In [1]:

```
import pandas as pd
import numpy as np
from IPython.display import Image  # To display images in jupyter notebook
from matplotlib import pyplot as plt
import seaborn as sns
plt.style.use("ggplot")
```

In [2]:

```
transaction_df = pd.read_excel(io='transaction_data.xlsx')
customer_df = pd.read_excel(io='purchase_behaviour.xlsx')
```

Analyse Transaction Data

In [3]:

```
print(transaction_df.shape)
transaction_df.head()
```

```
(264836, 8)
```

Out[3]:

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

In [4]:

```
# Check for any null value in 'DATE'

any(transaction_df['DATE'].isna())
```

Out[4]:

```
False
```

In [5]:

```
# Bring date to their propper format

from datetime import date, timedelta

start_date = date(1899, 12, 30)  # excel start date

new_dates = [start_date + timedelta(days=days) for days in transaction_df['DATE']]
transaction_df['DATE'] = new_dates
```

In [6]:

```
transaction_df.head()
```

Out[6]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	T
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	
2	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	
3	2018-08-17	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	
4	2018-08-18	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	

In [7]:

```
# Seperate Weight from the product name

PROD_WEIGHT = [product[len(product)-4: len(product)-1] for product in transaction_df['PROD_
transaction_df['PROD_WEIGHT(g)'] = PROD_WEIGHT
```

In [8]:

```
transaction_df.head()
```

Out[8]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	T
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt175g	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese 175g	3	
2	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken 170g	2	
3	2018-08-17	2	2373	974	69	Smiths Chip Thinly S/Cream&Onion 175g	5	
4	2018-08-18	2	2426	1038	108	Kettle Tortilla ChpsHny&Jlpno Chili 150g	3	

In [9]:

```
transaction_df['PROD_WEIGHT(g)'].unique()
```

Out[9]:

```
array(['175', '170', '150', '300', '330', '210', '270', '220', '125',
       '110', '134', '380', '180', '165', 'Sal', '250', '200', '160',
       '190', ' 90', ' 70'], dtype=object)
```

Here we have 'Sal' in unique value... Now we will deal with it.

In [10]:

```
# Check which Product gives us 'Sal' in PROD_WEIGHT(g)

f_mask = (transaction_df['PROD_WEIGHT(g)'] == 'Sal')
t_d = transaction_df[f_mask]
t_d.head()
```

Out[10]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY
65	2019-05-20	83	83008	82099	63	Kettle 135g Swt Pot Sea Salt	2
153	2019-05-17	208	208139	206906	63	Kettle 135g Swt Pot Sea Salt	1
174	2018-08-20	237	237227	241132	63	Kettle 135g Swt Pot Sea Salt	2
177	2019-05-17	243	243070	246706	63	Kettle 135g Swt Pot Sea Salt	1
348	2018-10-26	7	7077	6604	63	Kettle 135g Swt Pot Sea Salt	2

In [11]:

```
t_d['PROD_NAME'] .unique()
```

Out[11]:

```
array(['Kettle 135g Swt Pot Sea Salt'], dtype=object)
```

We see that name is 'Kettle 135g Swt Pot Sea' is not fomatted like other Product names.

In [12]:

```
# <<--- Replace all 'Kettle 135g Swt Pot Sea' with 'Kettle Swt Pot Sea' from PROD_NAME colu

transaction_df['PROD_NAME'].replace(to_replace='Kettle 135g Swt Pot Sea', value='Kettle Swt

# <<--- Replace all 'Sal' with 135 from PROD_WEIGHT(g) column --->>

transaction_df['PROD_WEIGHT(g)'].replace(to_replace='Sal', value=135, inplace=True)
```

In [13]:

```
# Seperate Name from the product name

PROD_NAME = [product[: len(product)-4].strip() for product in transaction_df['PROD_NAME']]
transaction_df['PROD_NAME'] = PROD_NAME
```

In [14]:

```
# Merge both the data frames

df = pd.merge(left=transaction_df, right=customer_df, on='LYLTY_CARD_NBR')
df.head()
```

Out[14]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TO
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese	3	
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips	2	
3	2019-03-09	1	1307	347	54	CCs Original	1	
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	2	

In [15]:

```
# Convert PROD_WEIGHT(g) from string datatype to interger

df['PROD_WEIGHT(g)'] = df['PROD_WEIGHT(g)'].astype(int)
```

In [16]:

```
# Convert DATE from object to datetime

df['DATE'] = pd.to_datetime(df['DATE'], format='%Y-%m-%d')
```

In [17]:

```
df.info()
```

```
<class 'pandas.core.frame.DataFrame'>
Int64Index: 264836 entries, 0 to 264835
Data columns (total 11 columns):
DATE                264836 non-null datetime64[ns]
STORE_NBR           264836 non-null int64
LYLTY_CARD_NBR      264836 non-null int64
TXN_ID              264836 non-null int64
PROD_NBR            264836 non-null int64
PROD_NAME           264836 non-null object
PROD_QTY            264836 non-null int64
TOT_SALES           264836 non-null float64
PROD_WEIGHT(g)      264836 non-null int32
LIFESTAGE           264836 non-null object
PREMIUM_CUSTOMER    264836 non-null object
dtypes: datetime64[ns](1), float64(1), int32(1), int64(5), object(3)
memory usage: 23.2+ MB
```

There is no Null value in any column/feature

In [18]:

```
df.describe()
```

Out[18]:

	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_QTY	TOT_S/
count	264836.00000	2.648360e+05	2.648360e+05	264836.000000	264836.000000	264836.0(
mean	135.08011	1.355495e+05	1.351583e+05	56.583157	1.907309	7.3(
std	76.78418	8.057998e+04	7.813303e+04	32.826638	0.643654	3.0ε
min	1.00000	1.000000e+03	1.000000e+00	1.000000	1.000000	1.5(
25%	70.00000	7.002100e+04	6.760150e+04	28.000000	2.000000	5.4(
50%	130.00000	1.303575e+05	1.351375e+05	56.000000	2.000000	7.4(
75%	203.00000	2.030942e+05	2.027012e+05	85.000000	2.000000	9.2(
max	272.00000	2.373711e+06	2.415841e+06	114.000000	200.000000	650.0(

From above metric we see that TOT_SALES have standard deviation more than 3, and acceptable scale is from -3 to 3 so there might be outliars.

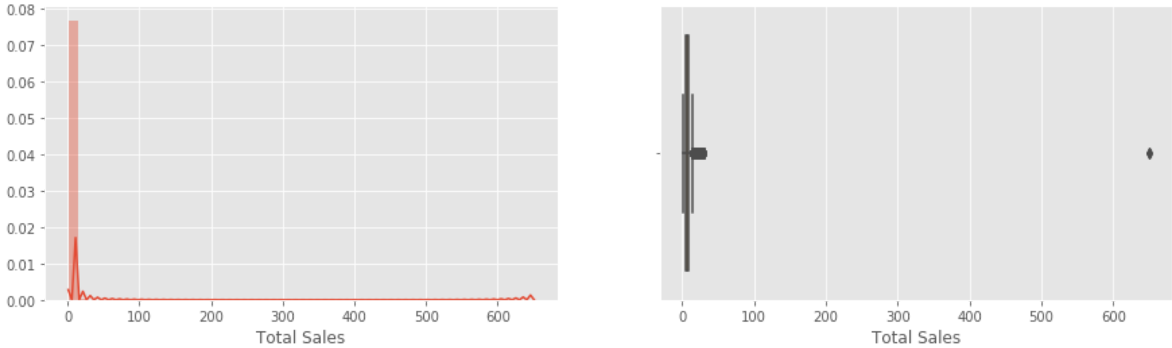
In [19]:

```
# Checking for outliars in TOT_SALES by histogram and Boxplot

fig1, ax1 =plt.subplots(nrows=1, ncols=2, figsize=(15, 4))

total_sales = df['TOT_SALES']

sns.distplot(a=total_sales, kde=True, ax=ax1[0], axlabel='Total Sales')  # Histogram
print(f"Skewness of Total Sales: {df['TOT_SALES'].skew()}")

sns.boxplot(x=total_sales, color='orange', ax=ax1[1])  # Boxplot
ax1[1].set(xlabel="Total Sales")
```

```
Skewness of Total Sales: 68.56963132181272
```

Out[19]:

```
[Text(0.5, 0, 'Total Sales')]
```



There are outliars above 600.

In [20]:

```
df[df['TOT_SALES'] > 600]
```

Out[20]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY
71456	2018-08-19	226	226000	226201	4	Dorito Corn Chp Supreme	200
71457	2019-05-20	226	226000	226210	4	Dorito Corn Chp Supreme	200

As you see there are tow extremely larege outliars, These both outliars are by

the same person having LYLTY_CARD_NBR as 226000. This person buy 200 packets of 'Dorito Corn Chp Supreme' of weight 380g each both the times. Most importantly these 2 transactions are not frequent, as he/she buys these 200 packets 2 times in timespan of 2 years. So these can be regarded as outliars. Therefore we will remove these 2 transactions.

In [21]:

```
df = df[df['TOT_SALES'] < 600]  # Remove the outliars
```

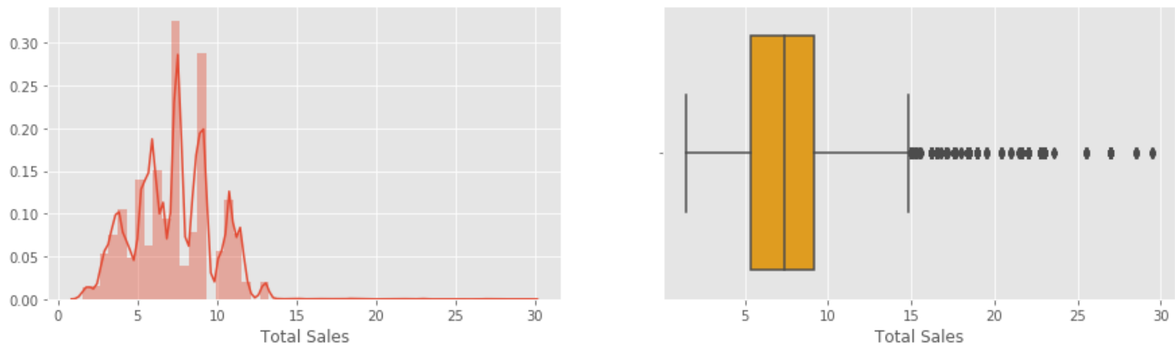
In [22]:

```
# Recheck outliars

fig1, ax1 =plt.subplots(nrows=1, ncols=2, figsize=(15, 4))

total_sales = df['TOT_SALES']

sns.distplot(a=total_sales, kde=True, ax=ax1[0], axlabel='Total Sales')  # Histogram
print(f"Skewness of Total Sales: {df['TOT_SALES'].skew()}")

sns.boxplot(x=total_sales, color='orange', ax=ax1[1])  # Boxplot
ax1[1].set(xlabel="Total Sales")
```

```
Skewness of Total Sales: 0.3131546350495999
```

Out[22]:

```
[Text(0.5, 0, 'Total Sales')]
```



You see still we got outliars, Lets figure out these outliars.

In [23]:

```
# Check the occurances of product quantity's in these outliars.

outliars = df[df['TOT_SALES'] > 15]

outliars['PROD_QTY'].value_counts()
```

Out[23]:

```
5    288
4    181
3     69
Name: PROD_QTY, dtype: int64
```

In [24]:

```
outliars['LIFESTAGE'].value_counts()
```

Out[24]:

```
OLDER SINGLES/COUPLES     119
OLDER FAMILIES            114
YOUNG FAMILIES             99
RETIREES                   91
MIDAGE SINGLES/COUPLES     53
YOUNG SINGLES/COUPLES      53
NEW FAMILIES                9
Name: LIFESTAGE, dtype: int64
```

You see quantities we get are in range 3 to 5, and we see that maximum people in this group are who are Old/Retirees or Old/Young families. Therefore it is not a surprise that a Family person buys 3 or 4 packet of chips. So these outliars can be accepted.

In [25]:

```
# Save Merged DataFrame

df.to_excel(excel_writer='Merged_data_frame.xlsx', sheet_name='Sheet1')
```

In [26]:

```
df.head()
```

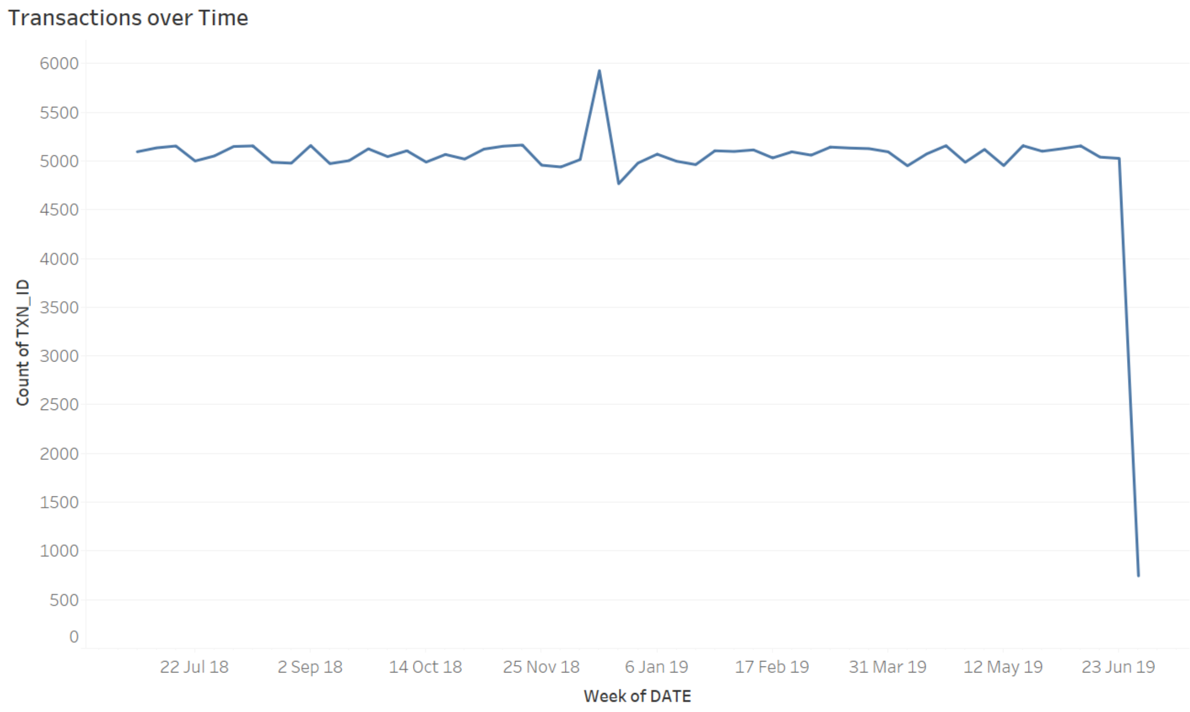
Out[26]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TO
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese	3	
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips	2	
3	2019-03-09	1	1307	347	54	CCs Original	1	
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	2	

In [27]:

```
# Transactions over time (Week)

Image('image1.png')
```

Out[27]:



The trend of count of TXN_ID for DATE Week.

Here we assume that year starts from July 2018 and ends at June 2019, rather than Jan 2018 to Dec 2019 (atleast in India) .

Here we see that Transactions are almost same all over the year, but there is 1 high Spike.

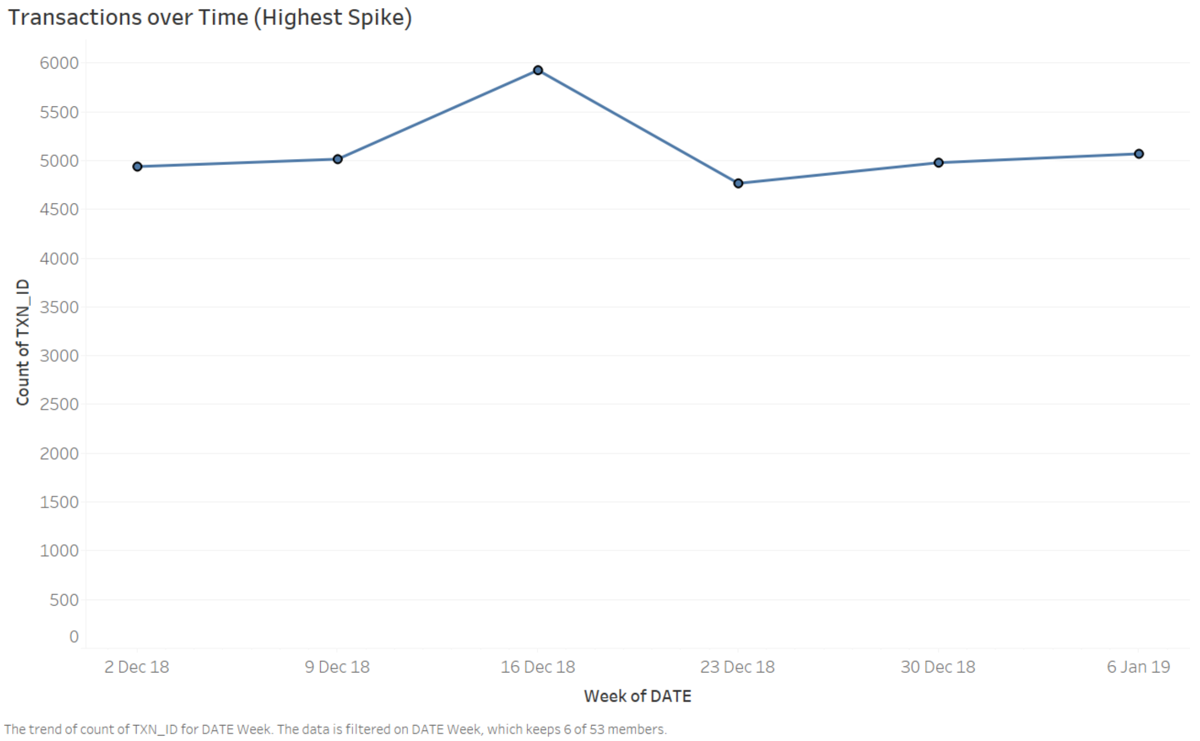
In [28]:

```
# <<<--- High Spike --->>
```

In [29]:

```
Image('image2.png')
```

Out[29]:



In [30]:

```
# Here we analyse customer from '9 Dec 2018' to '23 Dec 2018'

from datetime import datetime

filter_mask =  (df['DATE'] >= '2018-12-9') & (df['DATE'] <= '2018-12-30')
temp_df1 = df[filter_mask]
temp_df1.head()
```

Out[30]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	T
10	2018-12-12	4	4074	2980	4	Dorito Corn Chp Supreme	2	
41	2018-12-28	9	9208	8633	24	Grain Waves Sweet Chilli	2	
43	2018-12-18	13	13213	12448	53	RRD Sweet Chilli & Sour Cream	2	
50	2018-12-26	19	19272	16684	59	Old El Paso Salsa Dip Tomato Med	1	
64	2018-12-20	23	23067	19159	68	Pringles Chicken Salt Crips	2	

You see that great spike in the graph is between '9 dec 2018' to '24 dec 2018', So now we will analyse all date between '15 dec 2018' to '30 dec 2018'.

In [31]:

```
# Count of transctions from 2018-12-09  to 2018-12-30

temp_df1.groupby(by='DATE').count()['TXN_ID']
```

Out[31]:

```
DATE
2018-12-09    697
2018-12-10    715
2018-12-11    750
2018-12-12    664
2018-12-13    720
2018-12-14    744
2018-12-15    725
2018-12-16    761
2018-12-17    786
2018-12-18    862
2018-12-19    906
2018-12-20    855
2018-12-21    842
2018-12-22    915
2018-12-23    917
2018-12-24    939
2018-12-26    753
2018-12-27    732
2018-12-28    720
2018-12-29    706
2018-12-30    747
Name: TXN_ID, dtype: int64
```

Results:-

1. There is no transactions for date 25 dec 2018 (maybe shop's will be closed on Christmas).

2. The transactions keep on increasing (ie.more than average ie. from 700's to 900's) till date 24 dec 2018 (ie. a day before Christmas) and then after Christmas (ie. 25 dec 2018), the transactions comes to average (ie. 700's).

Conclusion:-

Highest Chips are sold near Christmas.

In [32]:

```
df.head()
```

Out[32]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TO
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese	3	
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips	2	
3	2019-03-09	1	1307	347	54	CCs Original	1	
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	2	

Lets Check weather pack size matters or not.

In [33]:

```
# <<--- Number of transactions per weight --->>
```

In [34]:

```
df.head()
```

Out[34]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TO
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese	3	
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips	2	
3	2019-03-09	1	1307	347	54	CCs Original	1	
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	2	

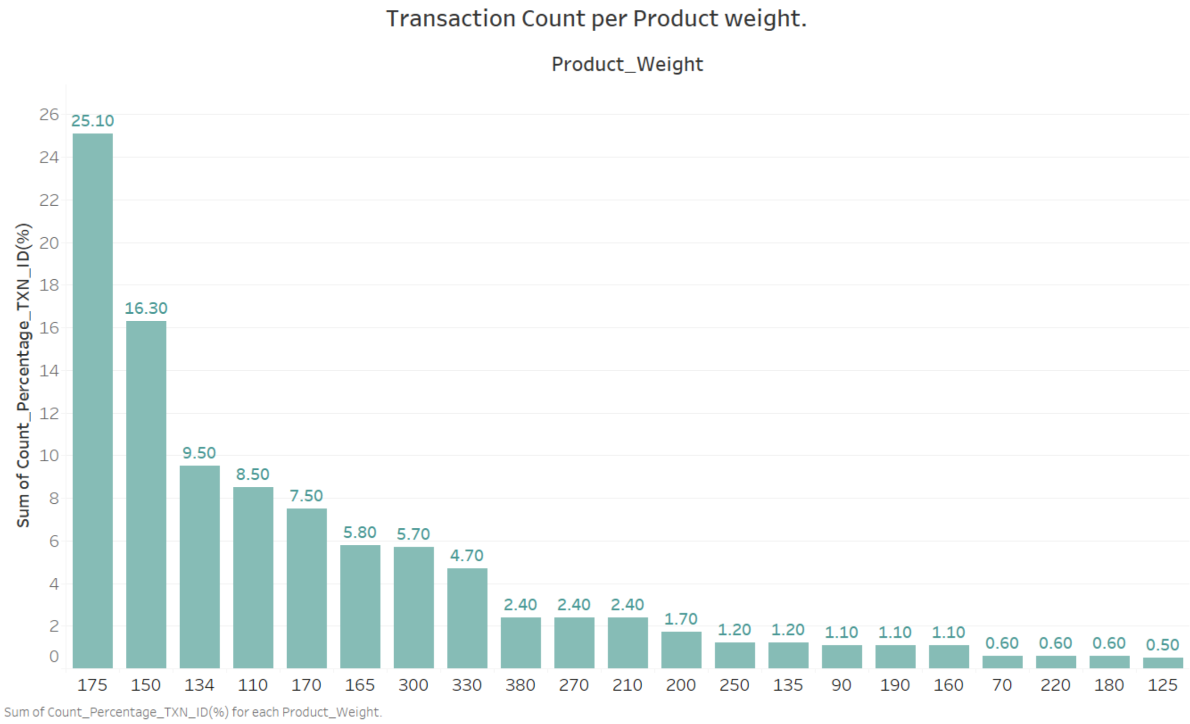
In [35]:

```
temp3 = df['PROD_WEIGHT(g)'].value_counts(normalize=True)
x = temp3.index
y = temp3

data = list(zip(x, y))
t_df = pd.DataFrame(data=data, index=range(0, len(x)), columns=['Product_Weight', 'Count_Pe

t_df['Count_Percentage_TXN_ID(%)'] = [round(per * 100, 1) for per in t_df['Count_Percentage
t_df.sort_values('Count_Percentage_TXN_ID(%)', ascending=False, inplace=True)
t_df['Product_Weight'] = [str(weight) for weight in t_df['Product_Weight']]

t_df.to_excel(excel_writer='ProductWeight_TransactionCount.xlsx', sheet_name='Sheet1')
```

In [36]:

```
# <<--- Number of Transaction per Product Weight --->>

Image('image3.png')
```

Out[36]:



Conclusion :- Most packets that are sold are of average weight 175g, 150g, 134g, 110g, 170g.

Analysis on Customer Segment

In [37]:

```
df.head()
```

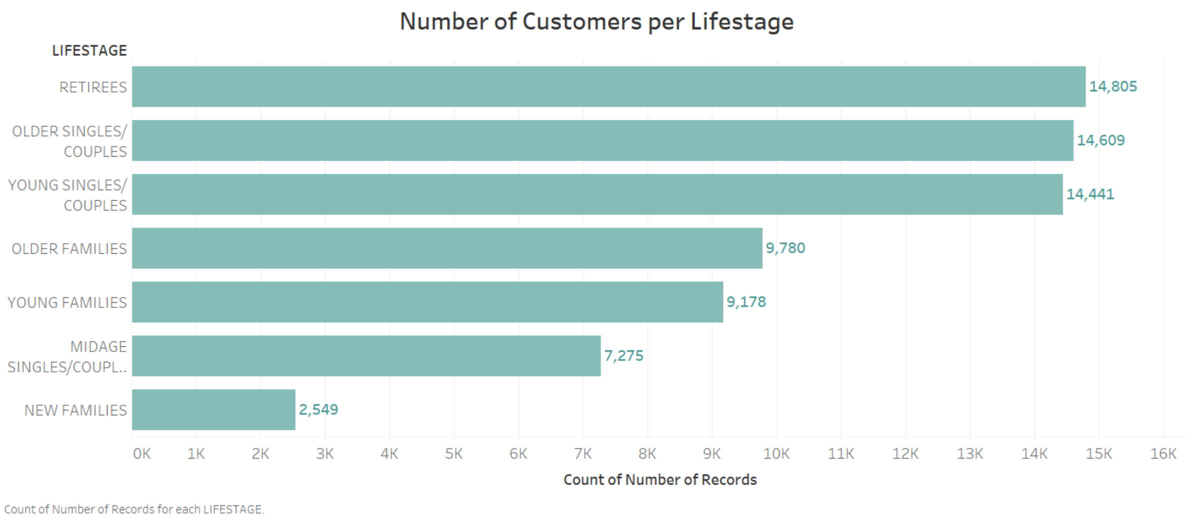
Out[37]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TO
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese	3	
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips	2	
3	2019-03-09	1	1307	347	54	CCs Original	1	
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	2	

In [38]:

```
# <<<--- Type of Customer's (acc. to LIFESTAGE) that are more interested in buying Chips --

Image('image4.png')
```

Out[38]:

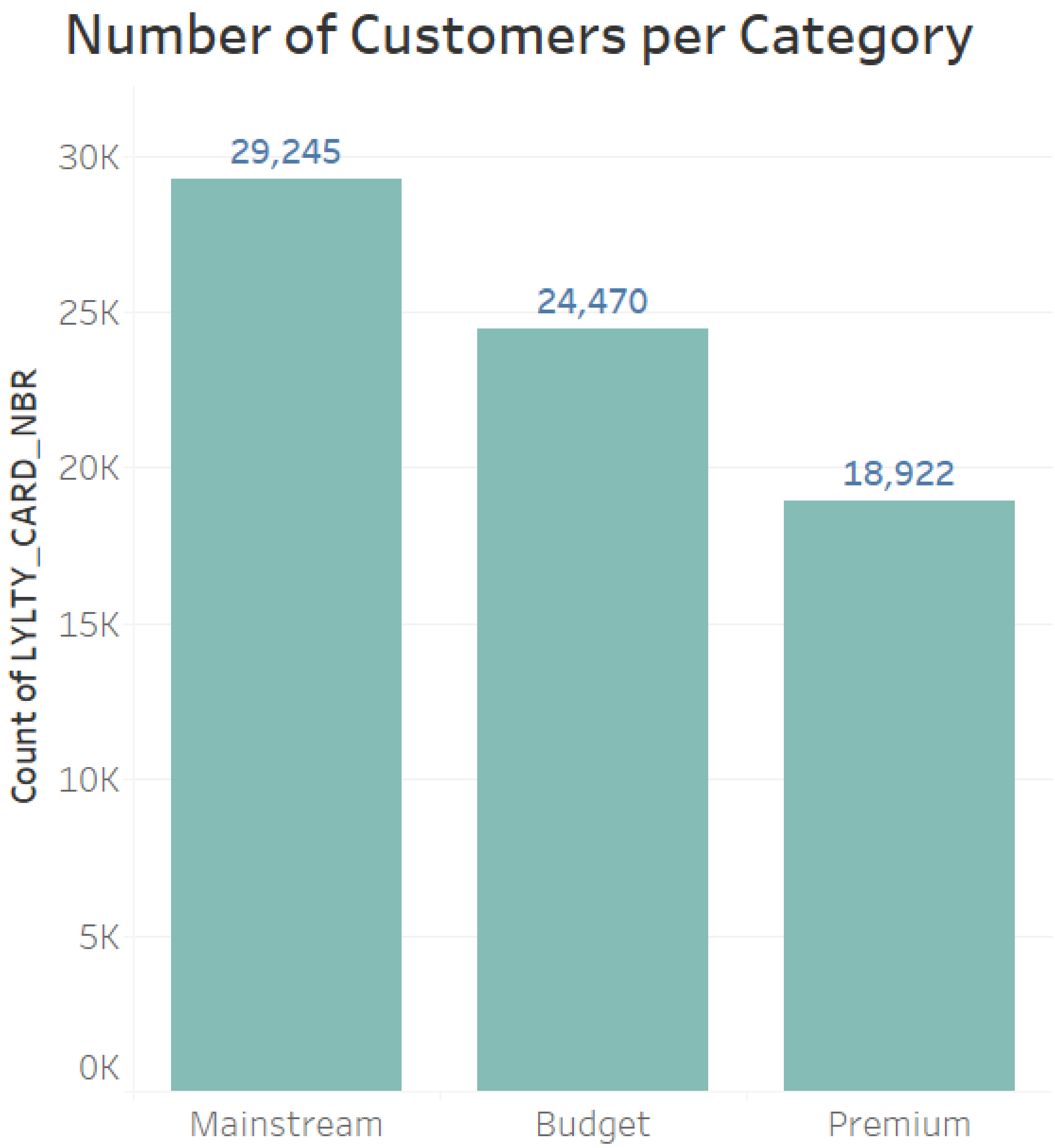


Conclusion :- Customers who mostly buy chips Retirees and single/couples.

In [39]:

```
# <<<--- Type of Customer's (acc. to Category) that are more interested in buying Chips ---

Image('image5.png')
```

Out[39]:



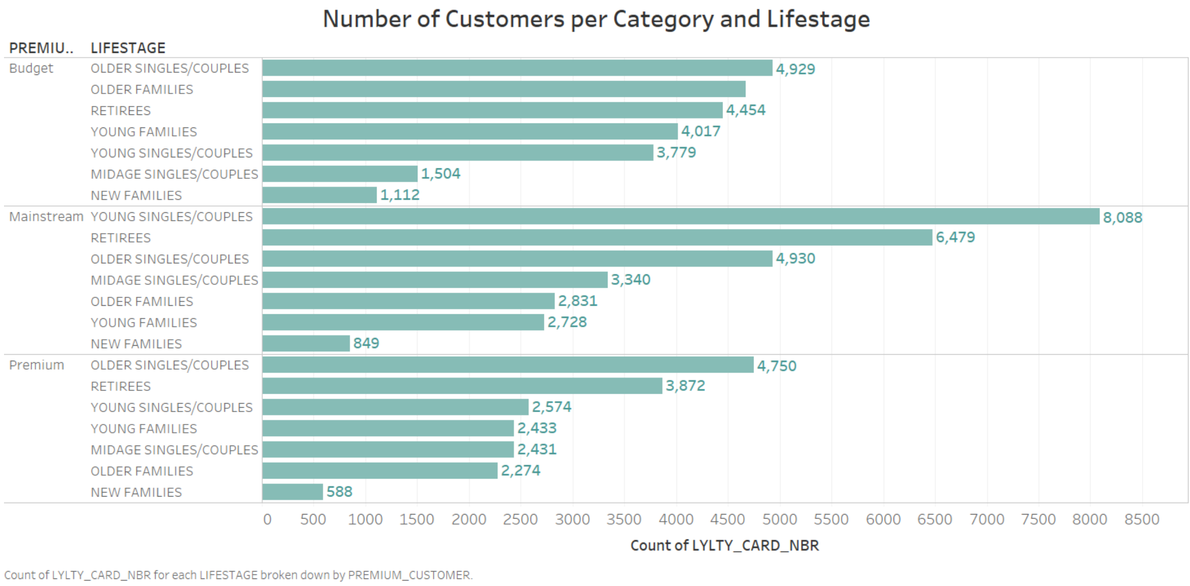
Count of LYLTY_CARD_NBR for each PREMIUM_CUSTOMER.

Conlcusion :- People with category mainstream more likely to buy chips followed by the budget category and premium customers less likely to buy chips!

In [40]:

```
# <<<---- Customer counts on basis category and subcategory ---->>>

Image('image6.png')
```

Out[40]:



Results :-

Here we have 3 main categories :-

1. Budget
2. Mainstream
3. Premium

All three categories have further 7 further categories :-

1. OLDER FAMILIES
2. YOUNG FAMILIES
3. NEW FAMILIES
4. OLDER SINGLE/COUPLES
5. YOUNG SINGLE/COUPLES
6. MIDAGE SINGLE/COUPLES
7. RETIREES

Result1 (Budget) :-

In Budget category everyone love to buy chips except mainstream single/couples.

Result2 (Mainstream) :-

In Mainstream Young/Single couples and families and retirees more likely to buy chips.

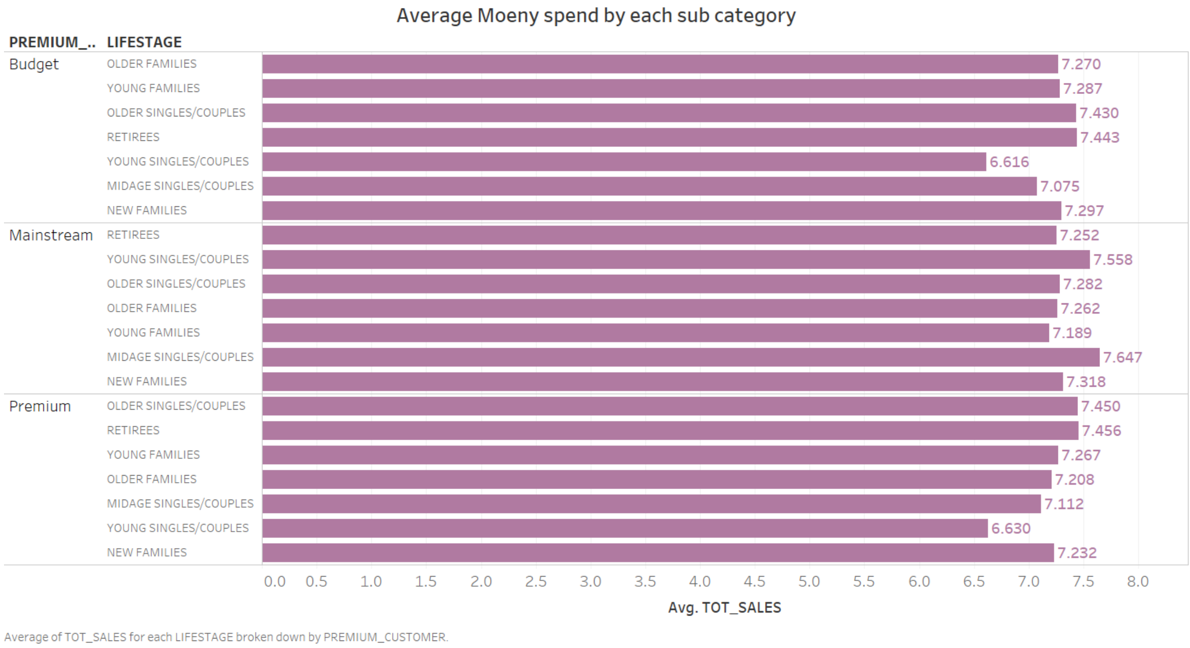
Result3 (Premium) :-

In Premium category Older Single/Couples and retirees more likely to buy Chips.

In [41]:

```
# <<<---- Average Moeny spend by each sub category ---->>>

Image('image7.png')
```

Out[41]:



Conclusion :- Here we can clearly see that Customer's in every Lifestage in every Category are spending same money on average (ie. about 7 to 7.5 USD)

In [42]:

```
df.head()
```

Out[42]:

	DATE	STORE_NBR	LYLTY_CARD_NBR	TXN_ID	PROD_NBR	PROD_NAME	PROD_QTY	TO
0	2018-10-17	1	1000	1	5	Natural Chip Compny SeaSalt	2	
1	2019-05-14	1	1307	348	66	CCs Nacho Cheese	3	
2	2018-11-10	1	1307	346	96	WW Original Stacked Chips	2	
3	2019-03-09	1	1307	347	54	CCs Original	1	
4	2019-05-20	1	1343	383	61	Smiths Crinkle Cut Chips Chicken	2	

In [43]:

```
# <<<--- Most sold Quantity --->>>
```

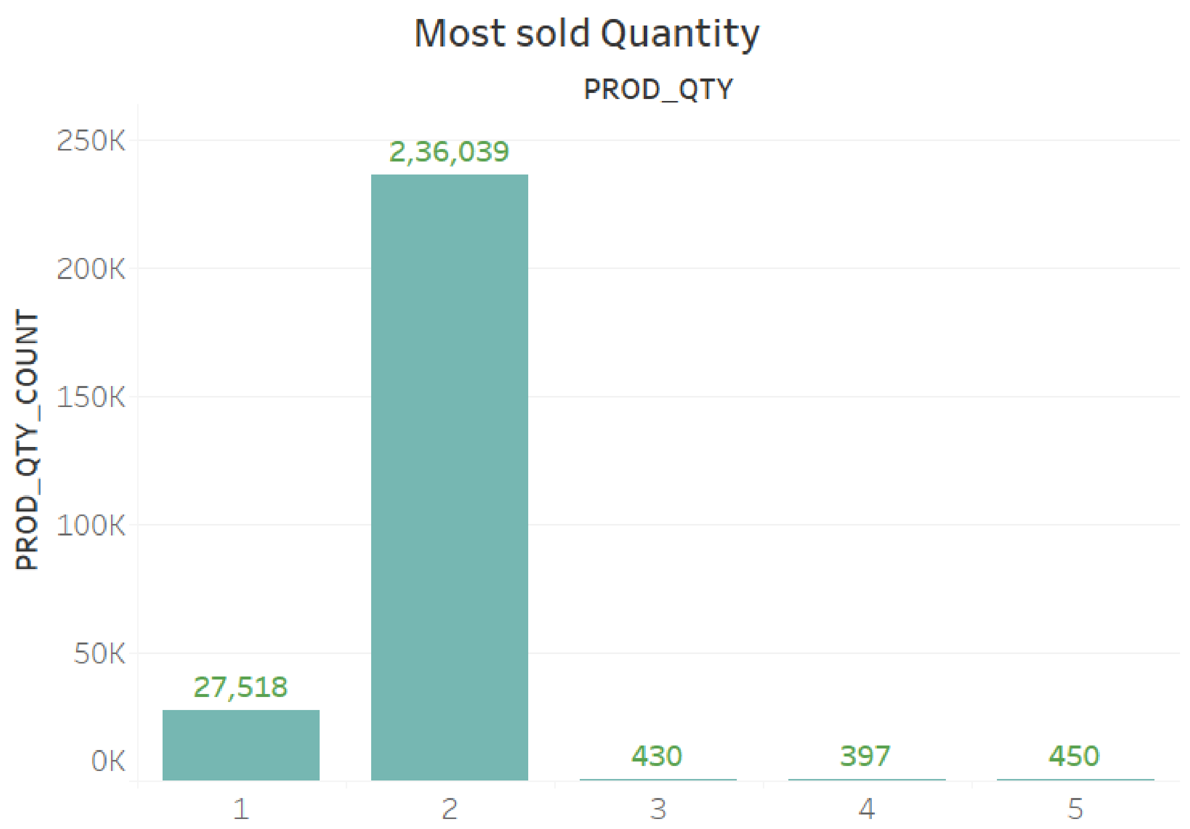
In [44]:

```
temp_df = df.groupby(by='PROD_QTY').count()
temp_df.reset_index(inplace=True)
temp_df.rename(columns={'TXN_ID': 'PROD_QTY_COUNT'}, inplace=True)
temp_df = temp_df.loc[:, ['PROD_QTY', 'PROD_QTY_COUNT']]
temp_df['PROD_QTY'] = temp_df['PROD_QTY'].astype(str)
temp_df.to_excel(excel_writer='Product_quantity_counts.xlsx', sheet_name='Sheet1')
```

In [45]:

```
Image('image8.png')
```

Out[45]:



Sum of PROD_QTY_COUNT for each PROD_QTY.

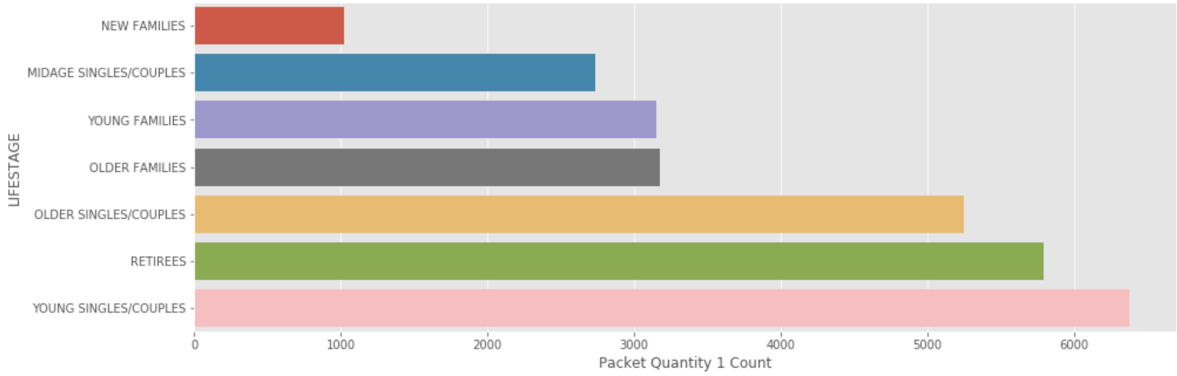
Conclusion :- Here we clearly see that people mostly love to buy 2 packetes at a time.

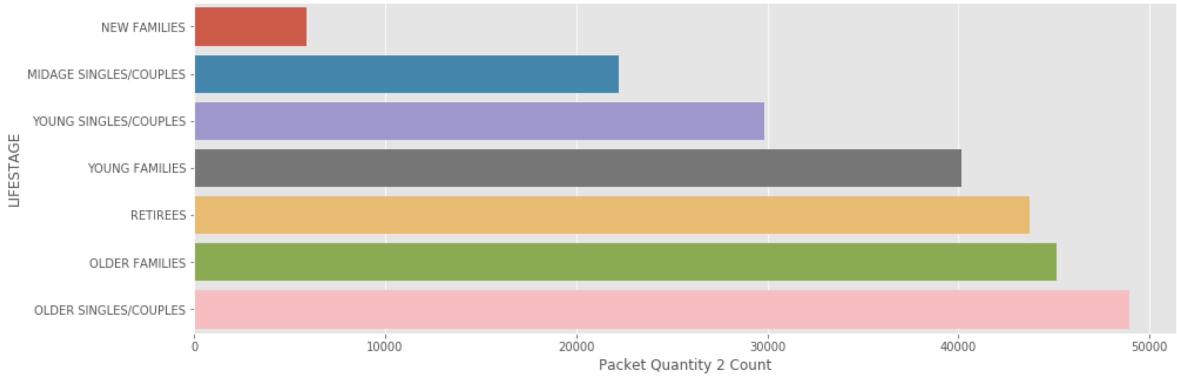
In [46]:

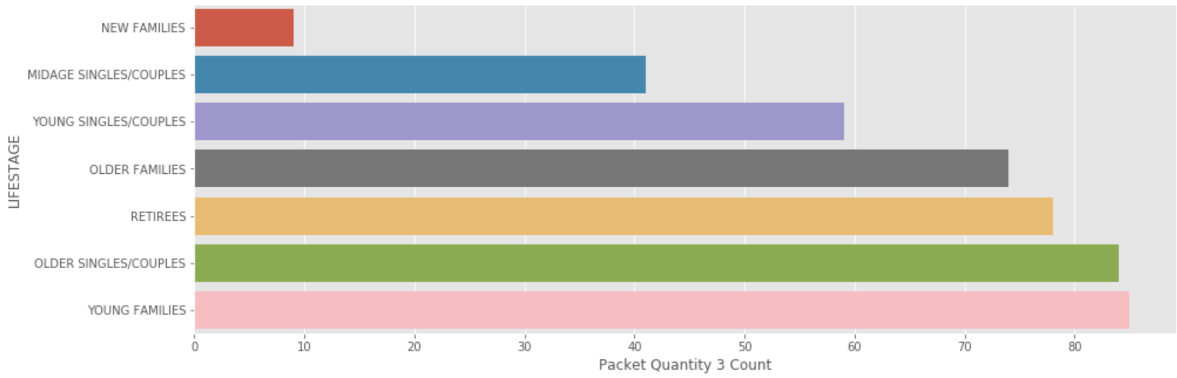
```
# <<<---- Most sold quantity by LIFESTATGE ---->>>
```

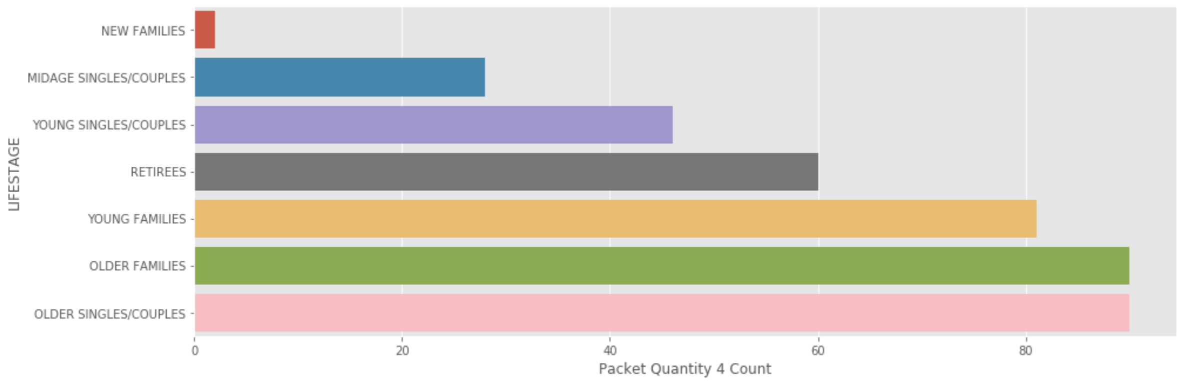
In [47]:

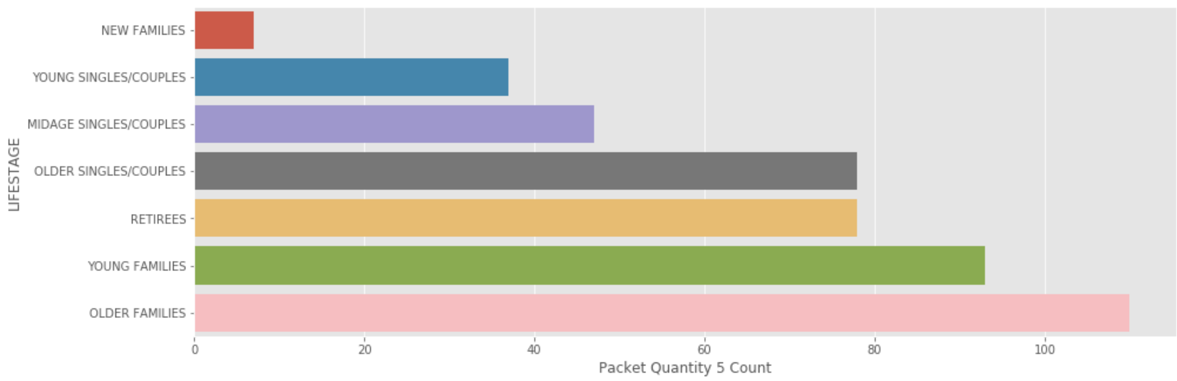
```
temp_df = df.groupby(by='PROD_QTY')

# Group1 (1 Packet)
group1_df = temp_df.get_group(1)
temp_group1 = group1_df.groupby(by='LIFESTAGE').count()
temp_group1.sort_values('DATE', inplace=True)
x_count_group1 = temp_group1['DATE']
y_lifestage_group1 = temp_group1.index

# Group2 (2 Packet)
group2_df = temp_df.get_group(2)
temp_group2 = group2_df.groupby(by='LIFESTAGE').count()
temp_group2.sort_values('DATE', inplace=True)
x_count_group2 = temp_group2['DATE']
y_lifestage_group2 = temp_group2.index

# Group3 (3 Packet)
group3_df = temp_df.get_group(3)
temp_group3 = group3_df.groupby(by='LIFESTAGE').count()
temp_group3.sort_values('DATE', inplace=True)
x_count_group3 = temp_group3['DATE']
y_lifestage_group3 = temp_group3.index

# Group4 (4 Packet)
group4_df = temp_df.get_group(4)
temp_group4 = group4_df.groupby(by='LIFESTAGE').count()
temp_group4.sort_values('DATE', inplace=True)
x_count_group4 = temp_group4['DATE']
y_lifestage_group4 = temp_group4.index

# Group5 (5 Packet)
group5_df = temp_df.get_group(5)
temp_group5 = group5_df.groupby(by='LIFESTAGE').count()
temp_group5.sort_values('DATE', inplace=True)
x_count_group5 = temp_group5['DATE']
y_lifestage_group5 = temp_group5.index


# Plot the graphs
fig1, ax1 =plt.subplots(nrows=5, ncols=1, figsize=(15, 30))

sns.barplot(x=x_count_group1, y=y_lifestage_group1, ax=ax1[0])
ax1[0].set(xlabel="Packet Quantity 1 Count")

sns.barplot(x=x_count_group2, y=y_lifestage_group2, ax=ax1[1])
ax1[1].set(xlabel="Packet Quantity 2 Count")

sns.barplot(x=x_count_group3, y=y_lifestage_group3, ax=ax1[2])
ax1[2].set(xlabel="Packet Quantity 3 Count")

sns.barplot(x=x_count_group4, y=y_lifestage_group4, ax=ax1[3])
ax1[3].set(xlabel="Packet Quantity 4 Count")

sns.barplot(x=x_count_group5, y=y_lifestage_group5, ax=ax1[4])
ax1[4].set(xlabel="Packet Quantity 5 Count")

#save figure
plt.savefig('image9.png')
```


NEW FAMILIES
MIDAGE SINGLES/COUPLES
YOUNG FAMILIES
OLDER FAMILIES
OLDER SINGLES/COUPLES
RETIREES
YOUNG SINGLES/COUPLES
LIFESTAGE
0 1000 2000 3000 4000 5000 6000
Packet Quantity 1 Count


NEW FAMILIES
MIDAGE SINGLES/COUPLES
YOUNG SINGLES/COUPLES
YOUNG FAMILIES
RETIREES
OLDER FAMILIES
OLDER SINGLES/COUPLES
LIFESTAGE
0 10000 20000 30000 40000 50000
Packet Quantity 2 Count


NEW FAMILIES
MIDAGE SINGLES/COUPLES
YOUNG SINGLES/COUPLES
OLDER FAMILIES
RETIREES
OLDER SINGLES/COUPLES
YOUNG FAMILIES
LIFESTAGE
0 10 20 30 40 50 60 70 80
Packet Quantity 3 Count


NEW FAMILIES
MIDAGE SINGLES/COUPLES
YOUNG SINGLES/COUPLES
RETIREES
YOUNG FAMILIES
OLDER FAMILIES
OLDER SINGLES/COUPLES
LIFESTAGE
0 20 40 60 80
Packet Quantity 4 Count


NEW FAMILIES
YOUNG SINGLES/COUPLES
MIDAGE SINGLES/COUPLES
OLDER SINGLES/COUPLES
RETIREES
YOUNG FAMILIES
OLDER FAMILIES
LIFESTAGE
0 20 40 60 80 100
Packet Quantity 5 Count

Conclusion1 (Packet 1) :-

Majority of persons that buy one packet are from the groups -> Old and Young (Singles/Couples), Retirees

Conclusion2 (Packet 2) :-

Majority of persons that buy two packets are from the groups -> Older Singles/Couples and Families , Young Families, Retirees

Conclusion3 (Packet 3) :-

Majority of persons that buy three packets are from the groups -> Young and Older Families, Older Single/Couple, Retirees

Conclusion4 (Packet 4) :-

Majority of persons that buy four packets are from the groups -> Young and Older Families, Older Single/Couple

Conclusion5 (Packet 5) :-

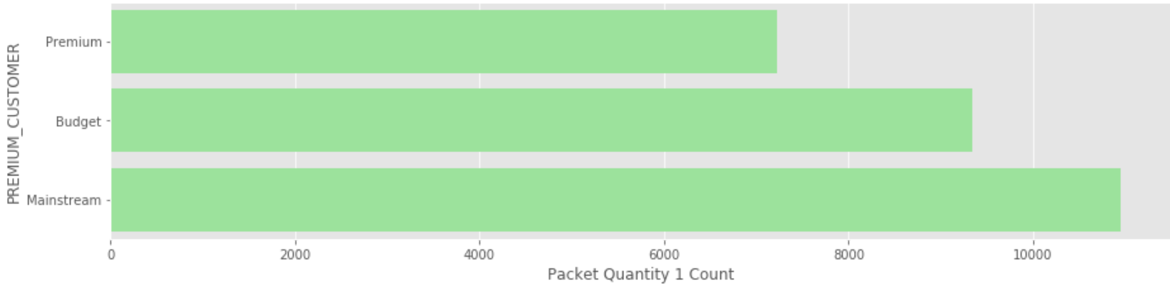
Majority of persons that buy five packets are from the groups -> Young and Older Families, Retirees

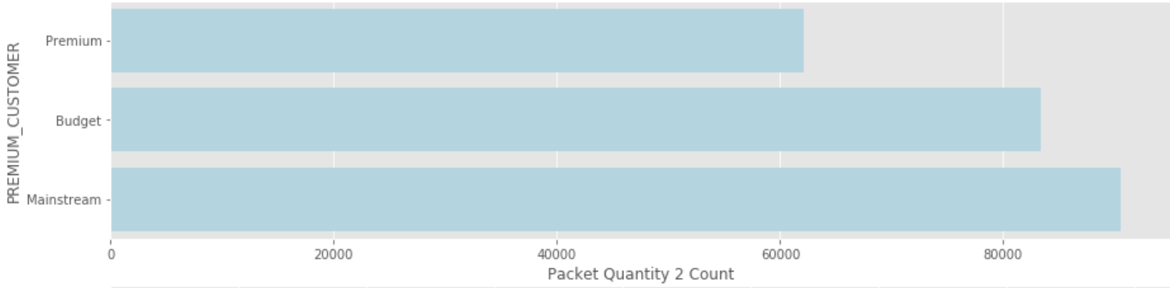
In [48]:

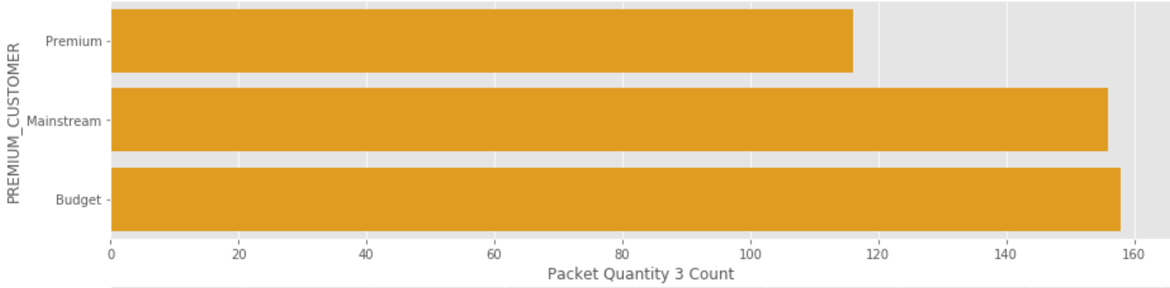
```
# <<<---- Most sold quantity by CATEGORY ---->>>
```

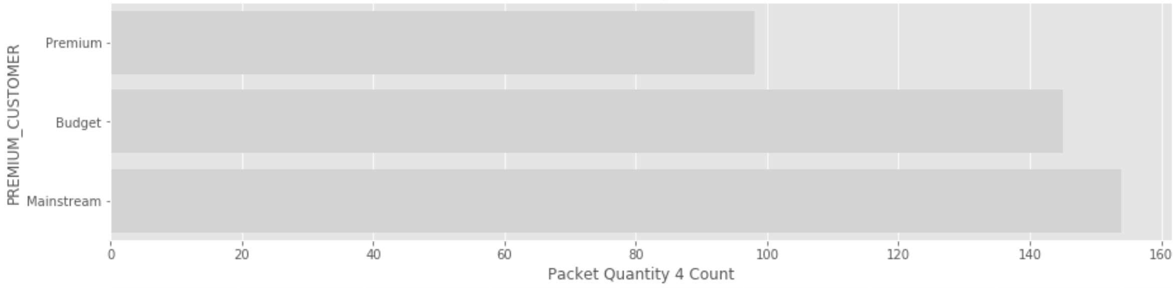
In [49]:

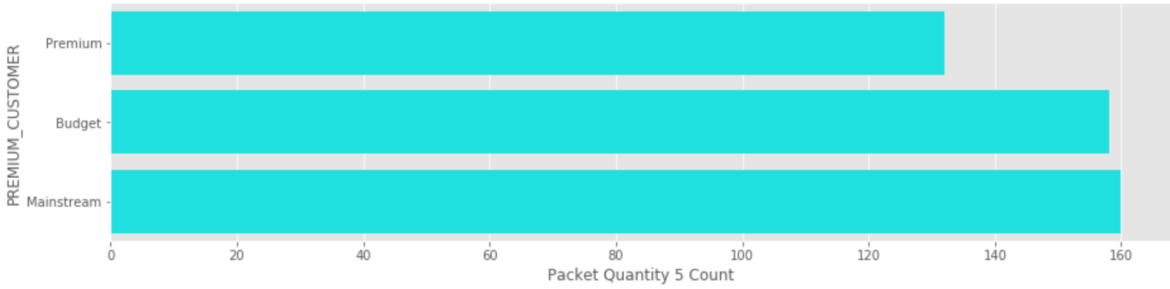
```
temp_df = df.groupby(by='PROD_QTY')

# Group1 (1 Packet)
group1_df = temp_df.get_group(1)
temp_group1 = group1_df.groupby(by='PREMIUM_CUSTOMER').count()
temp_group1.sort_values('DATE', inplace=True)
x_count_group1 = temp_group1['DATE']
y_category_group1 = temp_group1.index

# Group2 (2 Packet)
group2_df = temp_df.get_group(2)
temp_group2 = group2_df.groupby(by='PREMIUM_CUSTOMER').count()
temp_group2.sort_values('DATE', inplace=True)
x_count_group2 = temp_group2['DATE']
y_category_group2 = temp_group2.index

# Group3 (3 Packet)
group3_df = temp_df.get_group(3)
temp_group3 = group3_df.groupby(by='PREMIUM_CUSTOMER').count()
temp_group3.sort_values('DATE', inplace=True)
x_count_group3 = temp_group3['DATE']
y_category_group3 = temp_group3.index

# Group4 (4 Packet)
group4_df = temp_df.get_group(4)
temp_group4 = group4_df.groupby(by='PREMIUM_CUSTOMER').count()
temp_group4.sort_values('DATE', inplace=True)
x_count_group4 = temp_group4['DATE']
y_category_group4 = temp_group4.index

# Group5 (5 Packet)
group5_df = temp_df.get_group(5)
temp_group5 = group5_df.groupby(by='PREMIUM_CUSTOMER').count()
temp_group5.sort_values('DATE', inplace=True)
x_count_group5 = temp_group5['DATE']
y_category_group5 = temp_group5.index


# Plot the graphs
fig1, ax1 =plt.subplots(nrows=5, ncols=1, figsize=(15, 20))

sns.barplot(x=x_count_group1, y=y_category_group1, ax=ax1[0], color='lightgreen')
ax1[0].set(xlabel="Packet Quantity 1 Count")

sns.barplot(x=x_count_group2, y=y_category_group2, ax=ax1[1], color='lightblue')
ax1[1].set(xlabel="Packet Quantity 2 Count")

sns.barplot(x=x_count_group3, y=y_category_group3, ax=ax1[2], color='orange')
ax1[2].set(xlabel="Packet Quantity 3 Count")

sns.barplot(x=x_count_group4, y=y_category_group4, ax=ax1[3], color='lightgrey')
ax1[3].set(xlabel="Packet Quantity 4 Count")

sns.barplot(x=x_count_group5, y=y_category_group5, ax=ax1[4], color='cyan')
ax1[4].set(xlabel="Packet Quantity 5 Count")

#save figure
plt.savefig('image10.png')
```


PREMIUM_CUSTOMER
Premium
Budget
Mainstream
0
2000
4000
6000
8000
10000
Packet Quantity 1 Count


PREMIUM_CUSTOMER
Premium
Budget
Mainstream
0
20000
40000
60000
80000
Packet Quantity 2 Count


PREMIUM_CUSTOMER
Premium
Mainstream
Budget
0
20
40
60
80
100
120
140
160
Packet Quantity 3 Count


PREMIUM_CUSTOMER
Premium
Budget
Mainstream
0
20
40
60
80
100
120
140
160
Packet Quantity 4 Count


PREMIUM_CUSTOMER
Premium
Budget
Mainstream
0
20
40
60
80
100
120
140
160
Packet Quantity 5 Count

Conclusion :- Premium Customer buys less Chips in every segment of packet quantity.

Final Summary...

1. Near Christmas sales of Chips go high.

2. Most packet sold are of average weight.

3. Older people more likely to buy chips followed by Young Families.

4. Retirees and single/Couples more likely to buy chips.

5. In Budget category everyone love to buy chips except mainstream single/couples.

6. In Mainstream Young/Single couples and families and retirees more likely to buy chips.

7. In Premium category Older Single/Couples and retirees more likely to buy Chips!.

8. Customer's in every Lifestage in every Category are spending same money on average (ie. about 7 to 7.5 USD).

9. People mostly love to buy 2 packetes at a time.

10.(a) Majority of persons that buy one packet are from the groups -> Old and Young (Singles/Couples), Retirees.

10(b). Majority of persons that buy two packets are from the groups -> Older Singles/Couples and Families , Young Families, Retirees.

10(c). Majority of persons that buy three packets are from the groups -> Young and Older Families, Older Single/Couple, Retirees.

10(d). Majority of persons that buy four packets are from the groups -> Young and Older Families, Older Single/Couple.

10(e). Majority of persons that buy five packets are from the groups -> Young and Older Families, Retirees.

Basically the Customers that are old and have families buys 3 to 4 packets at a time and Singles/Couples buy 1 to 2 packets at a time.

11. Premium Customer seems to buy less Chips in every segment of packet quantity.