MRA Project-Extended

KRISHNABHAMINI SINHA

Exploratory Data Analysis

Market Basket Analysis

Problem Statement

The data set provided to you is the data set of a Café Chain for one of its restaurants. Do a thorough analysis of the data and come up with the following analysis. The owner of the restaurant wants you to use this data to come up with a set of recommendations that can help his Café Chain increase its revenues. He is able to provide you with a data set for POS (point of sale data) for one of his chains.

Dataset used: Café_Data_MRA.xlsx

Problem 1

Exploratory Data Analysis: Exploratory Analysis of data & an executive summary (in PPT) of your top findings, supported by graphs.

Exploratory Data Analysis

(Using Python)

First 5 rows of the dataset:

Date	Bill Number	Item Desc	Quantity	Rate	Tax	Discount
2010-04-01	G0470115	QUA MINERAL WATER(1000ML)	1	50.0	11.88	0.0
2010-04-01	G0470115	MONSOON MALABAR (AULAIT)	1	100.0	23.75	0.0
2010-04-01	G0470116	MASALA CHAI CUTTING	1	40.0	9.50	0.0
2010-04-01	G0470117	QUA MINERAL WATER(1000ML)	1	50.0	11.88	0.0
2010-04-01	G0470283	MOROCCAN MINT TEA	1	45.0	10.69	0.0

Data types in the dataset:

```
<class 'pandas.core.frame.DataFrame'>
DatetimeIndex: 145830 entries, 2010-04-01 to 2010-07-09
Data columns (total 9 columns):
 #   Column          Non-Null Count    Dtype
---  ------          --------------    -----
 0   Bill Number     145830 non-null   object
 1   Item Desc       145830 non-null   object
 2   Quantity        145830 non-null   int64
 3   Rate            145830 non-null   float64
 4   Tax             145830 non-null   float64
 5   Discount        145830 non-null   float64
 6   Total           145830 non-null   float64
 7   Category        145830 non-null   object
 8   Time_converted  145830 non-null   object
dtypes: float64(4), int64(1), object(4)
memory usage: 11.1+ MB
```

Shape of the Dataset and Count of Null Values:

- There are 1,45,830 rows and 9 columns in the dataset.

- There are no null values in the dataset.

```
df.shape
```

```
(145830, 9)
```

```
df.isnull().sum()
```

```
Bill Number        0
Item Desc          0
Quantity           0
Rate               0
Tax                0
Discount           0
Total              0
Category           0
Time_converted     0
dtype: int64
```

	count	unique	top	freq	mean	std	min	25%	50%	75%	max
Bill Number	145830	69982	G0490530	23	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Item Desc	145830	580	NIRVANA HOOKAH SINGLE	8553	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Quantity	145830.0	NaN	NaN	NaN	1.121299	0.477237	1.0	1.0	1.0	1.0	30.0
Rate	145830.0	NaN	NaN	NaN	161.782259	102.244631	0.01	95.0	125.0	225.0	2100.0
Tax	145830.0	NaN	NaN	NaN	48.929061	40.272851	0.0	22.56	32.06	72.0	2731.25
Discount	145830.0	NaN	NaN	NaN	0.095079	3.720735	0.0	0.0	0.0	0.0	825.0
Total	145830.0	NaN	NaN	NaN	224.959852	164.960776	0.01	117.56	167.06	315.0	14231.25
Category	145830	9	FOOD	57023	NaN	NaN	NaN	NaN	NaN	NaN	NaN
Time_converted	145830	36200	22:25:36	33	NaN	NaN	NaN	NaN	NaN	NaN	NaN

# Statistical Summary of the dataset:

Volume of Categories sold in the restaurant

- The top 3 categories in demand are – food, beverage and tobacco.

- Items like liquor, miscellaneous, wines and merchandise have negligible volume of sales compared to the top three.

- Using a combo of liquor with tobacco does not help the sale of the former.
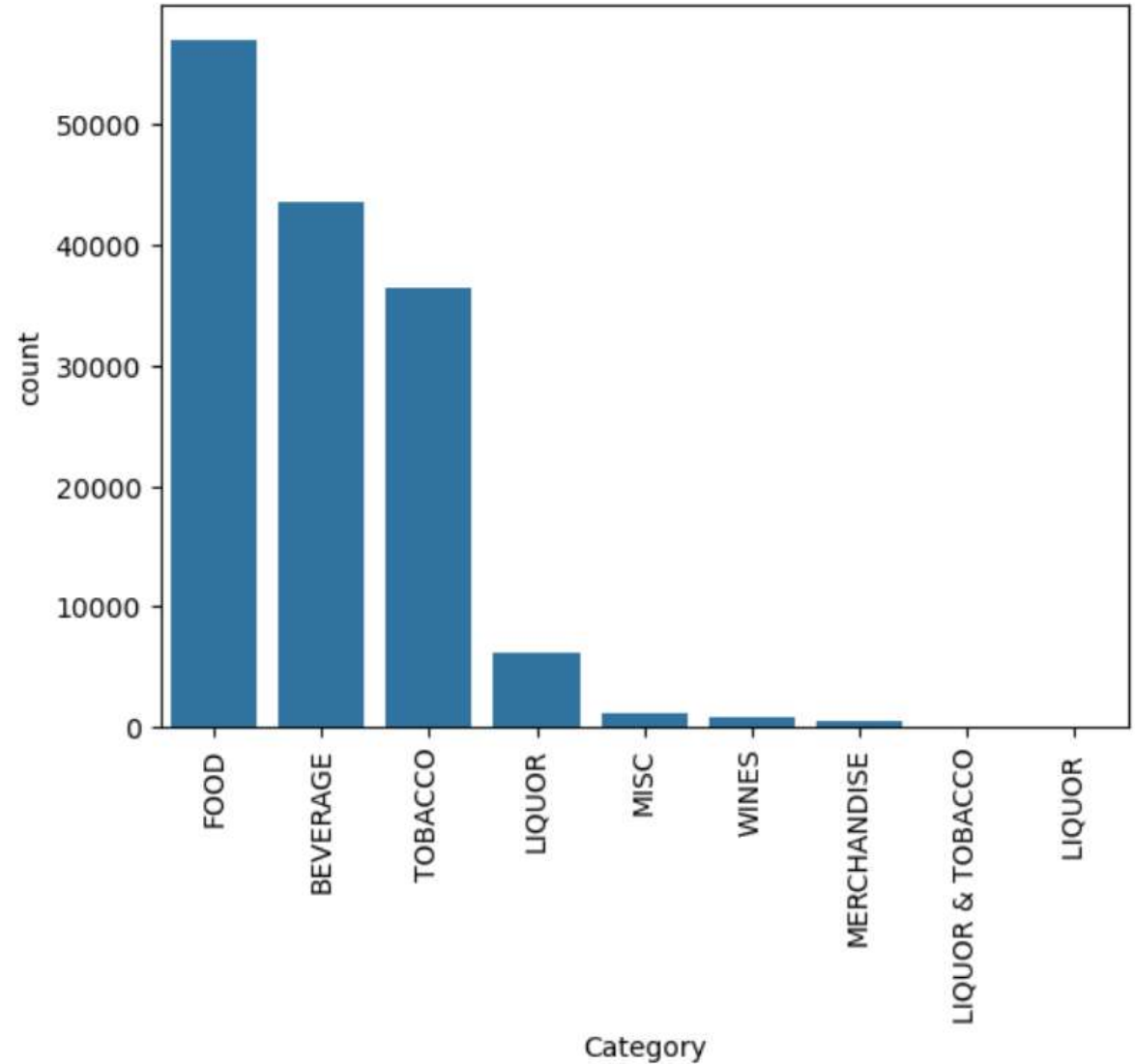
Discount on different categories

- Top 2 categories on which high rates of discount are given are merchandise and combo of "liquor and tobacco." (more than 8%)

- Next significant rates of discount are given on liquor and wines. (approximately form 2.5- 4 %)
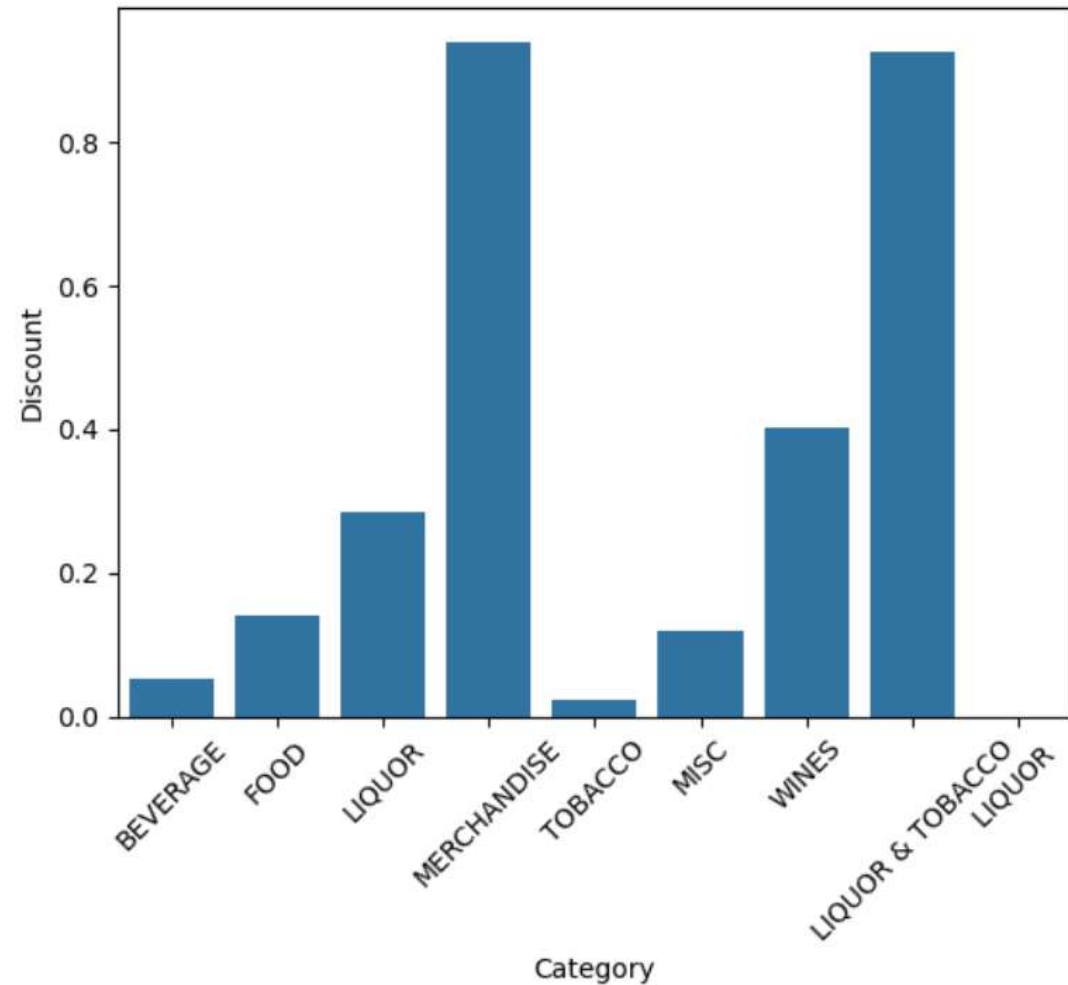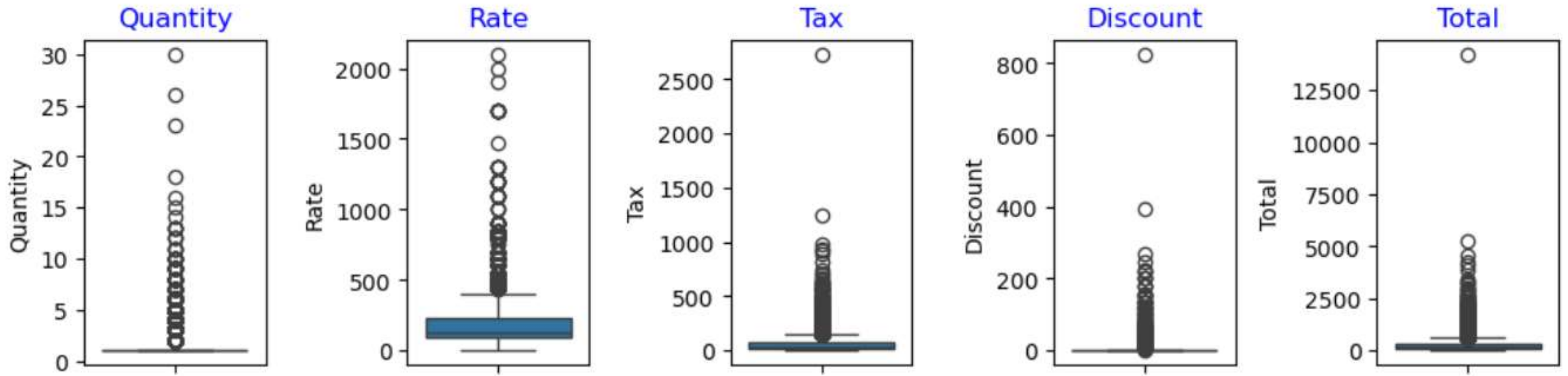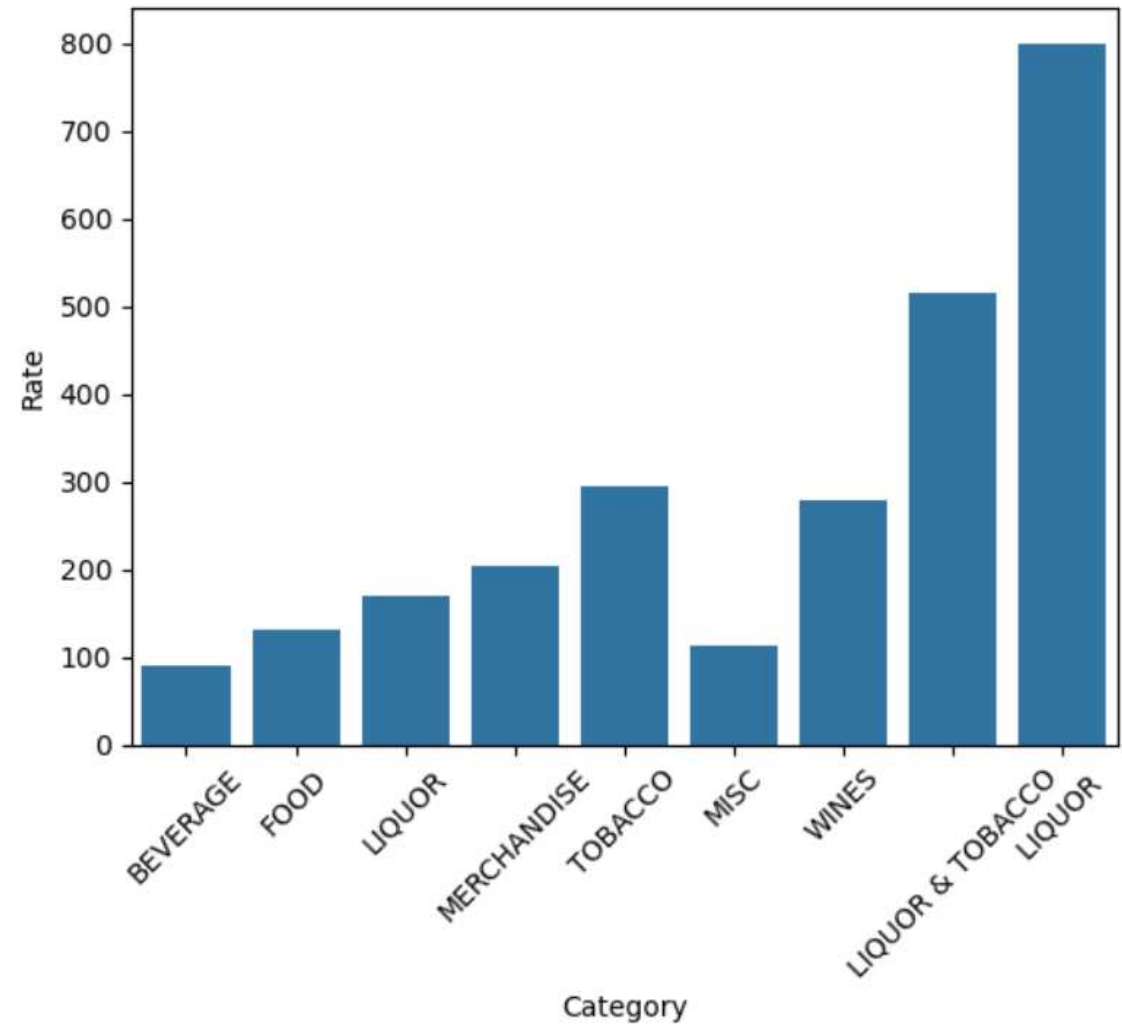
Checking presence of outliers in the variables.

We will not be treating the outliers as the pricing and quantity of the real data is crucial to forming genuine business decisions.
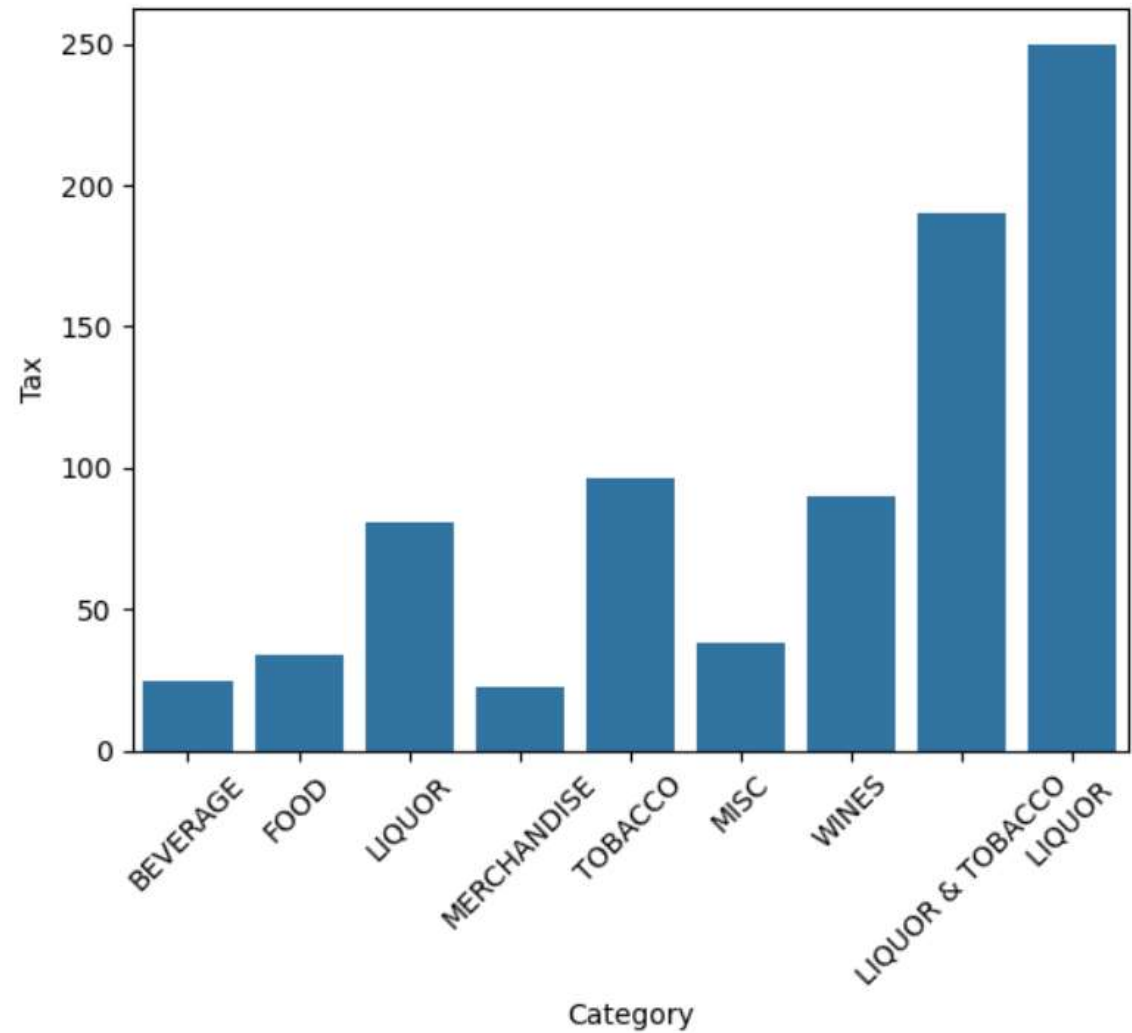
Rates of prices of different categories

- Rates are highest for liquor and combo of tobacco and liquor

- High rates of liquor is why maybe high discount is offered on this category.

Taxes on different categories

- Highest level of taxes are applied on liquor and combo of "liquor and tobacco."

Monthly sales

Sales start to increase most from the month of December and reach the highest on 1st of January.

Sales continue to remain high till February after which a dip starts from the month of March.
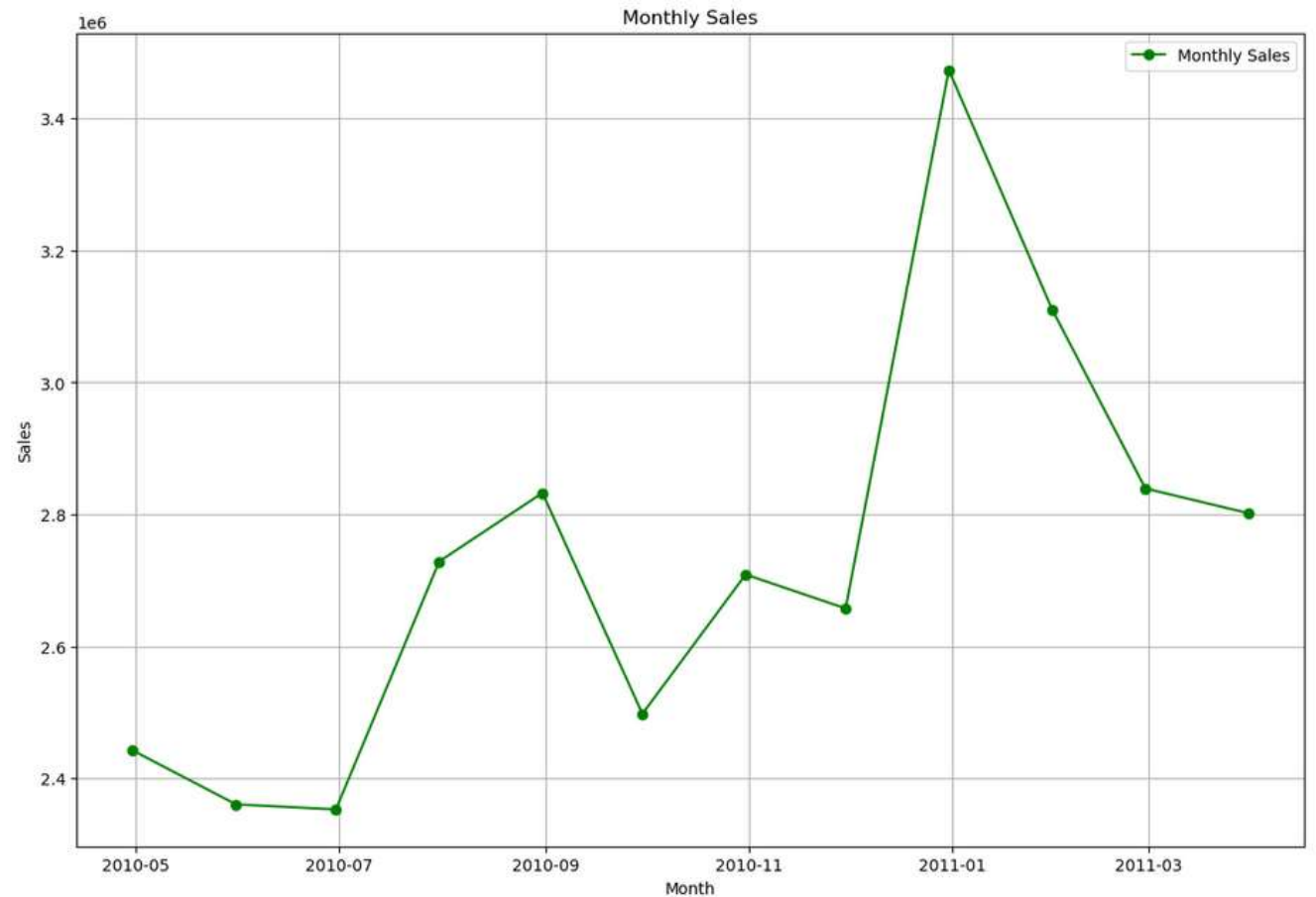
Problem 2

What kind of trends do you notice in terms of consumer behavior over different times of the day and different days of the week? Can you give concrete recommendations based on the same?

Tool used to solve this section: Tableau

Sales by Hour in a Day

Trends and Recommendations:

Trends –

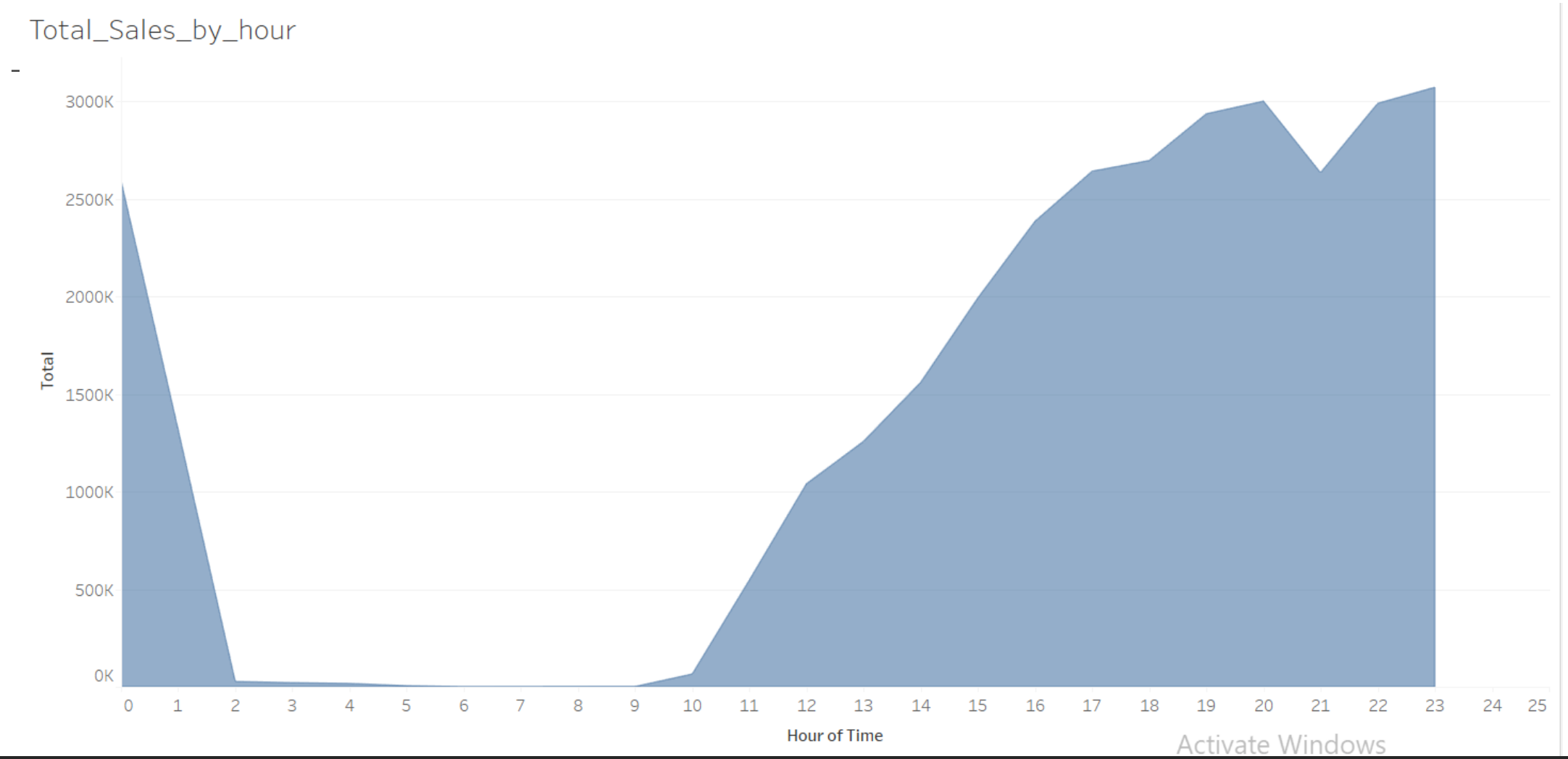❑Sales are minimum between 5 a,m, to 9 a.m.

❑Sales start from 9 a.m. and increase gradually and start peaking from 12 p.m. and reach the highest at 8 p.m. – during dinner time. There is a dip at 9 p.m. after which sales start to peak again till 12 a.m.

❑Sales start dipping from 12 a.m. to the lowest by 2 a,m, and maintain a flat line till 5 a.m.

Recommendations –

❑Instead of operating 24/7, the restaurant can close from 5 a.m to 9 p.m. for cleaning and restoration which will also save money, labour and energy since sales are minimum during this period.

❑Since we see that sales are high in demand during lunch and dinner, it would beneficial to keep food items limited (only the popular ones) on offer so that cost-cutting could be easy.

Sales by each Day of the Week
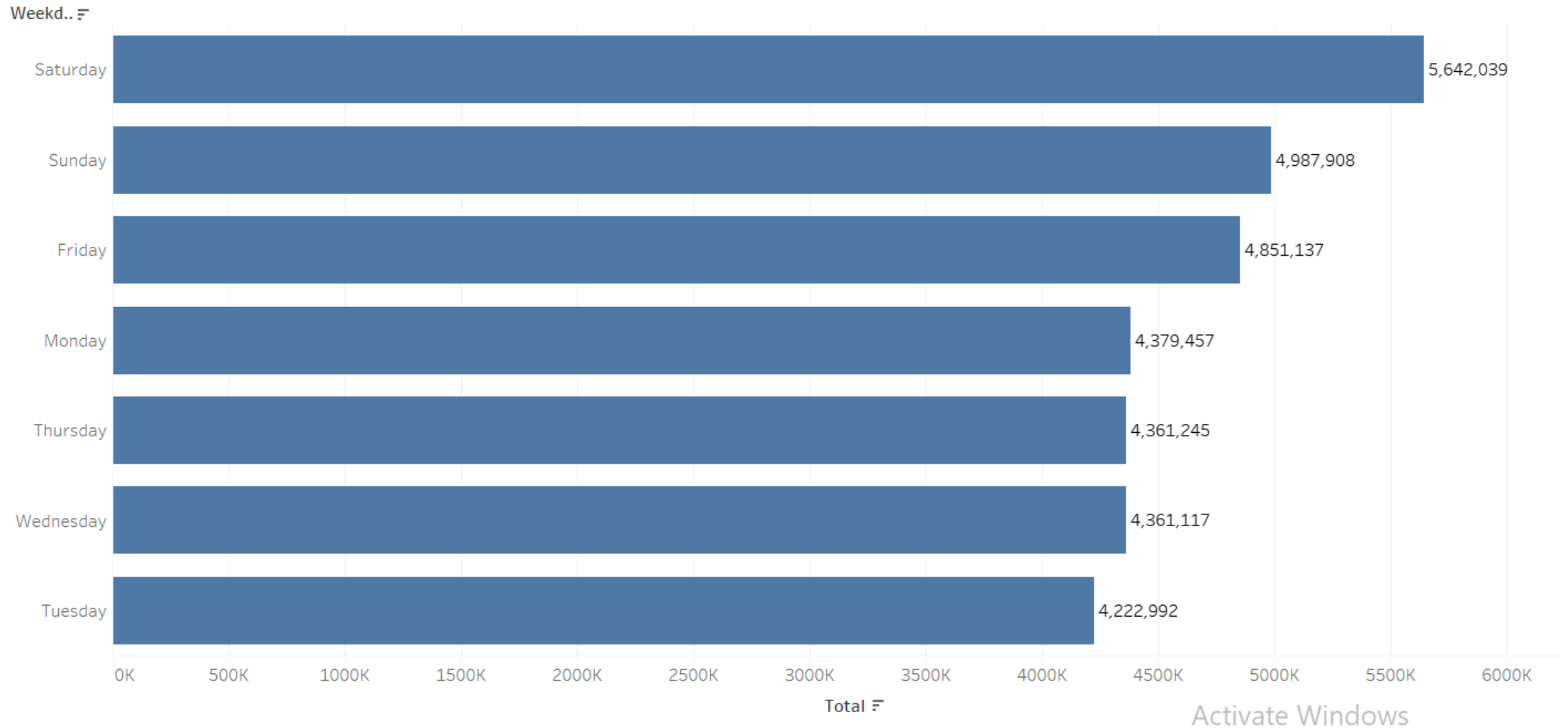
Trends and Recommendations

Trends –

❑Sales are highest during the weekend – from Friday to Sunday. Saturday sees the highest sales, followed by Sunday and Friday.

❑Tuesday sees the lowest sales.

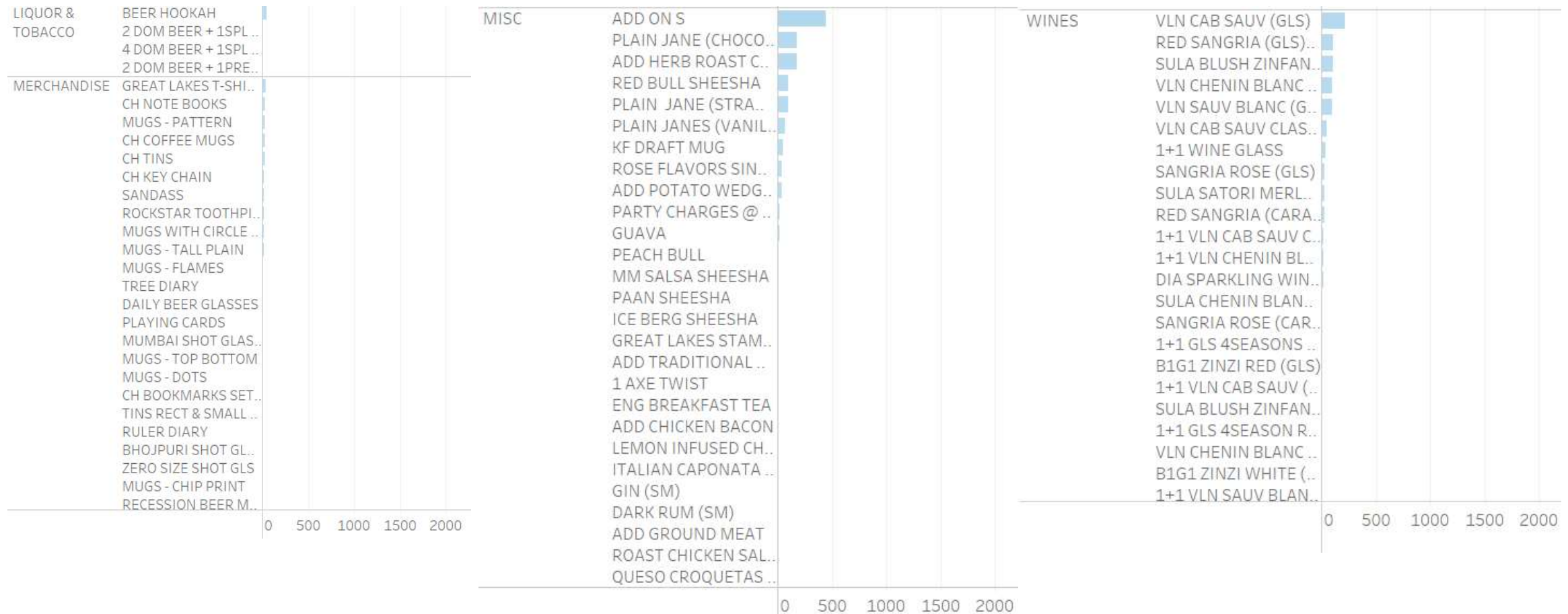❑Wednesday, Thursday and Monday maintain a consistent volume of sales.

Recommendations –

❑Attractive discounts and combos like weekday offers could be offered to attract customers.

❑Daily meal services could be offered for working customers who cannot buy everyday.

Problem 3

Are there certain menu items that can be taken off the menu?

Tool used to solve this section: Tableau

Sum of quantity of Categories that are Less

LIQUOR & TOBACCO	BEER HOOKAH
	2 DOM BEER + 1SPL ..
	4 DOM BEER + 1SPL ..
	2 DOM BEER + 1PRE..
MERCHANDISE	GREAT LAKES T-SHI..
	CH NOTE BOOKS
	MUGS - PATTERN
	CH COFFEE MUGS
	CH TINS
	CH KEY CHAIN
	SANDASS
	ROCKSTAR TOOTHPI..
	MUGS WITH CIRCLE ..
	MUGS - TALL PLAIN
	MUGS - FLAMES
	TREE DIARY
	DAILY BEER GLASSES
	PLAYING CARDS
	MUMBAI SHOT GLAS..
	MUGS - TOP BOTTOM
	MUGS - DOTS
	CH BOOKMARKS SET..
	TINS RECT & SMALL ..
	RULER DIARY
	BHOJPURI SHOT GL..
	ZERO SIZE SHOT GLS
	MUGS - CHIP PRINT
	RECESSION BEER M..

0 500 1000 1500 2000

MISC	ADD ON S
	PLAIN JANE (CHOCO..
	ADD HERB ROAST C..
	RED BULL SHEESHA
	PLAIN JANE (STRA..
	PLAIN JANES (VANIL..
	KF DRAFT MUG
	ROSE FLAVORS SIN..
	ADD POTATO WEDG..
	PARTY CHARGES @ ..
	GUAVA
	PEACH BULL
	MM SALSA SHEESHA
	PAAN SHEESHA
	ICE BERG SHEESHA
	GREAT LAKES STAM..
	ADD TRADITIONAL ..
	1 AXE TWIST
	ENG BREAKFAST TEA
	ADD CHICKEN BACON
	LEMON INFUSED CH..
	ITALIAN CAPONATA ..
	GIN (SM)
	DARK RUM (SM)
	ADD GROUND MEAT
	ROAST CHICKEN SAL..
	QUESO CROQUETAS ..

0 500 1000 1500 2000

WINES	VLN CAB SAUV (GLS)
	RED SANGRIA (GLS)..
	SULA BLUSH ZINFAN..
	VLN CHENIN BLANC ..
	VLN SAUV BLANC (G..
	VLN CAB SAUV CLAS..
	1+1 WINE GLASS
	SANGRIA ROSE (GLS)
	SULA SATORI MERL..
	RED SANGRIA (CARA..
	1+1 VLN CAB SAUV C..
	1+1 VLN CHENIN BL..
	DIA SPARKLING WIN..
	SULA CHENIN BLAN..
	SANGRIA ROSE (CAR..
	1+1 GLS 4SEASONS
	B1G1 ZINZI RED (GLS)
	1+1 VLN CAB SAUV (..
	SULA BLUSH ZINFAN..
	1+1 GLS 4SEASON R..
	VLN CHENIN BLANC ..
	B1G1 ZINZI WHITE (..
	1+1 VLN SAUV BLAN..

0 500 1000 1500 2000

Items that have Sales < 10 units.

Recommendations:

Categories that can be removed:

❖Miscellaneous, wines, merchandise and combo of liquor and tobacco.

❖Items under the categories given above can be removed. Items that have made sales < 10 units in 11 months can definitely be removed as these are simply taking storage space and shelf-life maintenance without adding profit to the restaurant.

❖Given below are some products that can be removed based on their low quantity of sales.

1+1 VLN SAUV BLANC (GLS)
VLN SAUV BLANC (BTL)
VLN CAB SAUV CLASIQ (BTL)
SULA BRUT (BTL)
4 SEASONS CLAS SYRAH(GLS)
VLN CAB SAUV (BTL)
DIA SPARKLING WINE(BTL)
4 SEASONS CLAS SAUV(GLS
MAISON PIERRE SAUV MARSAN
B1G1 ZINZI WHITE (BTL)
B1G1 ZINZI RED (BTL)
SULA SATORI MERLOT (BTL)
MANDALA VALLEY RED ZINFANDEL(G
B1G1 4SEASON CLAS SYRAH(GLS)
4 SEASONS CLAS SAUV(BTL)
1+1 WINE BOTTLE
1+1 VLN CAB SAUV CLASIQ (BTL)
1+1 BTL4 SEASON WHITE
SULA CHENIN BLANC (BTL)
MATEUS ROSE PORTUGAL(BTL)
MANDALA VALLEY CHENIN BLANC(GL
GOSSIPS CHARD AUS (BTL)
B1G1 4SEASON CLAS SAUV(GLS)
B1G1 4SEASON CLAS SAUV(BTL)
4 SEASONS CLAS SYRAH(BTL)
2 OCEAN PINOTAGE (BTL)
1+1 VLN SAUV BLANC (BTL)
1+1 VLN CAB SAUV (BTL)

MM SALSA SHEESHA
PAAN SHEESHA
ICE BERG SHEESHA
GREAT LAKES STAMP DAIRY
ADD TRADITIONAL MEAT FEAST
1 AXE TWIST
ENG BREAKFAST TEA
ADD CHICKEN BACON
LEMON INFUSED CHAR GRILLED VEG
ITALIAN CAPONATA PANINO
GIN (SM)
DARK RUM (SM)
ADD GROUND MEAT
ROAST CHICKEN SALAD
QUESO CROQUETAS FRITOS
POLLO CON AIOLI
PHILADELPHIA CREAM CHEESECAKE
ORANGE ARRABIATA
NUTELLA CREPES
MEDITER RANEAN PANINO
HOTDOG WRAP
GREEK GYROS CRUSTINI
FISH FINGER
ROMA TOMATO & JALAPENO CROQUE

LATE HARVEST SULA CHENIN (BTL)
BLUE LAGOON SHEESHA
GOLD FLAKE KINGS-BIG
GOLD FLAKE KING BLUE
BENSON & HEDGES SPL
SPICE SHEESHA
CLASSIC ULTRA MILD
CLASSIC MENTHOL
MINT FLAVOUR DOUBLE
GOLD FLAKE LIGHTS-BIG
BENSON & HEGDES GOLD BLUE
ICE SPICE SHEESHA
GREAT LAKES HOOKAH SINGLE
CLASSIC MENTHOL RUSH
APPLE FLAVOUR DOUBLE
INDIA KINGS OCEAN BLUE
GOLD FLAKE ULTRA LIGHTS(20)
CLASSIC REGULAR
AL SIKANDARI HOOKAH DOUBLE

ROCKSTAR TOOTHPICK HOLDER
MUGS WITH CIRCLE DESIGN
MUGS - TALL PLAIN
MUGS - FLAMES
TREE DIARY
DAILY BEER GLASSES
PLAYING CARDS
MUMBAI SHOT GLASSES
MUGS - TOP BOTTOM
MUGS - DOTS
CH BOOKMARKS SET OF 4
TINS RECT & SMALL CIRCULAR
RULER DIARY
BHOJPURI SHOT GLASSES
ZERO SIZE SHOT GLS
MUGS - CHIP PRINT
RECESSION BEER MUG SHOT GLS
MUGS - STRIPE PLAIN
GOA GIRLS SHOT GLASS
DAIRY OF A DAIRY
FLAVOUR 500 GMS
MM DAIRY GRAMAPHONE
FLAVORS (100 GMS)

ADD IRISH CREAM FLAVOUR
2 RED BULL
GUATEMALA ANTIGUA (REG)
GUATEMALA ANTIGUA (AULAIT)
HAWAIIAN KONA FANCY (AU LAIT)
BERRY BULL
JAVA ESTATES (REG)
JAVA ESTATES (AULAIT)
ICE BULL
COLUMBIAN SUP DCAFE (AU LAIT)
NEW ORLEANS BLUE (REG)
N R G HOOKAH
VARLHONA HOT CHOCOLATE
NEW ORLEANS BLUE (AULAIT)
HOUSE BLEND DE CAFFE (AU LAIT)
BOTTLED WATER (1LITRE)
WHAT A MELON
PEACH BULL
MOCAFE HOT CHOCOLATE(SF)
MIXED FLAVOUR SINGLE
DECAFFINATE COFFEE FRAPPE
2 AXE TWIST

ALIO AGLIO
MAGGI NDL BURMESE CURRY
CAFE ZABAGLIONE
POLENTA & CORN CAKES
SCRAMBLED EGGS + BEVERAGE
RED VELVET CHEESE CAKE
MUSHROOM & CORN
3COURSE NON-VEG MEAL
TOAST CIABATA
CALAMARI FRITO
BEANS NACHO CHILLI W MEAT
3COURSE VEG MEAL
NONVEG PASTA PESTO
MOTHERS DAY SPL
CHICKEN HAM
CHEESE FINGERS
VEGETABLE PASTA
CARROT CAKE
WAFFLES + BEVERAGE
J.PCHENET SPARKLING ROSE (BTL)
2 MUFFINS + BEVERAGE
SUNNY SIDEUP + BEVERAGE
STRAWBERRY MERINGUE
SCHNEIDER 2+1
NIRVANA HOOKAH DOUBLE
CAPONATA
ADD BUTTERED TOAST

LIQUOR	STELLA ARTOIS MUG (1/2 LTR)
	STELLA ARTOIS (GLS)
	VODKA (SM)
	CARLSBERG 2+1
	TUBORG 2+1
	ZINZI WHITE (GLS)
	STELLA ARTOIS MUG (1 LTR)
	BEER TANK 3.5 LITRE
	TEQUILA
	ZINZI RED (GLS)
	WHITE RUM (SM)
	1+1 KF 2 LITER
	WHITE SANGRIA (CARAFE)áááááááá
	BROOKLYN
	STELLA 1LTR 2+1
	UNLIMITED BEER
	STELLA ARTOIS
	SCHNEIDER WEISSE
	BROOKLYN BUCKET - 4
	SCHNEIDER BUCKET - 6
	WHISKEY (SM)
	ZINZI WHITE (BTL)
LIQUOR & TOBACCO	BEER HOOKAH
	2 DOM BEER + 1SPL SHEESHA
	4 DOM BEER + 1SPL SHEESHA
	2 DOM BEER + 1PREM SHEESHA
MERCHANDISE	GREAT LAKES T-SHIRTS
	CH NOTE BOOKS

Problem 4

Are there trends across months that you are able to notice?

Tool used to solve this section: Tableau

Trends of Quantities and Total Sales across Months
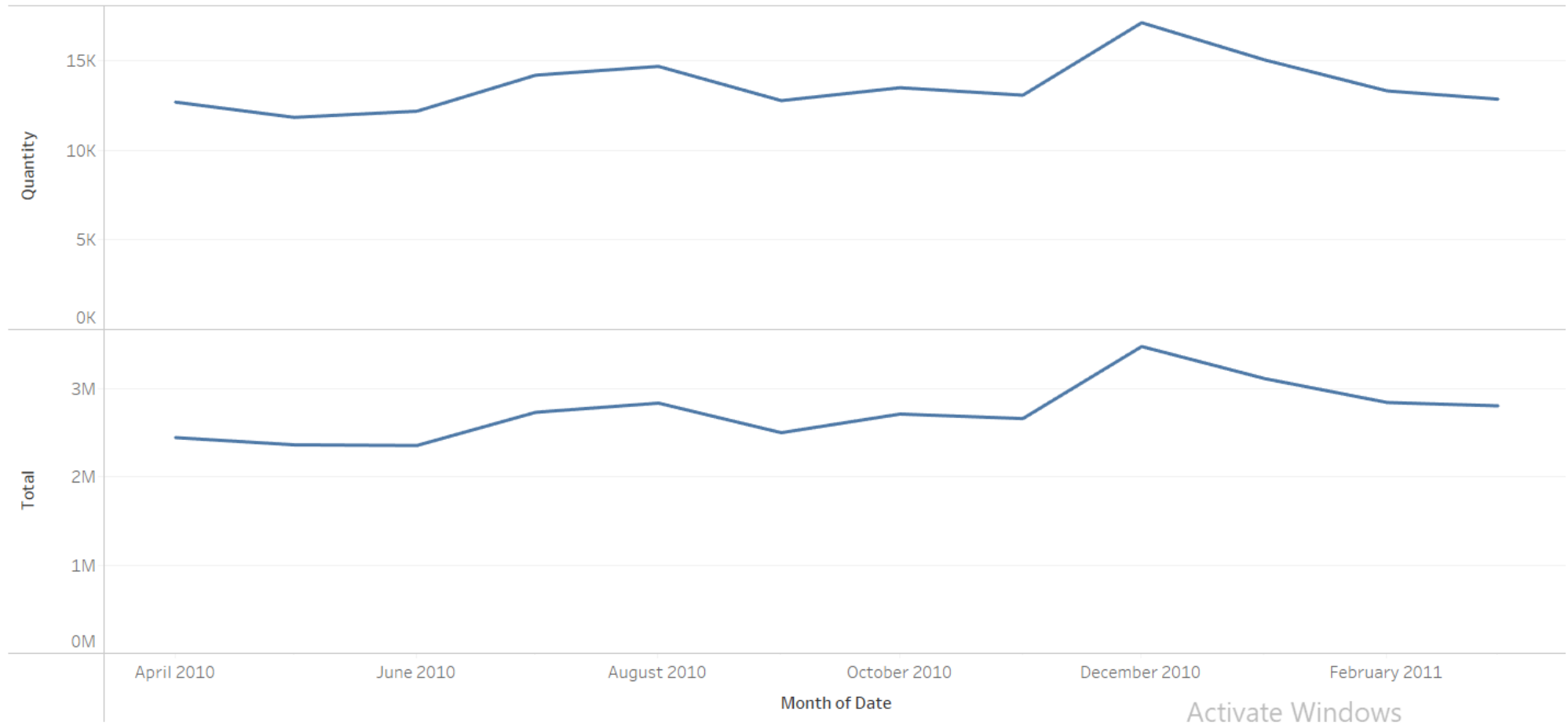
Trends of Discounts across Months

- Highest discounts seen in months of January and October.

- Medium levels of discounts are seen in months of March, September, February, November, May and July.

- Least levels of discount are seen in April, June, August and December.
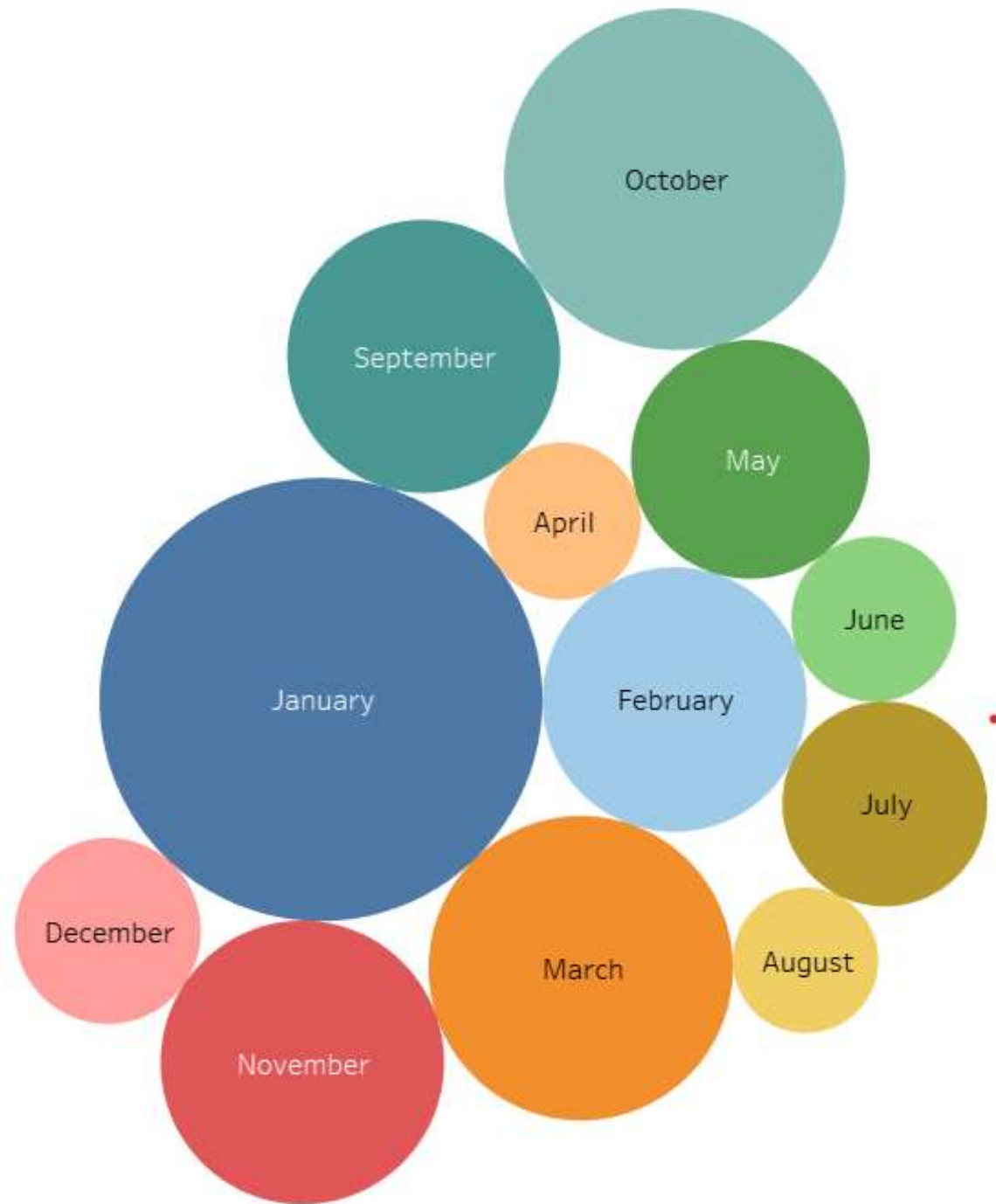
Observations:

❑The total sales is directly proportional to the quantity of items sold.

❑ Although August and July exhibit low levels of discount rates, total sales are second highest in the month of July and August – it is mostly around the season of summer. So, people might resort to the restaurant for food instead of cooking at home.

❑ January has the highest total sales along with a high level of discount across products. The season of December to February seems to be naturally booming with sales due to the ongoing winter season and new year celebrations.

Problem 5

Menu Analysis: Use of Market Basket Analysis (Association Rules) 1. Write Something about the association rule and its relevance in this case. 2. Add KNIME workflow Image or Python package used 3. Write about threshold values of Support and Confidence.

Tool used to solve this section: KNIME

Association Rule and its Relevance in this case

Association Rules: Association rules are used to identify the strength of the relationship between different products. These rules are expressed in terms of support, confidence, and lift. Support refers to the frequency of co-occurrence of items in a transaction, while confidence measures the probability that if a customer buys one item, they will also buy another. Lift measures the degree of correlation between two items.

Applications: Market Basket Analysis is used in a variety of industries, including retail, e-commerce, and marketing. Retailers use this technique to optimize product placement and promotions. E-commerce companies use it to personalize product recommendations, and marketers use it to develop targeted advertising campaigns.

Benefits: Market Basket Analysis helps businesses increase revenue by identifying cross-selling opportunities and developing targeted promotions. It also helps improve customer satisfaction by providing personalized recommendations and improving the overall shopping experience

Association Rules:

In market basket analysis, support, confidence, and lift values are used to measure the strength of association between items in a transaction dataset.
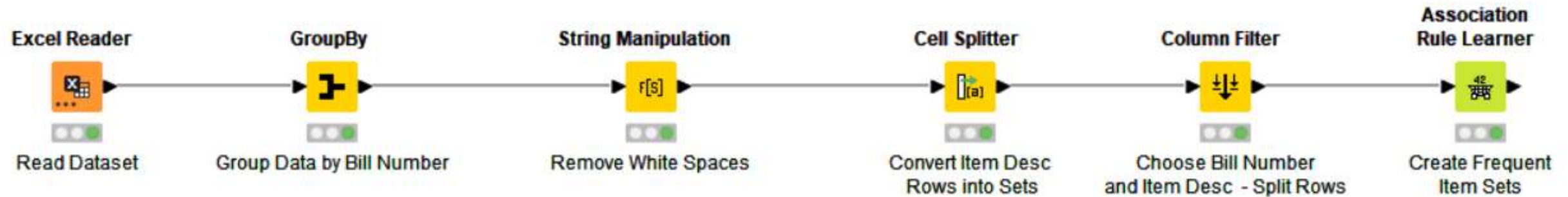
Support: It is the probability of observing the items together in a transaction. It is calculated as the number of transactions that contain both items divided by the total number of transactions. It measures how frequent the itemset occurs in the dataset. High support indicates that the itemset is popular and should be considered for promotion or placement together.

Confidence: It is the conditional probability that a transaction containing one item also contains another item. It is calculated as the number of transactions containing both items divided by the number of transactions containing the first item. It measures the strength of the association between two items. High confidence indicates that the items are likely to be bought together and can be used to recommend or suggest items to customers.

Lift: It is the measure of how much more often two items occur together than expected if they were independent of each other. It is calculated as the support of the itemset divided by the product of the individual supports of the items. A lift value of 1 indicates that the items are independent, while a value greater than 1 indicates a positive association between the items. A lift value less than 1 indicates a negative association between the items. High lift indicates that the items have a strong association and can be used for cross-selling or bundling.

Excel Reader — Read Dataset

GroupBy — Group Data by Bill Number

String Manipulation — Remove White Spaces

Cell Splitter — Convert Item Desc Rows into Sets

Column Filter — Choose Bill Number and Item Desc - Split Rows

Association Rule Learner — Create Frequent Item Sets

KNIME Workflow for the Market Basket Analysis

Association Rule Parameters

- Minimum Support - 0.0005

- Maximum Item Set Length – 10

- Minimum Confidence Level – 0.001

Problem 6

Association Rules Identified. 1. Put the associations in a tabular manner. 2. Explain about support, confidence, & lift values that are calculated.

Tool used to solve this section: KNIME

Associations Identified - 1553

Table "default" - Rows: 1553   Spec - Columns: 6   Properties   Flow Variables

Row ID	D Support	D Confide...	D Lift	S Consequent	S implies	[...] Items
rule0	0.001	0.025	0.878	SILVER APPLE SINGLE	<---	[PINK LEMONADE]
rule1	0.001	0.018	0.878	PINK LEMONADE	<---	[SILVER APPLE SINGLE]
rule2	0.001	0.006	0.298	PINK LEMONADE	<---	[MINT FLAVOUR SINGLE]
rule3	0.001	0.025	0.298	MINT FLAVOUR SINGLE	<---	[PINK LEMONADE]
rule4	0.001	0.11	2.322	QUA MINERAL WATER(1000ML)	<---	[KHEEMA GHOTALA]
rule5	0.001	0.011	2.322	KHEEMA GHOTALA	<---	[QUA MINERAL WATER(1000ML)]
rule6	0.001	0.06	1.258	QUA MINERAL WATER(1000ML)	<---	[SNICKER BAR SHAKE]
rule7	0.001	0.011	1.258	SNICKER BAR SHAKE	<---	[QUA MINERAL WATER(1000ML)]
rule8	0.001	0.05	1.044	QUA MINERAL WATER(1000ML)	<---	[RABAT HOOKAH SINGLE]
rule9	0.001	0.011	1.044	RABAT HOOKAH SINGLE	<---	[QUA MINERAL WATER(1000ML)]
rule10	0.001	0.055	0.456	NIRVANA HOOKAH SINGLE	<---	[BLUE BERRY SINGLE]
rule11	0.001	0.004	0.456	BLUE BERRY SINGLE	<---	[NIRVANA HOOKAH SINGLE]
rule12	0.001	0.128	1.07	NIRVANA HOOKAH SINGLE	<---	[CHUNKY CHOCO CHIP COOKIES]
rule13	0.001	0.004	1.07	CHUNKY CHOCO CHIP COOKIES	<---	[NIRVANA HOOKAH SINGLE]
rule14	0.001	0.099	1.269	CAPPUCCINO	<---	[SPANISH OMELETTE BREAKFAST]
rule15	0.001	0.006	1.269	SPANISH OMELETTE BREAKFAST	<---	[CAPPUCCINO]
rule16	0.001	0.121	1.545	CAPPUCCINO	<---	[SCRAMBLED EGGS]
rule17	0.001	0.006	1.545	SCRAMBLED EGGS	<---	[CAPPUCCINO]
rule18	0.001	0.165	2.113	CAPPUCCINO	<---	[APPLE CINNAMON MUFFIN]
rule19	0.001	0.006	2.113	APPLE CINNAMON MUFFIN	<---	[CAPPUCCINO]
rule20	0.001	0.036	1.115	MASALA CHAI CUTTING	<---	[SATAY CHICKEN PANINI]
rule21	0.001	0.016	1.115	SATAY CHICKEN PANINI	<---	[MASALA CHAI CUTTING]
rule22	0.001	0.021	0.653	MASALA CHAI CUTTING	<---	[KIT KAT SHAKE]
rule23	0.001	0.016	0.653	KIT KAT SHAKE	<---	[MASALA CHAI CUTTING]
rule24	0.001	0.04	0.478	MINT FLAVOUR SINGLE	<---	[MAGGI NDL ARRABIATA]
rule25	0.001	0.006	0.478	MAGGI NDL ARRABIATA	<---	[MINT FLAVOUR SINGLE]
rule26	0.001	0.033	1.016	MOROCCAN MINT TEA	<---	[ULTIMATE HOT CHOCOLATE]
rule27	0.001	0.016	1.016	ULTIMATE HOT CHOCOLATE	<---	[MOROCCAN MINT TEA]
rule28	0.001	0.094	1.98	JR.CHL AVALANCHE	<---	[VERTIGO]
rule29	0.001	0.011	1.98	VERTIGO	<---	[JR.CHL AVALANCHE]
rule30	0.001	0.054	2.099	COUNTRY LEMONADE	<---	[NON-VEG CLUB WRAP]
rule31	0.001	0.019	2.099	NON-VEG CLUB WRAP	<---	[COUNTRY LEMONADE]
rule32	0.001	0.056	2.173	COUNTRY LEMONADE	<---	[MEZE PLATTER]
rule33	0.001	0.019	2.173	MEZE PLATTER	<---	[COUNTRY LEMONADE]
rule34	0.001	0.019	2.306	VEG. CLUB WRAP	<---	[PHILLYCREAM CHEESE &CHILLY PAN]
rule35	0.001	0.061	2.306	PHILLYCREAM CHEESE &CHILLY PAN	<---	[VEG. CLUB WRAP]
rule36	0.001	0.018	1.638	ADD FRIES	<---	[OREO COOKIE SHAKE]
rule37	0.001	0.047	1.638	OREO COOKIE SHAKE	<---	[ADD FRIES]

Logic behind Association Rule Parameters in This Case

Considering the shape of the original dataset which has 145830 rows, the minimum confidence has been made granular to capture the minutest of hints in associations.

The two parameters can me made more smaller, but the resulting dataset will be too elaborate to analyse market baskets.

Meaning of 0.0005 support: This means that an itemset must appear in at least 0.05% (or 1/2000) of the total transactions in the dataset to be considered "frequent" and included in the analysis. A higher minimum support leads to fewer frequent item sets being generated, potentially missing less frequent but still interesting relationships revealing rarer patterns.

Meaning of 10 Set Length: It means the analysis will consider combinations of up to 10 items at a time.

Meaning of 0.001 confidence: This means that for a rule to be considered valid, if item A is present, item B must also be present in at least 0.1% of the transactions containing A. A higher minimum confidence means the rules generated are more reliable.

Problem 7

The suggestion of Possible Combos with Lucrative Offers: 1. Write recommendations 2. Make discount offers or combos (or buy two get one free) based on the associations and your experience.

Tool used to solve this section: KNIME

Support	Confide...	Lift	Consequent	implies	[...] Items
0.001	0.462	101.891	KHEEMA GHOTALA	<---	[BUTTERED TOASTS]
0.001	0.151	101.891	BUTTERED TOASTS	<---	[KHEEMA GHOTALA]
0.001	0.178	79.364	ADD HERB ROAST CHICKEN	<---	[LEMON INFUSED CHAR GRILLED VEG]
0.001	0.465	79.364	LEMON INFUSED CHAR GRILLED VEG	<---	[ADD HERB ROAST CHICKEN]
0.001	0.325	45.925	ORANGE ARRABIATA	<---	[ADD HERB ROAST CHICKEN]
0.001	0.103	45.925	ADD HERB ROAST CHICKEN	<---	[ORANGE ARRABIATA]
0.001	0.8	26.723	CAFFE LATTE	<---	[ADD VANILLA FLAVOUR]
0.001	0.019	26.723	ADD VANILLA FLAVOUR	<---	[CAFFE LATTE]
0.001	0.638	21.301	CAFFE LATTE	<---	[ADD CARAMEL FLAVOUR]
0.001	0.021	21.301	ADD CARAMEL FLAVOUR	<---	[CAFFE LATTE]
0.001	0.223	20.798	ADD FRIES	<---	[TRADITIONAL ITALIAN CRUSTINI]
0.001	0.078	20.798	TRADITIONAL ITALIAN CRUSTINI	<---	[ADD FRIES]
0.002	0.546	18.235	CAFFE LATTE	<---	[ADD HAZELNUT FLAVOUR]
0.002	0.054	18.235	ADD HAZELNUT FLAVOUR	<---	[CAFFE LATTE]
0.001	0.192	15.257	MAGGI NDL ARRABIATA	<---	[SAMBUCA,B.M.T. PANINI]
0.001	0.061	12.093	CHICKEN SLOUVLAKI WRAP	<---	[ADD FRIES]
0.001	0.13	12.093	ADD FRIES	<---	[CHICKEN SLOUVLAKI WRAP]
0.001	0.06	11.108	MEDITER RANEAN PANINO	<---	[ADD FRIES]
0.001	0.119	11.108	ADD FRIES	<---	[MEDITER RANEAN PANINO]
0.001	0.195	11.036	GARDEN FRESH PANINI	<---	[FRENCH FRIES]
0.001	0.042	11.036	FRENCH FRIES	<---	[GARDEN FRESH PANINI]
0.001	0.36	9.671	B.M.T. PANINI	<---	[MAGGI NDL ARRABIATA,SAMBUCA]
0.001	0.176	9.318	COUNTRY ROAST CHICKEN PANINI	<---	[FRENCH FRIES]
0.001	0.036	9.318	FRENCH FRIES	<---	[COUNTRY ROAST CHICKEN PANINI]
0.001	0.145	8.667	RED BULL 2+1	<---	[SAMBUCA,CALCUTTA MINT]
0.001	0.535	8.463	SAMBUCA	<---	[QUA MINERAL WATER(1000ML),RED BULL 2+1]
0.001	0.14	8.41	RED BULL 2+1	<---	[QUA MINERAL WATER(1000ML),SAMBUCA]
0.001	0.507	8.02	SAMBUCA	<---	[RED BULL 2+1,GREAT LAKES SHAKE]
0.001	0.125	7.496	RED BULL 2+1	<---	[SAMBUCA,B.M.T. PANINI]
0.001	0.105	7.479	SATAY CHICKEN PANINI	<---	[ADD FRIES]
0.001	0.08	7.479	ADD FRIES	<---	[SATAY CHICKEN PANINI]
0.001	0.47	7.439	SAMBUCA	<---	[MAGGI NDL ARRABIATA,B.M.T. PANINI]
0.001	0.048	7.189	KF DRAUGHT PITCHER (2LTR)	<---	[KF DRAUGHT (1LTR)]
0.001	0.087	7.189	KF DRAUGHT (1LTR)	<---	[KF DRAUGHT PITCHER (2LTR)]
0.001	0.027	7.144	FRENCH FRIES	<---	[B.M.T. PANINI]
0.001	0.266	7.144	B.M.T. PANINI	<---	[FRENCH FRIES]
0.001	0.116	6.977	RED BULL 2+1	<---	[SAMBUCA,GREAT LAKES SHAKE]
0.001	0.414	6.553	SAMBUCA	<---	[RED BULL 2+1,B.M.T. PANINI]

Lucrative Offers and Recommendations

After arranging the frequently occurring items in a descending order on based on lift values, we have designed some frequently occurring combos.

The Combos are:

- ADD HERB ROAST CHICKEN & LEMON INFUSED CHAR GRILLED VEG

- KHEEMA GHOTALA & BUTTERED TOASTS

- ORANGE ARRABIATA & ADD HERB ROAST CHICKEN

- ADD FRIES & TRADITIONAL ITALIAN CRUSTINI

- FRENCH FRIES & COUNTRY ROAST CHICKEN PANINI

- RED BULL 2+1 & SAMBUCA, CALCUTTA MINT

- KF DRAUGHT PITCHER (2LTR) & KF DRAUGHT (1LTR)

Discount Offers

❑- Beverages like Sambuca, Red Bull, Masala Chai Tea and Lemon Iced tea and shakes are quite popular with solid food dishes. Buy two get one offers can be applied to solid food items like Keema Ghotala or Roast Chicken Panini to attract customers. The promise of a beverage with automatically increase chances of sale as a solid food item is ac companied by a beverage.

❑- Low-value items like Fries and flavour-adding add-ons are also quite popular choices. Instead of offering them in singular units, buy two get one offers can be applied to increase sales of high-value items.

❑- Tobacco items also are accompanied by beverages, shakes and frozen items. Since tobacco items have point-of-sales offering buy two get one offers will easily attract customers.