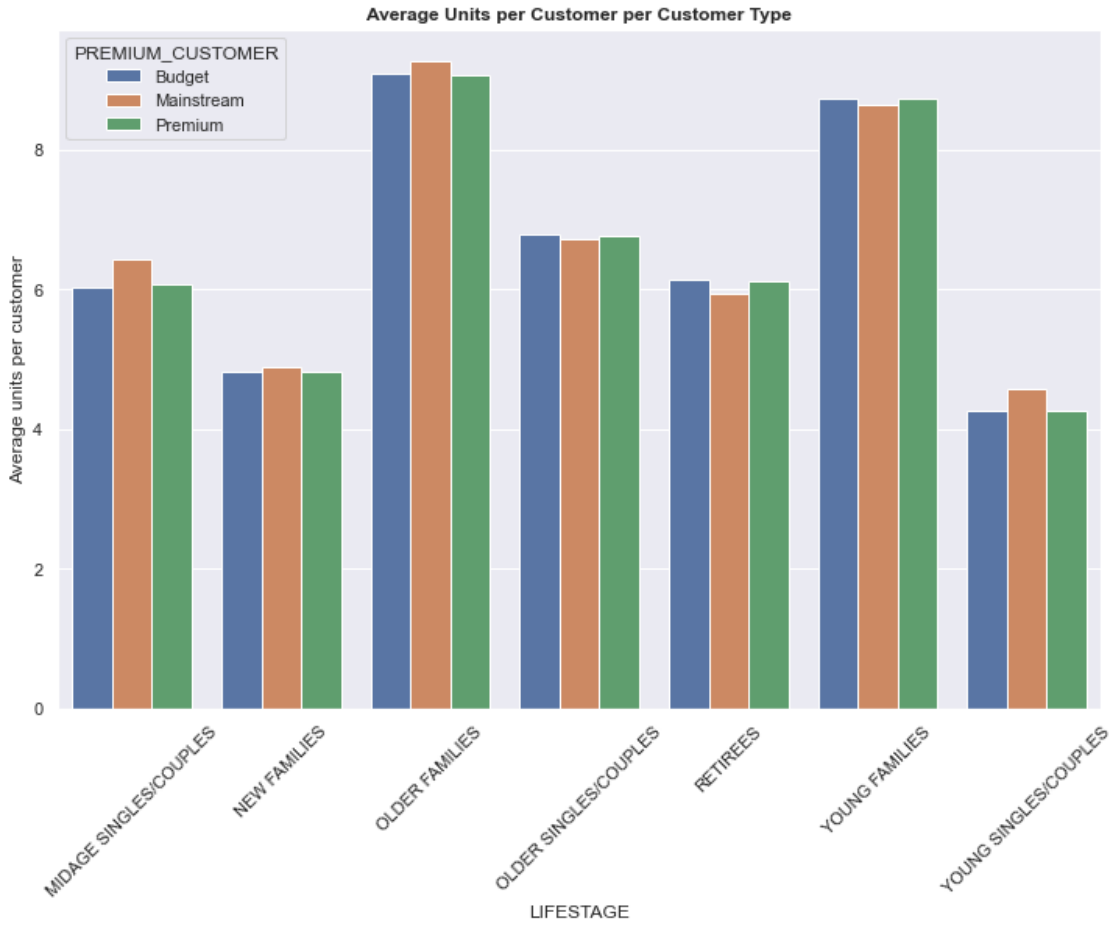
[123]:
```
#the fourth group extracts lylty_card_number, prod_qty, premium_customer, and␣
 ↪lifestage
#next it groups each customer by summing up the prod_qty, then groups it again␣
 ↪by taking the average of quantity
#purchased for each customer demographic and type then displays the dataframe

df_group4 = df_wrangle[['LYLTY_CARD_NBR','PROD_QTY', 'PREMIUM_CUSTOMER',␣
 ↪'LIFESTAGE']]
df_group4 = df_group4.groupby(by=['PREMIUM_CUSTOMER', 'LIFESTAGE',␣
 ↪'LYLTY_CARD_NBR'], as_index=False).sum()
df_group4 = df_group4.groupby(by=['PREMIUM_CUSTOMER', 'LIFESTAGE'],␣
 ↪as_index=False).mean()
```

```
df_group4
```

[123]:

	PREMIUM_CUSTOMER	LIFESTAGE	LYLTY_CARD_NBR	PROD_QTY
0	Budget	MIDAGE SINGLES/COUPLES	139568.736771	6.026459
1	Budget	NEW FAMILIES	135402.718491	4.821527
2	Budget	OLDER FAMILIES	135762.774019	9.076773
3	Budget	OLDER SINGLES/COUPLES	137848.987008	6.781398
4	Budget	RETIREES	136730.930445	6.141847
5	Budget	YOUNG FAMILIES	136932.194789	8.722995
6	Budget	YOUNG SINGLES/COUPLES	134862.341376	4.250069
7	Mainstream	MIDAGE SINGLES/COUPLES	134471.814130	6.432080
8	Mainstream	NEW FAMILIES	131650.580723	4.891566
9	Mainstream	OLDER FAMILIES	135539.159254	9.255380
10	Mainstream	OLDER SINGLES/COUPLES	133653.509881	6.712021
11	Mainstream	RETIREES	137882.138723	5.925920
12	Mainstream	YOUNG FAMILIES	139142.329609	8.638361
13	Mainstream	YOUNG SINGLES/COUPLES	135998.656436	4.575597
14	Premium	MIDAGE SINGLES/COUPLES	137483.508653	6.078514
15	Premium	NEW FAMILIES	136969.196522	4.815652
16	Premium	OLDER FAMILIES	134874.900493	9.071717
17	Premium	OLDER SINGLES/COUPLES	135132.831269	6.769543
18	Premium	RETIREES	135786.997901	6.103358
19	Premium	YOUNG FAMILIES	136480.909925	8.716013
20	Premium	YOUNG SINGLES/COUPLES	137479.734677	4.264113

[145]:
```
#this displays a bar graph showing each customer demographic and type showing␣
 ↪the average units purchased per customer
#older and young families tend to purchase the most chips on average despite␣
 ↪the type of group they are in

plt.figure(figsize = [12,8])

g = sns.barplot(data=df_group4, x='LIFESTAGE', y='PROD_QTY',␣
 ↪hue='PREMIUM_CUSTOMER', ci=None)
g.set_title('Average Units per Customer per Customer Type', weight='bold')
plt.ylabel('Average units per customer')
plt.xticks(rotation=45);
```



[130]:
```
#the fifth group looks at unit price per transaction. It extracts prod_qty,␣
 ↪tot_sales, lifestage, and premium_customer
#then calculates unit_price then groups it by the average unit price for each␣
 ↪customer demographic and type

df_group5 = df_wrangle[['PROD_QTY', 'TOT_SALES', 'LIFESTAGE',␣
 ↪'PREMIUM_CUSTOMER']]
df_group5['UNIT_PRICE'] = df_group5['TOT_SALES'] / df_group5['PROD_QTY']
df_group5 = df_group5[['LIFESTAGE', 'PREMIUM_CUSTOMER', 'UNIT_PRICE']]
df_group5 = df_group5.groupby(by=['LIFESTAGE', 'PREMIUM_CUSTOMER'],␣
 ↪as_index=False).mean()
df_group5
```

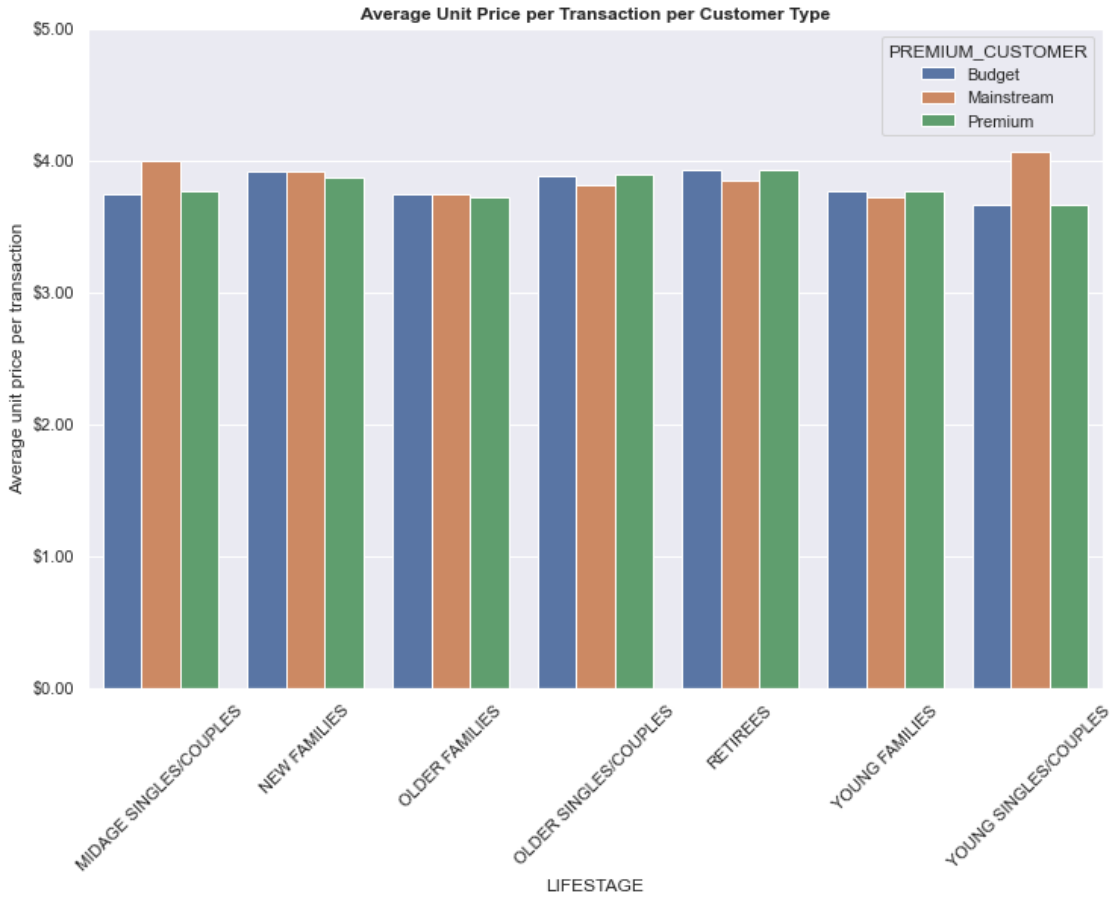
```
<ipython-input-130-b048e10e9dad>:2: SettingWithCopyWarning:
A value is trying to be set on a copy of a slice from a DataFrame.
Try using .loc[row_indexer,col_indexer] = value instead

See the caveats in the documentation: https://pandas.pydata.org/pandas-
```

```
docs/stable/user_guide/indexing.html#returning-a-view-versus-a-copy
  df_group5['UNIT_PRICE'] = df_group5['TOT_SALES'] / df_group5['PROD_QTY']
```

[130]:

	LIFESTAGE	PREMIUM_CUSTOMER	UNIT_PRICE
0	MIDAGE SINGLES/COUPLES	Budget	3.743328
1	MIDAGE SINGLES/COUPLES	Mainstream	3.994241
2	MIDAGE SINGLES/COUPLES	Premium	3.770698
3	NEW FAMILIES	Budget	3.917688
4	NEW FAMILIES	Mainstream	3.916133
5	NEW FAMILIES	Premium	3.872110
6	OLDER FAMILIES	Budget	3.745340
7	OLDER FAMILIES	Mainstream	3.737077
8	OLDER FAMILIES	Premium	3.717000
9	OLDER SINGLES/COUPLES	Budget	3.882096
10	OLDER SINGLES/COUPLES	Mainstream	3.814665
11	OLDER SINGLES/COUPLES	Premium	3.893182
12	RETIREES	Budget	3.924404
13	RETIREES	Mainstream	3.844294
14	RETIREES	Premium	3.920942
15	YOUNG FAMILIES	Budget	3.760737
16	YOUNG FAMILIES	Mainstream	3.724533
17	YOUNG FAMILIES	Premium	3.762150
18	YOUNG SINGLES/COUPLES	Budget	3.657366
19	YOUNG SINGLES/COUPLES	Mainstream	4.065642
20	YOUNG SINGLES/COUPLES	Premium	3.665414

[150]:
```
#This bar graph displays the average unit price per

plt.figure(figsize=[12,8])
ticks = np.arange(0, 5.0+1.0, 1.0)
tick_val = ['${:0.2f}'.format(x) for x in ticks]

g5 = sns.barplot(data=df_group5, x='LIFESTAGE', y='UNIT_PRICE',␣
 ↪hue='PREMIUM_CUSTOMER', ci=None)
g5.set_title('Average Unit Price per Transaction per Customer Type',␣
 ↪weight='bold')
plt.ylabel('Average unit price per transaction')
plt.yticks(ticks, tick_val)
plt.xticks(rotation=45);
```


Average Unit Price per Transaction per Customer Type
PREMIUM_CUSTOMER
Budget
Mainstream
Premium
$5.00
$4.00
$3.00
$2.00
$1.00
$0.00
Average unit price per transaction
MIDAGE SINGLES/COUPLES
NEW FAMILIES
OLDER FAMILIES
OLDER SINGLES/COUPLES
RETIREES
YOUNG FAMILIES
YOUNG SINGLES/COUPLES
LIFESTAGE