

# Market Research Analysis of Cafe Chain

Submitted By :  
Suprasanna Pradhan

## **Business Problem**

- The owner of the restaurant wants use this data and produce a set of recommendations that can help Café Chain increase the revenues.
- Not able to launch a loyalty program and is unable to provide a data set which has customer level information.
- Data set for POS (point of sale data) is available for one of chain group .

## **Project Objective and Scope**

- We will have to find out the trends observed in terms of consumer behavior over different times of the day and different days of the week? Recommendations to the business for the same
- Any changes required in the restaurant menu items
- Find out the trends are temporarily or prolonged , sustained time period of this to be measured day, weekly or Monthly
- Identify the most popular combos that can be suggested to the restaurant chain after a thorough analysis of the most commonly occurring sets of menu items in the customer orders. The restaurant doesn't have any combo meals. Best suggestion to have the best combo meals?

# Project Approach

A typical Development Lifecycle can be adopted for this assignment, as follows:

1. Exploratory Analysis
2. Data Preparation
3. Model Building –Market Basket
4. Communicating Results

## Data Preparation

The data set consist of 145830 observation and 10 variables , the data hailed from the year of 2010 and 2011.

The type of data and description are mentioned right side table

Variable Category is having these levels

1. BEVERAGE
2. FOOD
3. LIQUOR
4. LIQUOR
5. LIQUOR & TOBACCO
6. MERCHANDISE
6. MISC
7. TOBACCO
8. WINES



Microsoft Excel Worksheet

**Data Set of Cafe Great Transaction**

Variables	Value	Type of data
Date	Date of Sale	Date Format
Bill Number	Invoice Number	Alpha Numeric
Item Desc	Name of Manu item	Text
Time	Time of served	Time Hourly format
Quantity	Number of Item	Number
Rate	Individual Price of the Manu item	Number
Tax	Tax added after rate	Number
Discount	Customer Discount	Number
Total	Total amount of against of the Invoice number	Number
Category	The are nine categories which is part of the Manu	Text

# Importing data

- The data set is consistent of 145830 observations with 10 variables, the data is hailed from the year of 2010 and 2011 from one of the chain restaurant of the group.
- To analyse the customer behaviour we can use variable of date , time , discount, revenue and quantity .
- In the data set nothing mentioned about the capacity of the restaurant , hence we have to analysis the sale of total amount and quantity which is alternatively interacted more customer in particular day , week ,month or year
- Resultant does not have any schemes so we need to understand that customers who got the discount due to highly bill amount or regular visit .
- Data set does not give any clarification about the class of people is able interacted for the past year so we should categorize the people after analysing the food categories and their sale

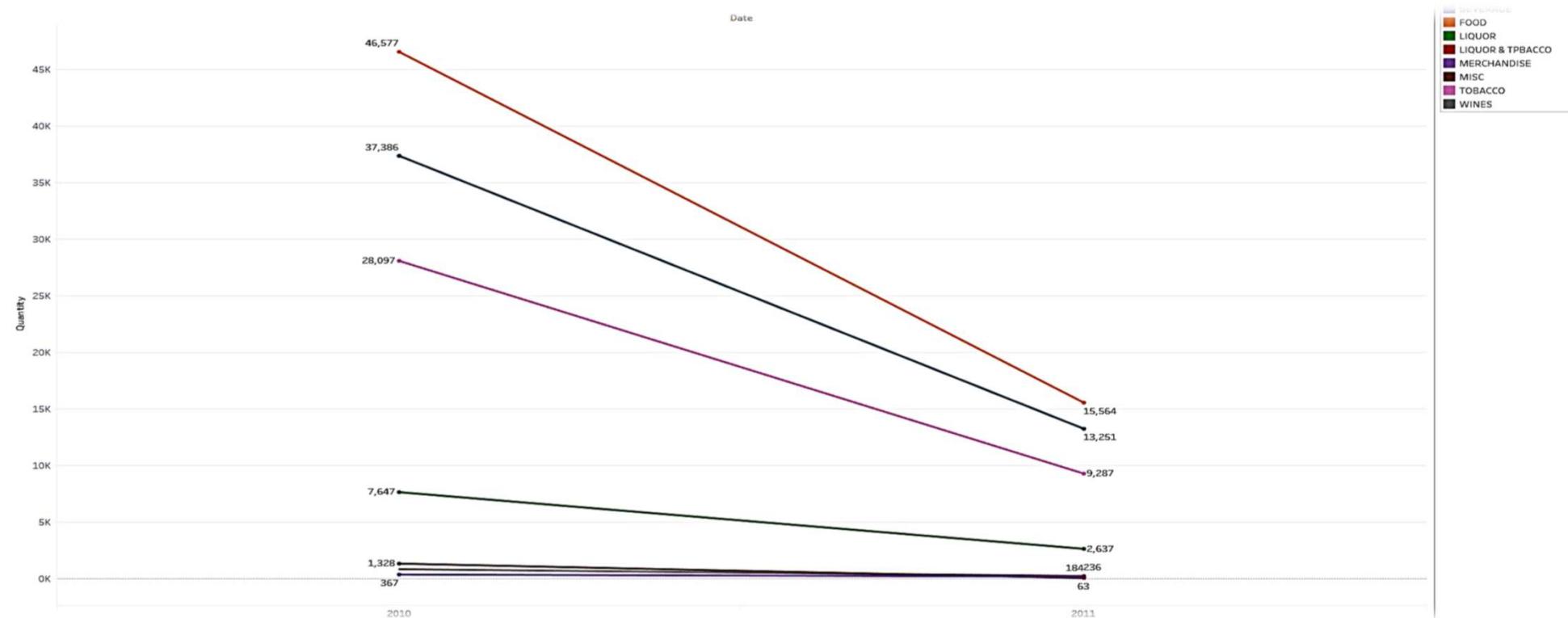
```
str(cafe_df)
```

```
## 'data.frame': 145830 obs. of 10 variables:
## $ Date      : POSIXct, format: "2011-01-25" "2011-02-20" ...
## $ Bill_Number: chr "G0522713" "N0033392" "N0032132" "N0030048" ...
## $ Item_Desc  : chr "PARTY CHARGES @ 500/-" "KF DRAUGHT PITCHER (2LTR)" "SULA BRUT (BTL)" "RED SANGRIA (CARAFE) Ä;Ä;Ä;Ä;
## $ Time      : POSIXct, format: "1899-12-31 21:21:02" "1899-12-31 21:24:40" ...
## $ Quantity   : num 23 10 3 4 9 13 2 11 8 6 ...
## $ Rate       : num 500 400 1200 850 350 225 1300 250 330 400 ...
## $ Tax        : num 2731 1250 936 884 984 ...
## $ Discount   : num 0 0 0 0 0 0 825 0 0 ...
## $ Total      : num 14231 5250 4536 4284 4134 ...
## $ Category   : chr "MISC" "LIQUOR" "WINES" "WINES" ...
```

# Yearly sales trend from 2010 to 2011

- The revenue is decreasing in year of 2011

The categories like Food and Beverage Liquor and Tobacco sale has been downsized highly whereas wines, miscellaneous and merchandise categories are having somehow minor cut-off on their sale comparing the sale of 2010 to 2011

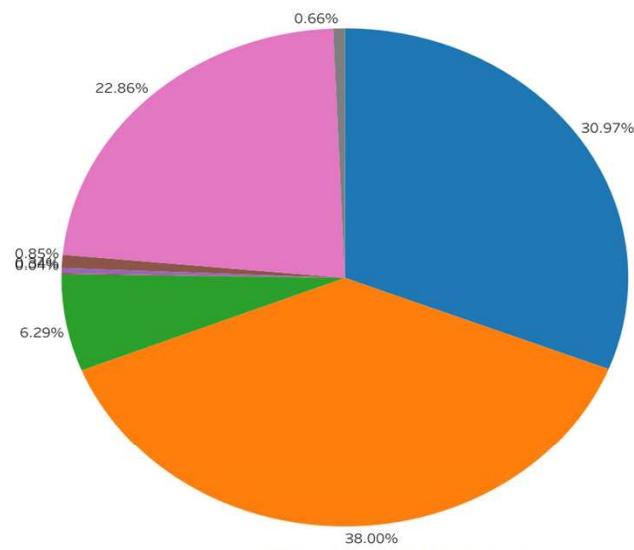


# Yearly Quantity Categorized and Item sold in maximum quantity

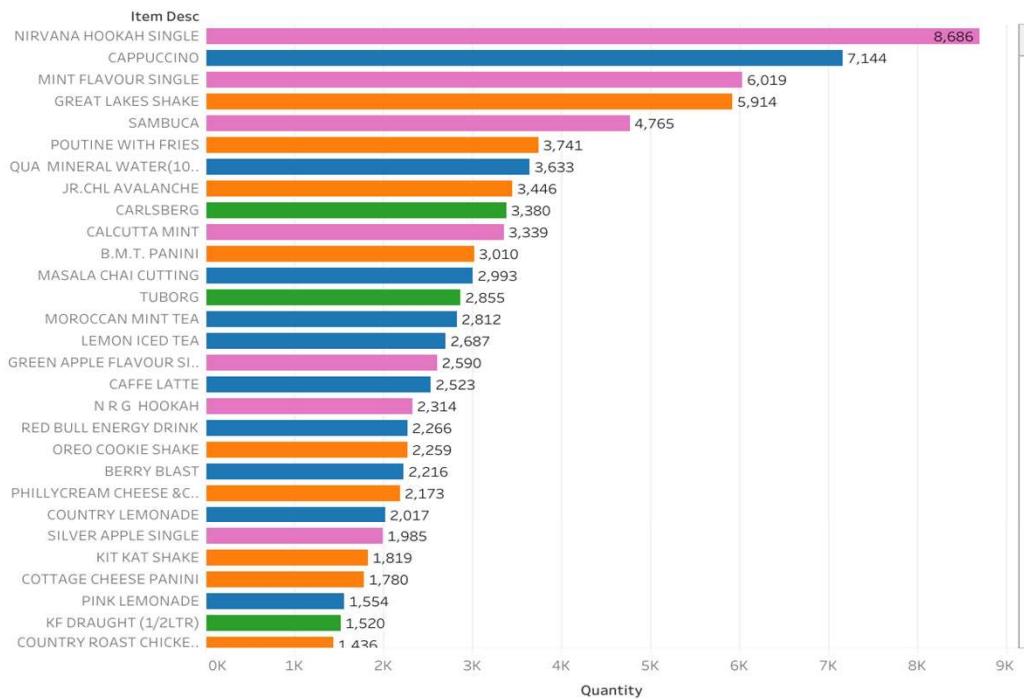
- Observed here that Food 38.00% and Beverage category 30.96% is shown maximum range of sale quantities whereas Tabaco is 22.86 % of overall quantity of wholesale of amount
- LIQUOR & TPBACCO 6%, MERCHANTIS 0.33%, MISC 0.84% is very minor contribution towards the revenue

Category BEVERAGE FOOD LIQUOR LIQUOR & TPBA.. MERCHANTISE MISC TOBACCO WINES

Category Wise VS Sum of Quantity



Sum of Quantity VS Item Sold Out



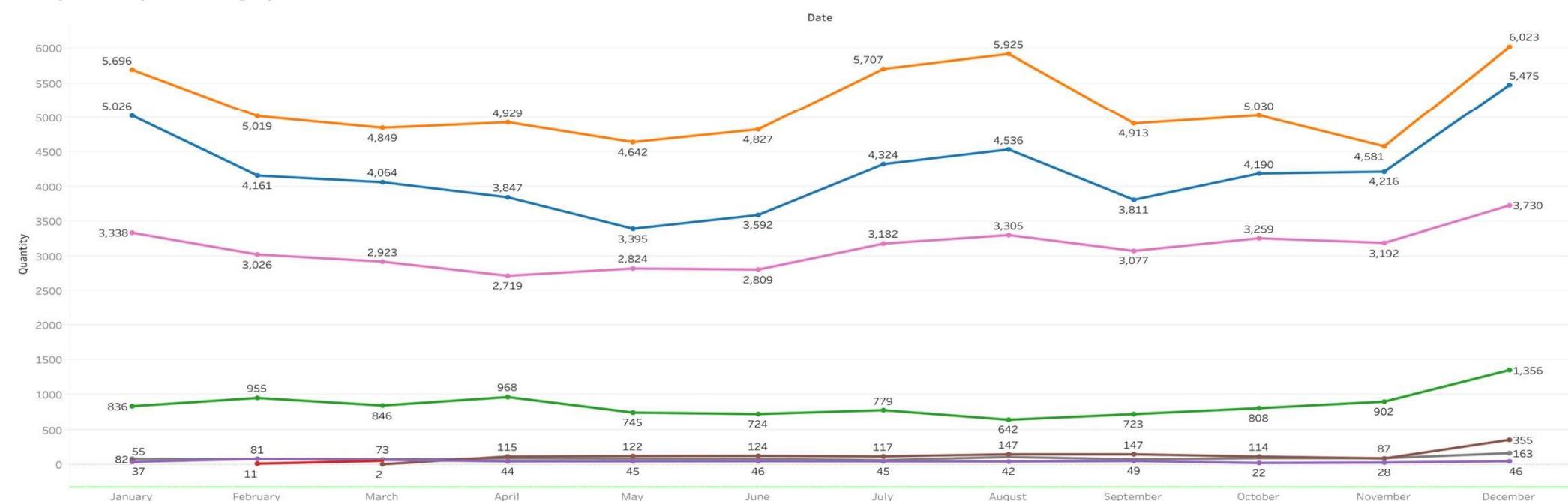
# Month to year sold quantities categorize – Finding monthly trend

- Food and Beverage and Tabaco are equally shows the quantities of January to May has been downsized
- From June to September there is seasonal trend and December it shows restaurant is highly active in business

Sale of year& Monthly

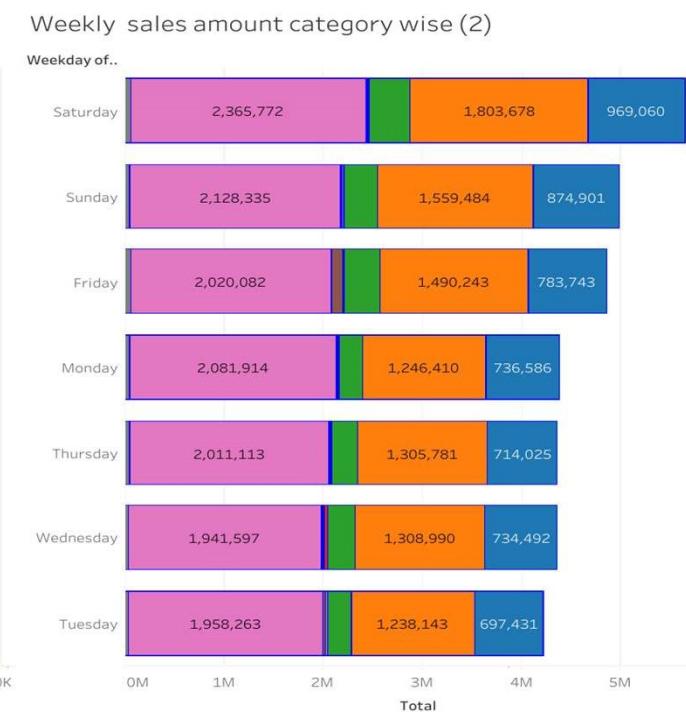
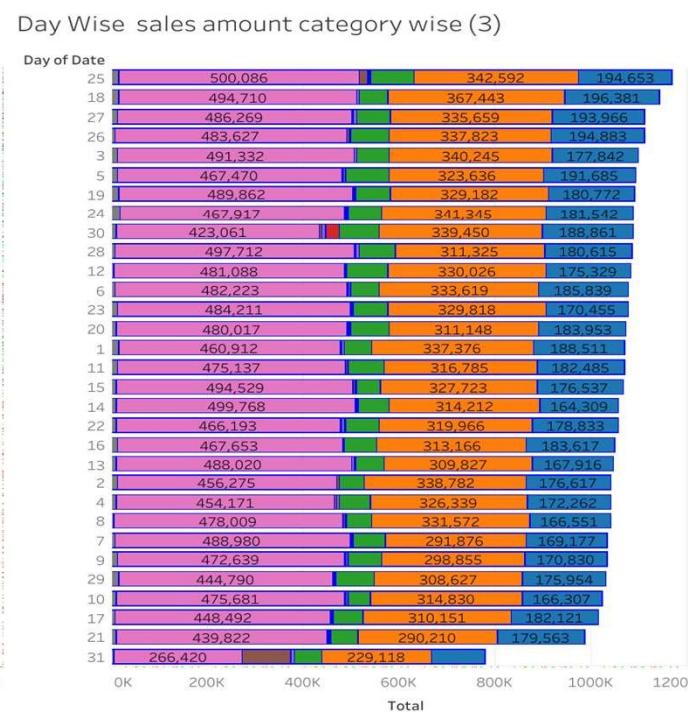
Category BEVERAGE FOOD LIQUOR LIQUOR & TPBA.. MERCHANDISE MISC TOBACCO WINES

Yearly Quantity Sold Category



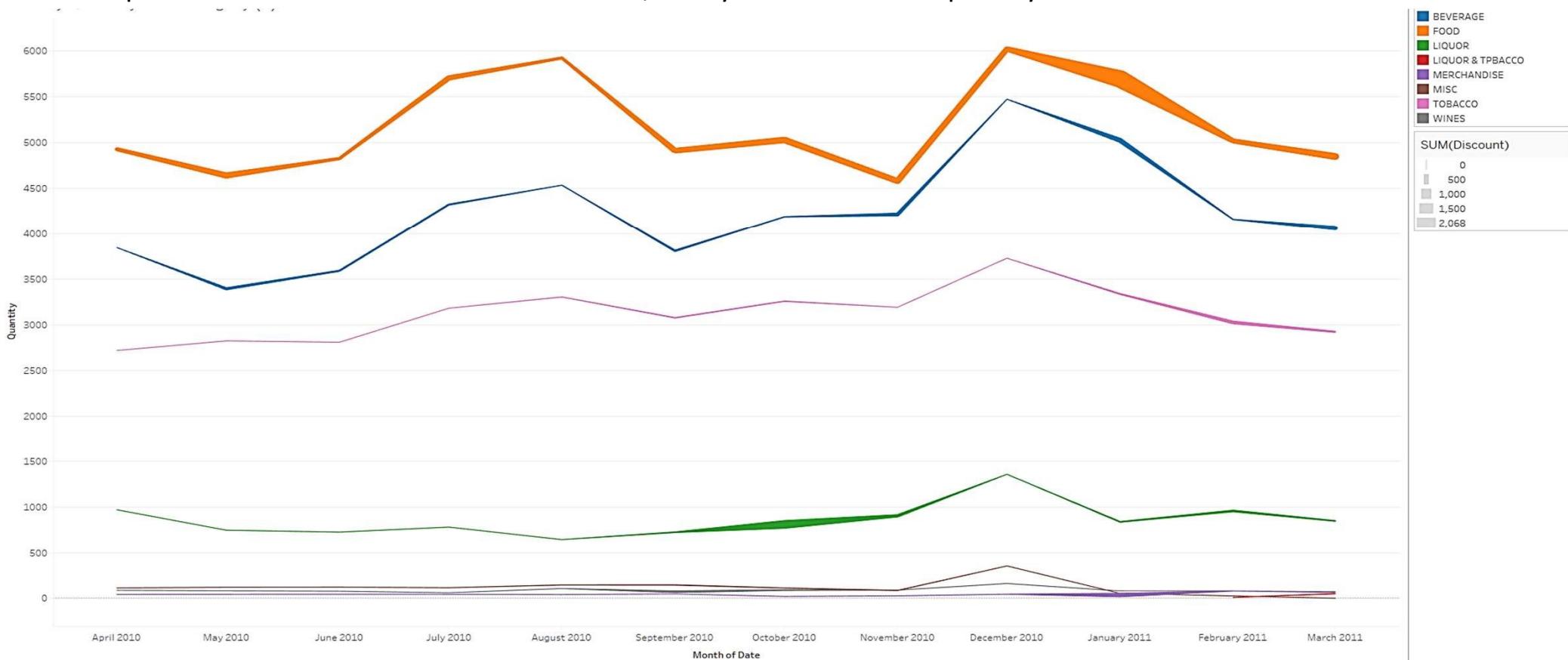
# Finding monthly trends

- Month wise the sales amount shows December Month is the highest sale for category of Tobacco ,Food and Beverages and June is generating very less revenue, September to February the sale is slowly increased .
- 25th day of month's seems generating more revenue for same categories as for monthly sales whereas 31st is generated revenue very low , day of 20<sup>th</sup> to 25<sup>th</sup> constantly increased the revenue .
- Saturday is providing highest sale and Tuesday is generating low revenue subsequently followed by Friday and Sunday ,Wed, Thu and Mon is providing average sale for highlighted categories
- We understand the café got more guests and business get in Jan, Dec and 20<sup>th</sup> to 25<sup>th</sup> and on Friday to Sunday



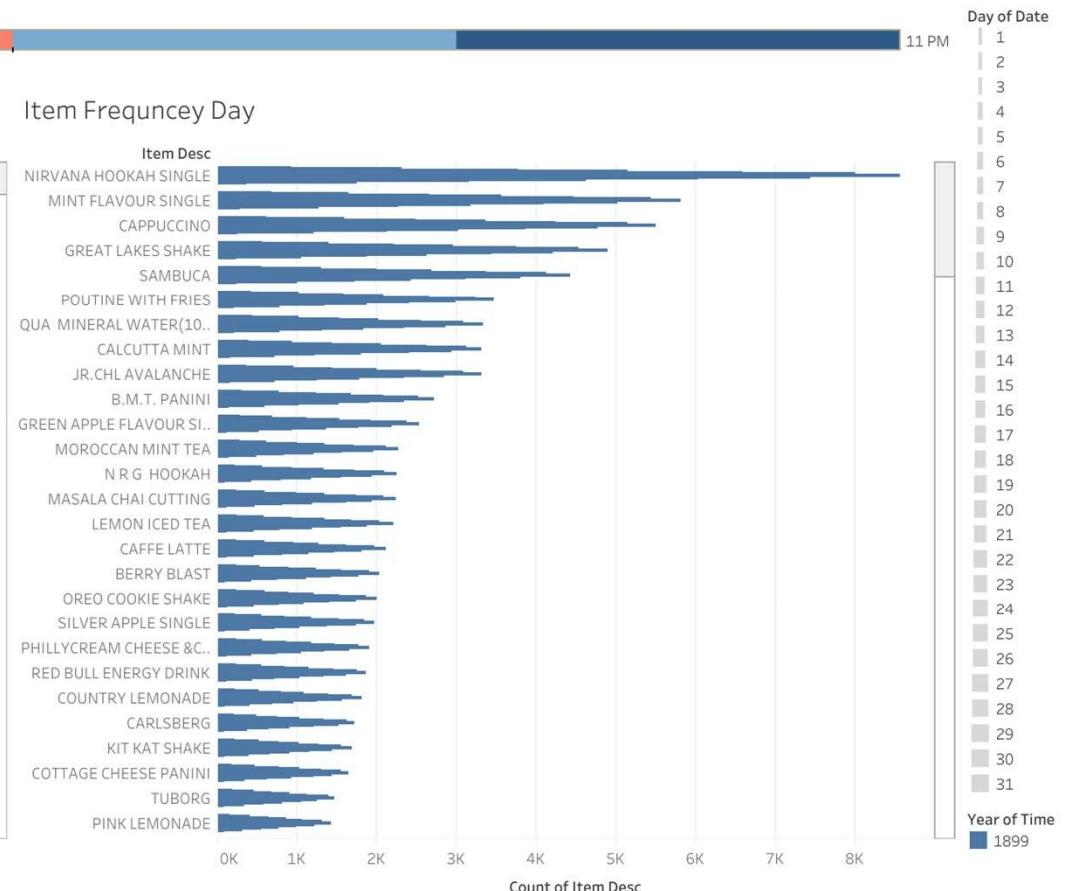
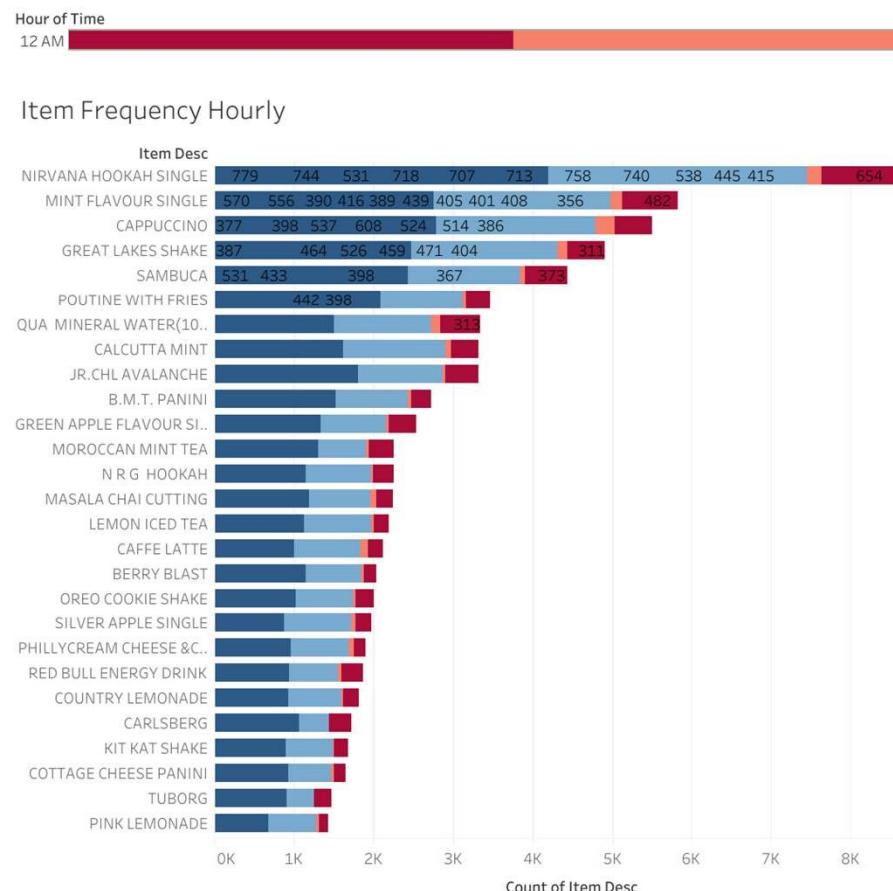
# Discounted Period

- We analysed few discounts are offered on food and beverage and liquor & tobacco but major customer has occurred the discount on December and January
- Liquor discounts are offered in month of Oct , it may be due to some specially season or occasion



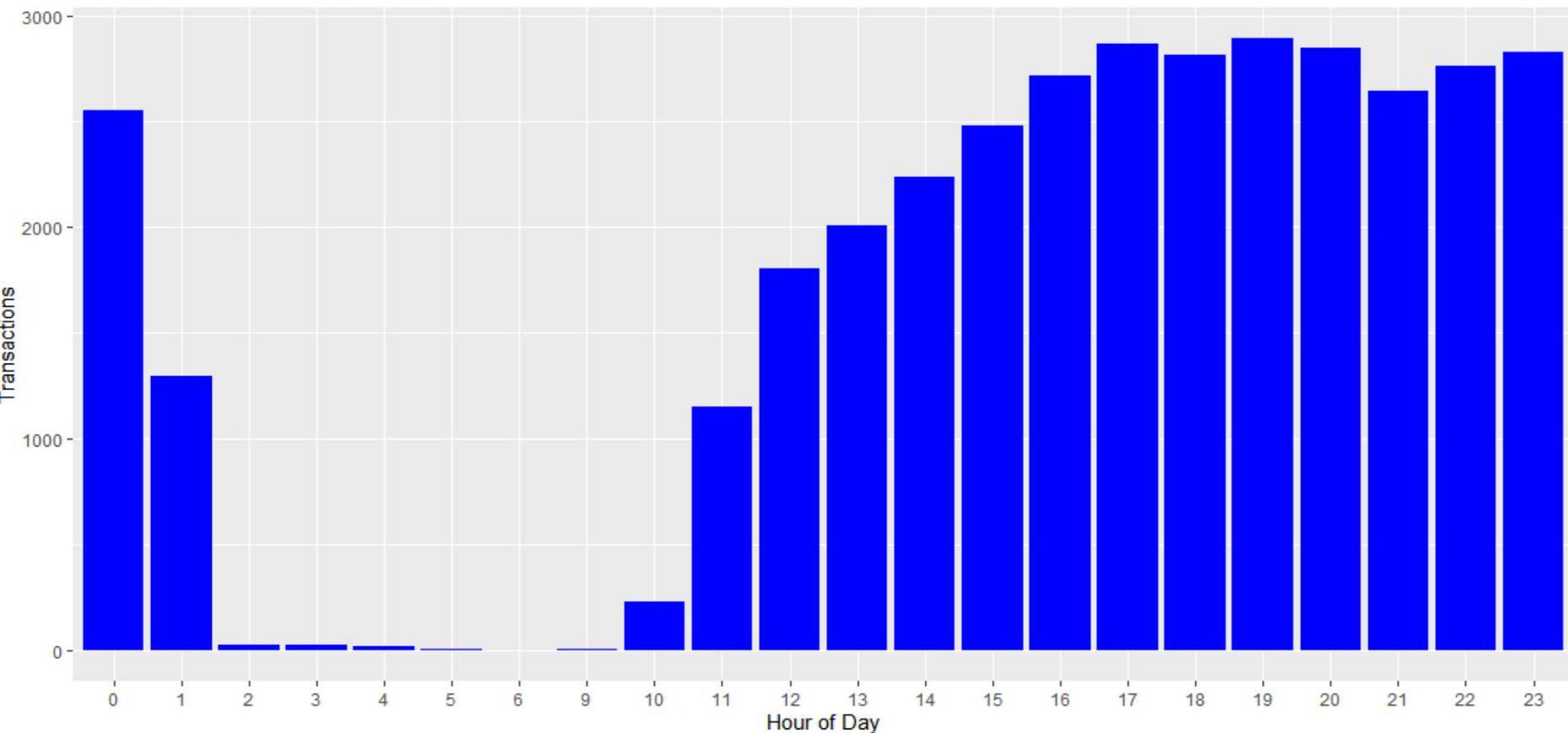
# Item Frequency hourly and day wise

- Below shows Manu items are hourly and daily basis sold out

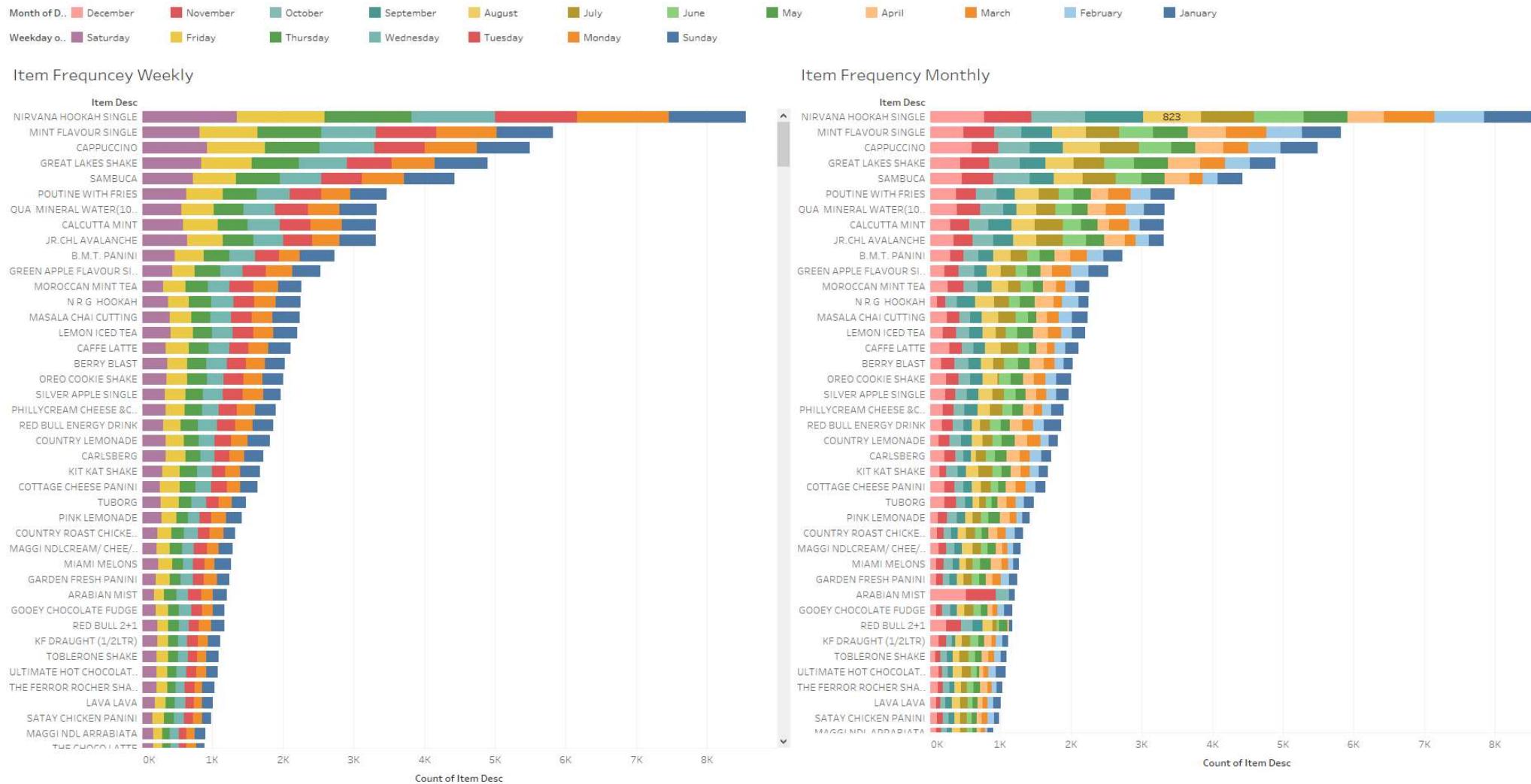


# Hourly Transaction Distribution (Item count)

Hourly Transaction Distribution

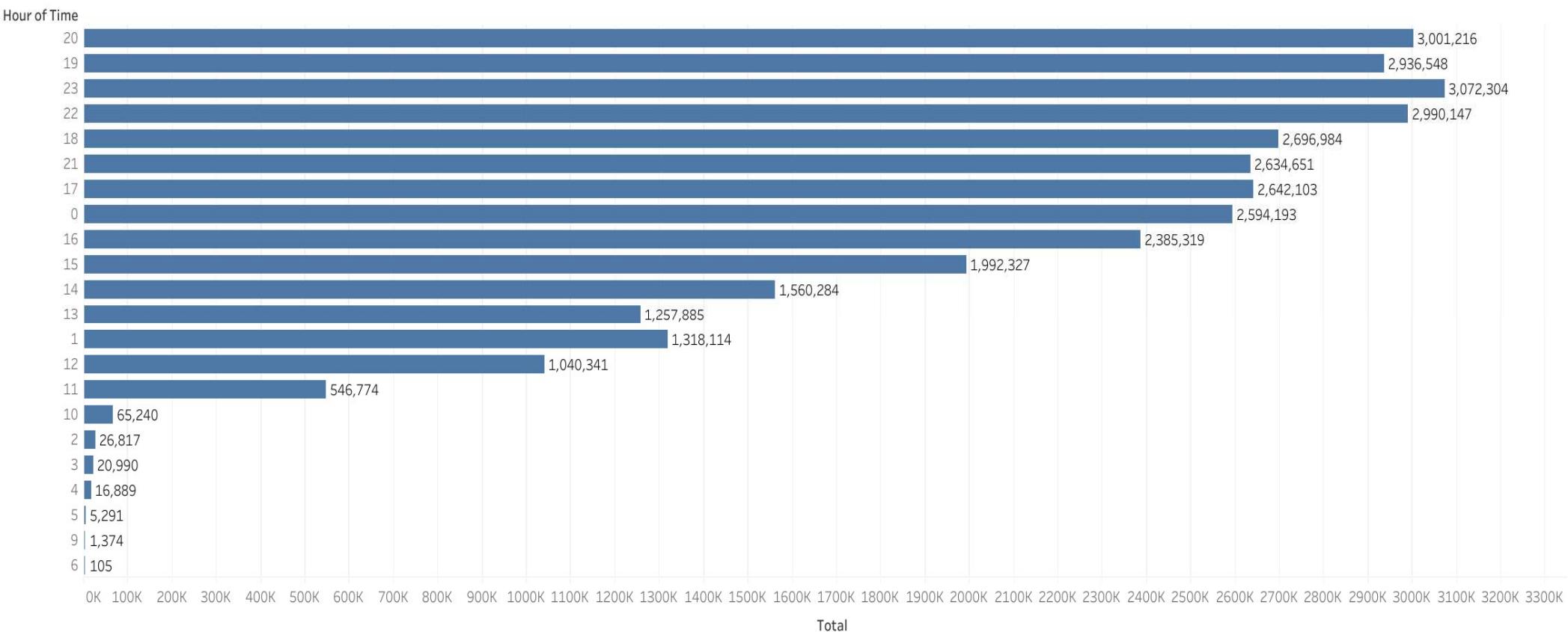


# Item Frequency Monthly and day Weekly



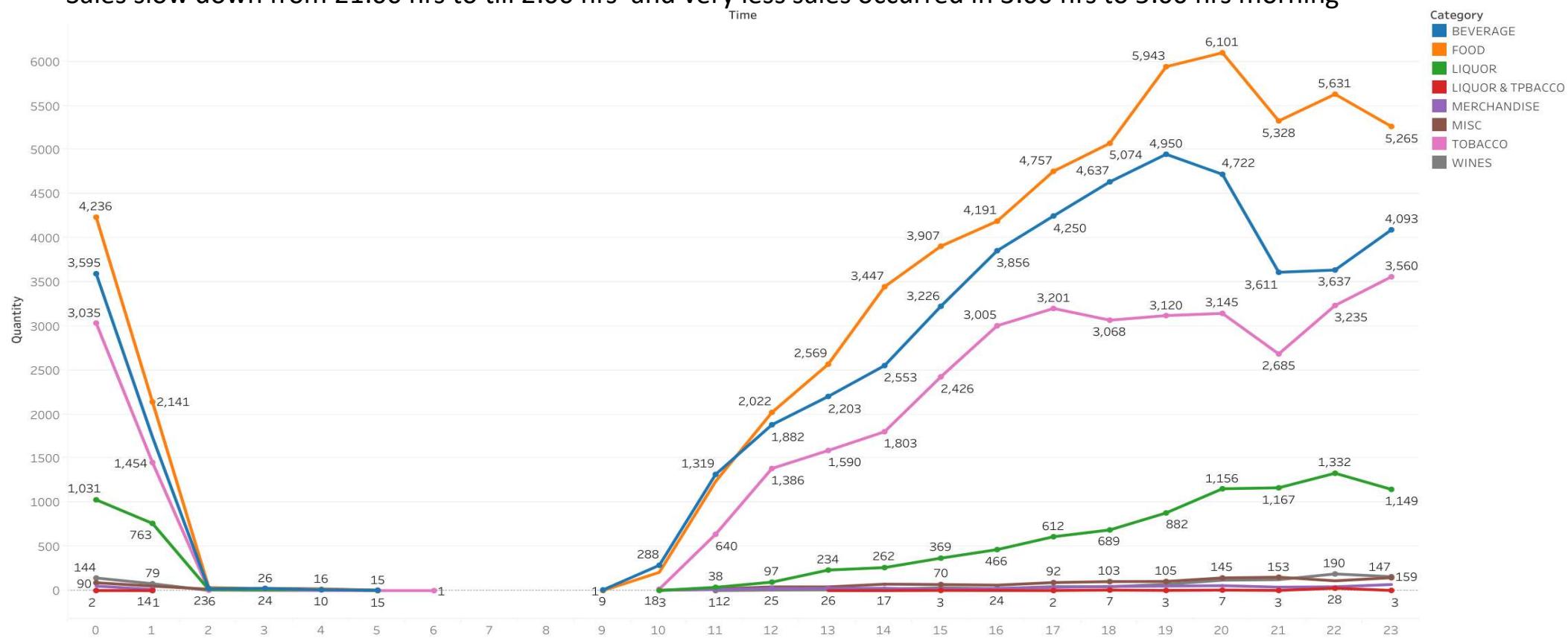
# Maximum sale in hourly

- The restaurant generating maximum revenue in evening time 23:00 Hrs.
- Low sale are recorded morning 6:00 O'clock to 10:00 O'clock ,seems breakfast sales are less .
- Restaurant's sale for dinner is good ,lunch and mid night sales is conventional against of dinner

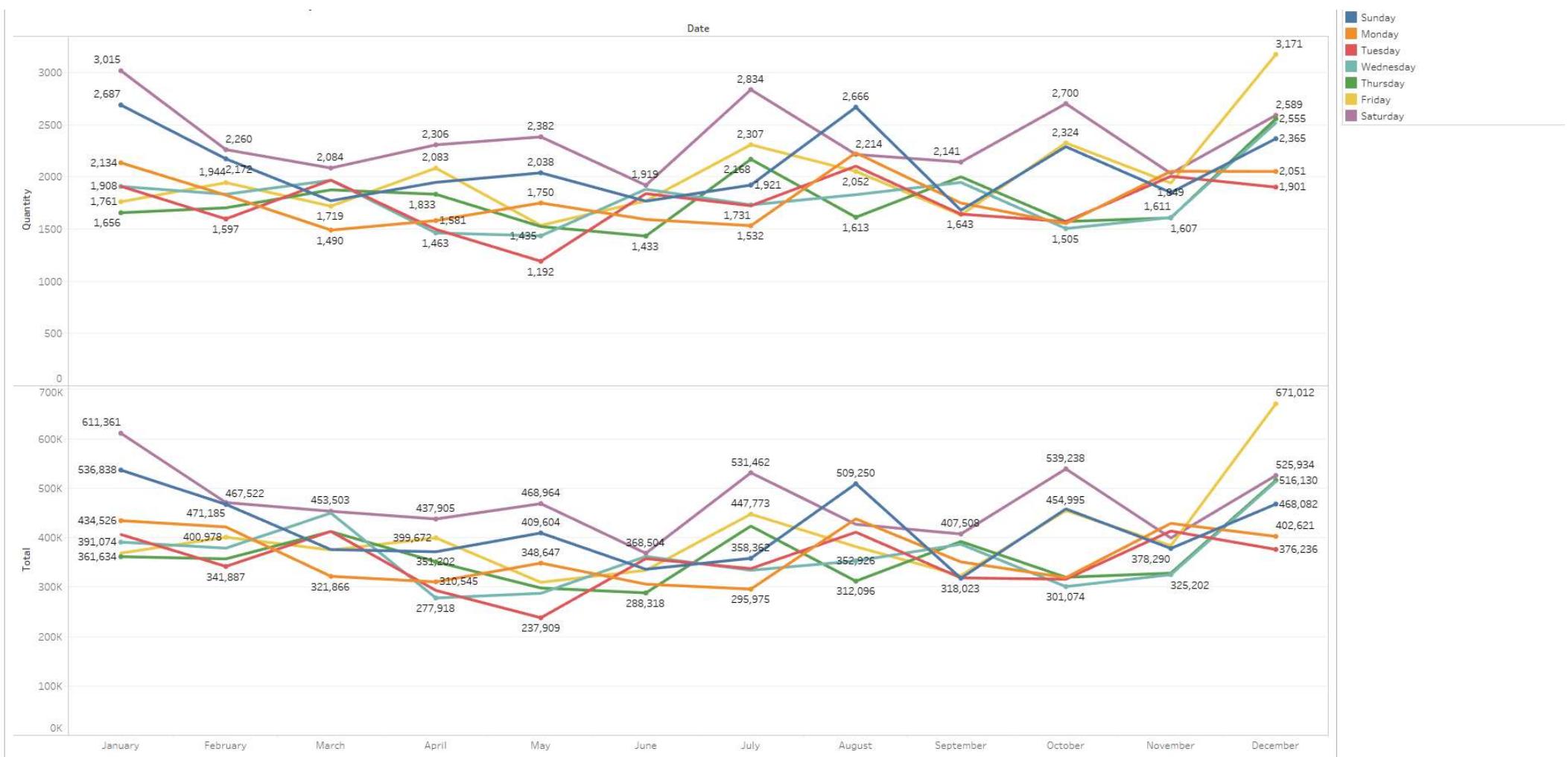


# Maximum sale in hourly categorize

- Food ,Beverage and Tobacco are sold out maximal at night 20:00 hrs.
- No sales are happened between morning 7:00 to 9:00 am
- Sales slow down from 21:00 hrs to till 2:00 hrs and very less sales occurred in 3:00 hrs to 5:00 hrs morning



# Week to Month with total sale and quantity

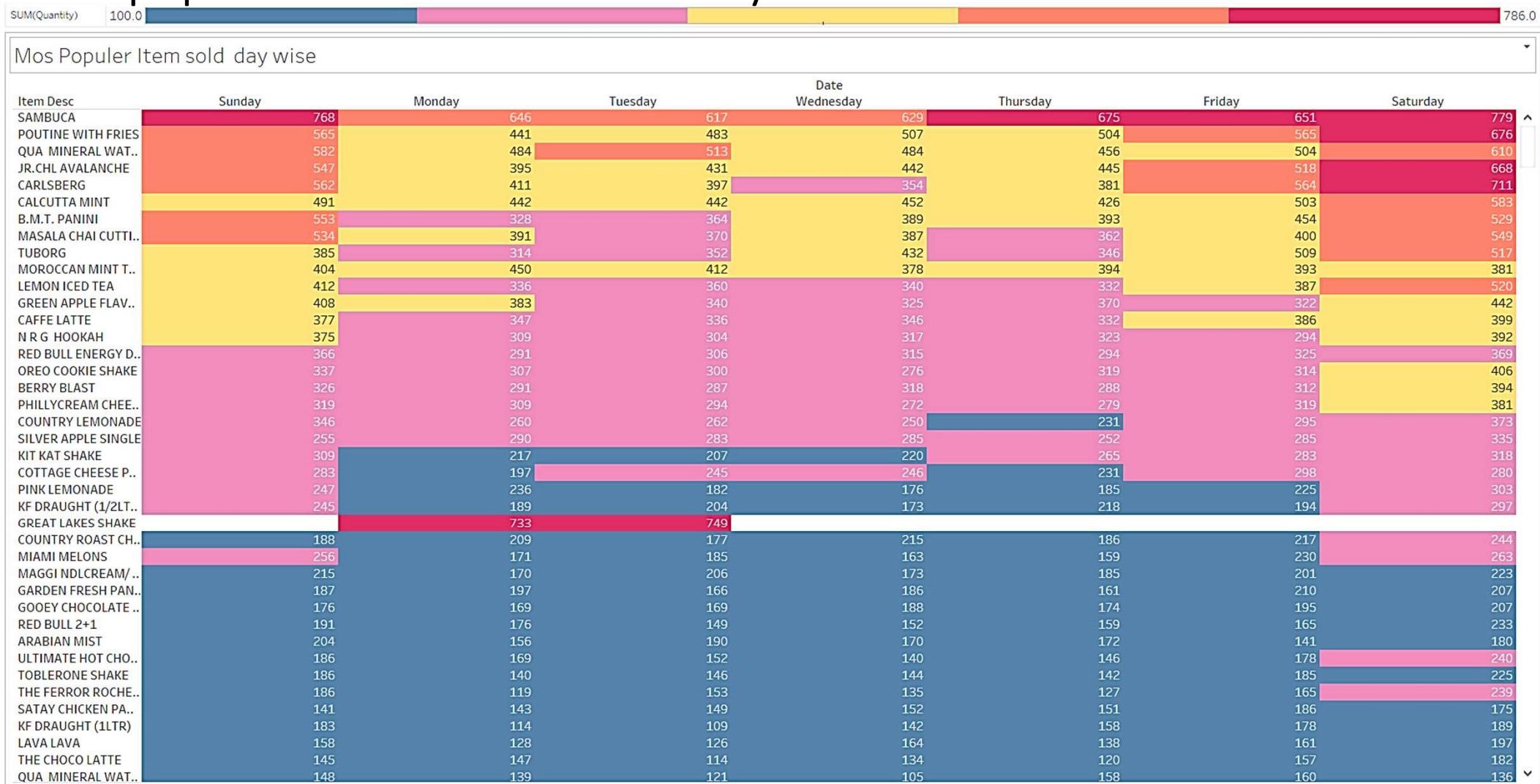


# Most popular Item sold out hourly

MostPopular Items Sold Hourly

Item Desc	Time														
	0	1	11	12	13	14	15	16	17	18	19	20	21	22	23
NIRVANA HOOKAH SINGLE	670	280		357	418	453	541	743	765	724	717	735	560	752	786
CAPPUCCINO	360		242	336	315	357	458	509	690	673	765	697	490	444	499
MINT FLAVOUR SINGLE	536	249		312	367	340	418	411	414	445	400	424	399	571	587
GREAT LAKES SHAKE	393				305	387	470	556	566	641	567	373	389	473	
SAMBUCA	404					276	399	381	409	452	391	359	452	566	
JR.CHL AVALANCHE	282						252	312	278	311	286	295	334	361	
CARLSBERG	306	253							259	310	366	424	428	349	
QUA MINERAL WATER(1000ML)	350						242	291	249	249	272	247	277	376	
POUTINE WITH FRIES								275	326	418	473	360	362	298	
CALCUTTA MINT		246					244	287	340	302	275	241		258	309
TUBORG		250									278	349	276	361	309
B.M.T. PANINI										297	305	296	254	281	253
MOROCCAN MINT TEA		268								257	240	259		268	363
MASALA CHAI CUTTING							245	264	343	324	322				
CAFFE LATTE								239		296	243				
LEMON ICED TEA									251	271	252				
GREEN APPLE FLAVOUR SINGLE		245									262				238
OREO COOKIE SHAKE									266						257
N R G HOOKAH									269						
BERRY BLAST											260				

# Most popular Item sold out week day wise



# Most popular Item sold out day wise (Monthly)

	Date																															
Item Desc	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
NIRVANA HOOKAH SIN..	309	261	295	266	273	309	291	278	283	315	306	286	267	251	303	300	278	332	284	290	280	286	289	271	306	257	278	323	252	234	133	
CAPPUCCINO	241	226	252	264	211	252	236	220	256	226	236	215	238	211	206	227	250	252	220	228	226	239	231	266	260	254	225	214	234	199	129	
MINT FLAVOUR SINGLE	189	207	225	199	184	195	199	183	190	196	177	193	213	191	190	172	178	204	200	215	209	214	188	203	218	189	207	208	189	180	114	
GREAT LAKES SHAKE	220	234	191	214	182	188	166	196	178	186	192	190	182	213	172	178	164	207	199	191	214	182	213	214	186	196	185	209	170	202	100	
SAMBUCIA	158	166	179	168	152	158	136	152	145	153	157	138	152	138	149	169	144	154	145	171	133	145	161	155	163	169	170	159	173	173	80	
POUTINE WITH FRIES	116	138	147	126	134	99	118	124	141	125	106	115	116	114	104	109	107	128	115	116	102	139	106	154	143	122	119	106	140	134	78	
QUA MINERAL WATER(..	147	118	140	108	100	138	97	102	118	109	133	118	89	95	123	85	123	114	127	101	110	111	126	128	115	160	128	130	134	88		
JR.CHL AVALANCHE	138	113	115	115	111	103	101	113	96	132	104	120	108	119	145	112	98	120	86	97	104	116	111	117	121	131	121	108	103	92	76	
CARLSBERG	74	102	108	106	147	103	142	102	128	89	91	152	155	100	119	81	107	72	114	124	135	74	81	106	133	125	139	124	120	68	59	
CALCUTTA MINT	92	105	91	89	102	92	129	110	100	108	127	140	126	122	138	111	115	106	108	96	90	102	110	101	116	123	107	109	113	101	60	
B.M.T. PANINI	113	114	93	105	81	106	101	105	92	89	80	87	97	83	99	110	103	122	103	106	82	86	107	91	97	110	120	78	91	103	56	
MASALA CHAI CUTTING	96	109	96	87	94	85	89	92	87	104	132	121	91	103	102	74	94	103	112	111	101	104	88	83	108	129	87	77	74	97	63	
TUBORG	83	73	137	139	128	99	68	75	72	77	86	123	99	84	64	114	67	73	115	92	88	89	114	104	91	128	43	99	91	65	75	
MOROCCAN MINT TEA	95	93	113	80	95	109	111	75	92	91	101	81	67	106	78	104	95	115	83	103	81	84	78	85	104	68	75	101	88	93	68	
LEMON ICED TEA	122	93	91	83	89	93	68	85	75	70	96	84	109	75	115	92	92	97	105	112	71	67	80	61	107	75	113	71	78	82	36	
GREEN APPLE FLAVOUR..	78	88	96	83	95	92	97	67	88	77	78	95	89	81	85	96	78	91	86	86	74	85	88	100	79	73	88	83	81	83	73	43
CAFFE LATTE	89	76	80	100	88	76	80	77	95	92	77	76	64	83	71	79	81	84	70	85	92	81	83	93	86	92	81	86	84	71	51	
N R G HOOKAH	85	89	79	76	70	80	81	74	90	87	67	78	76	81	90	72	74	71	84	72	76	80	70	75	81	58	76	73	56	53	40	
RED BULL ENERGY DRI..	94	58	68	93	75	62	64	79	68	88	79	75	69	51	79	84	63	76	70	65	78	68	79	53	83	73	85	57	78	92	60	
OREO COOKIE SHAKE	88	66	69	84	68	85	77	73	64	83	86	81	68	69	72	56	72	77	81	67	55	64	81	75	80	66	87	75	55	76	59	
BERRY BLAST	59	81	88	65	76	86	74	81	69	63	65	64	69	78	67	87	72	71	80	93	79	67	57	66	65	75	77	76	58	71	37	
PHILLYCREAM CHEESE ..	73	84	68	63	75	75	61	68	69	53	56	100	75	63	59	76	72	81	59	66	63	69	55	97	70	72	65	87	55	73	71	
COUNTRY LEMONADE	67	74	65	64	78	63	65	67	81	56	69	52	59	74	69	62	48	62	66	66	64	69	56	68	77	63	60	81	67	69	36	
SILVER APPLE SINGLE	72	51	54	69	78	62	67	78	71	86	59	60	73	61	62	67	58	66	69	57	48	66	86	56	71	64	60	55	61	60	38	
KIT KAT SHAKE	70	79	60	62	59	63	54	66	54	43	56	63	69	43	61	53	50	68	51	55	44	43	59	73	47	77	72	65	59	71	30	
COTTAGE CHEESE PANI..	57	57	73	45	50	53	50	53	50	52	63	71	47	68	55	63	41	72	77	54	62	64	69	66	60	56	57	56	46	57	36	
PINK LEMONADE	46	65	52	69	56	54	54	49	46	43	51	35	59	35	47	49	48	53	52	50	56	50	46	48	49	58	57	39	46	63	29	
KF DRAUGHT (1/2LTR)	55	37	41	64	58	58	55	43	59	33	64	53	47	46	28	45	49	49	40	51	48	62	41	58	64	35	66	40	61	50	20	
COUNTRY ROAST CHICK..	42	52	58	32	43	50	40	46	38	52	57	49	39	38	53	42	39	48	48	51	55	62	52	43	49	58	39	44	43	31		
MIAMI MELONS	46	57	52	36	50	51	49	51	36	31	54	50	28	39	42	47	52	48	44	50	54	47	38	45	52	38	65	48	43	57	27	
MAGGI NDLCREAM /CH..	46	47	43	46	39	52	47	44	44	42	36	56	43	48	45	52	51	45	42	41	31	51	43	37	44	55	36	46	52	38	31	
GARDEN FRESH PANINI	39	59	40	43	44	42	40	34	47	34	52	50	48	65	49	48	28	41	38	30	43	62	55	20	40	46	36	28	39	44	30	
GOOEY CHOCOLATE FU..	43	52	42	44	46	43	43	31	44	52	34	39	45	38	47	44	50	33	54	43	32	32	47	32	33	38	43	57	43	39	15	
RED BULL 2+1	41	44	49	25	42	44	34	27	30	30	37	44	36	37	39	30	47	42	34	35	43	51	34	43	38	58	65	43	45	38	20	
ARABIAN MIST	33	45	50	43	48	46	31	30	33	24	29	22	33	30	26	31	39	39	58	41	43	26	44	55	46	53	49	57	32	53	24	
ULTIMATE HOT CHOCOL..	37	31	40	47	51	33	49	33	40	35	46	44	28	51	32	43	48	59	38	34	32	40	36	36	44	42	31	33	28	34	36	
TOBLERONE SHAKE	45	35	39	40	40	45	28	49	29	30	39	45	41	51	41	33	41	52	33	29	37	38	30	23	44	25	56	35	28	36	31	
THE FERROR ROCHER S..	29	28	34	46	30	42	34	49	41	38	30	40	31	38	44	26	53	39	40	30	22	40	35	40	41	36	35	35	36	36	26	
SATAY CHICKEN PANINI	32	31	47	32	34	34	27	43	25	40	45	36	31	44	40	42	23	36	39	32	35	36	44	38	47	27	25	35	35	39	20	
KF DRAUGHT (1LTR)	23	27	39	25	37	26	40	28	55	42	42	40	16	39	21	32	46	37	22	39	23	47	42	38	41	35	54	31	49	27	10	

## Menu Analysis

Name of most 10 purchased Items frequently 

Items are purchased on an average = 251.431

Average Order Value = total revenue / total transactions = 468.7762

Sr. No	Item	Qty.
1	NIRVANA HOOKAH SINGLE	8553
2	MINT FLAVOUR SINGLE	5817
3	CAPPUCCINO	5495
4	GREAT LAKES SHAKE	4895
5	SAMBUCA	4425
6	POUTINE WITH FRIES	3464
7	QUA MINERAL WATER(100	3331
8	CALCUTTA MINT	3318
9	JR.CHL AVALANCHE	3314
1	O B.M.T. PANINI	2724

# Summary of café data

```
Date          Bill_Number      Item_Desc
Min. :2010-04-01 00:00:00 Length:145830    Length:145830
1st Qu.:2010-07-10 00:00:00 Class :character  Class :character
Median :2010-10-07 00:00:00 Mode  :character   Mode  :character
Mean   :2010-10-04 15:52:45
3rd Qu.:2011-01-01 00:00:00
Max.  :2011-03-31 00:00:00

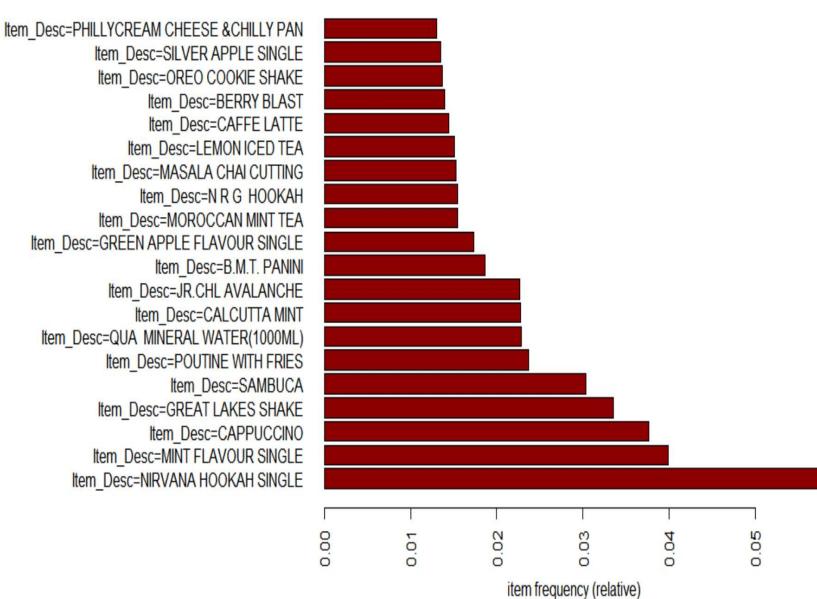
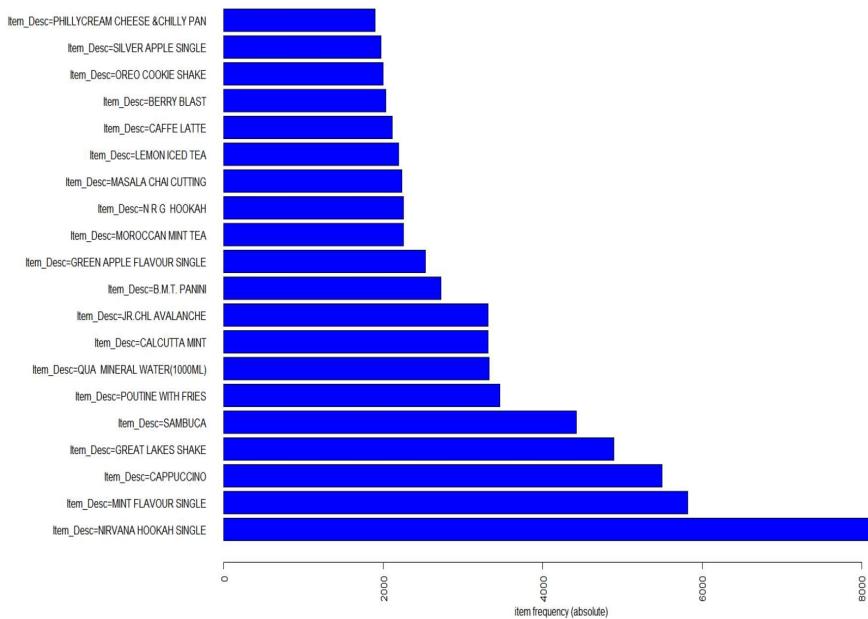
Time          Quantity        Rate           Tax
Min. :1899-12-31 00:00:01 Min.   : 1.000  Min.   : 0.01  Min.   : 0.00
1st Qu.:1899-12-31 14:48:53 1st Qu.: 1.000  1st Qu.: 95.00  1st Qu.: 22.56
Median :1899-12-31 18:17:24 Median  : 1.000  Median : 125.00 Median : 32.06
Mean   :1899-12-31 16:39:16 Mean    : 1.121  Mean   : 161.78 Mean   : 48.93
3rd Qu.:1899-12-31 21:02:20 3rd Qu.: 1.000  3rd Qu.: 225.00 3rd Qu.: 72.00
Max.  :1899-12-31 23:59:57 Max.    :30.000  Max.   :2100.00 Max.   :2731.25

Discount      Total          Category
Min.   : 0.0000  Min.   : 0.01  Length:145830
1st Qu.: 0.0000  1st Qu.: 117.56 Class :character
Median : 0.0000  Median : 167.06 Mode  :character
Mean   : 0.0951  Mean   : 224.96
3rd Qu.: 0.0000  3rd Qu.: 315.00
Max.   :825.0000 Max.   :14231.25
```

Item_Desc=NIRVANA HOOKAH SINGLE	Item_Desc=MINT FLAVOUR SINGLE	
##	8553	5817
##	Item_Desc=CAPPUCCINO	Item_Desc=GREAT LAKES SHAKE
##	5495	4895
##	Item_Desc=SAMBUCA	(Other)
##	4425	116645

# Item Frequency Plot

- The most frequent items in the data set can be plotted using `itemFrequencyPlot()`. We can specify the number of items to be plotted and whether the Y axis should represent the absolute or relative number of transactions that include the item.
- The `topN` argument can be used to specify the number of items to be plotted and the `type` argument can be used to specify whether the Y axis represents absolute/relative frequency of the items.



# Generate Rules

The `apriori()` function is used for generating the rules. We will first learn the different inputs that must be specified and later on play around with them and see how the rules generated change.

---

```
summary(first.rules)
```

```
## set of 677 rules
##
## rule length distribution (lhs + rhs):sizes
##   1   2
## 50 627
##
##      Min. 1st Qu. Median     Mean 3rd Qu.     Max.
## 1.000  2.000  2.000  1.926  2.000  2.000
##
## summary of quality measures:
##           support       confidence        lift       count
##  Min. :0.001000  Min. :0.01007  Min. : 0.1464  Min. : 70.0
##  1st Qu.:0.001200 1st Qu.:0.02939 1st Qu.: 0.9843 1st Qu.: 84.0
##  Median :0.001529  Median :0.04755  Median : 1.2857 Median :107.0
##  Mean   :0.003817  Mean   :0.05607  Mean   : 1.8382 Mean   :267.1
##  3rd Qu.:0.002343 3rd Qu.:0.07025 3rd Qu.: 1.7865 3rd Qu.:164.0
##  Max.   :0.119872  Max.   :0.54589  Max.   :79.3655 Max.   :8389.0
##
## mining info:
##   data ntransactions support confidence
##   trans2       69983    0.001       0.01
```

# Rules Summary

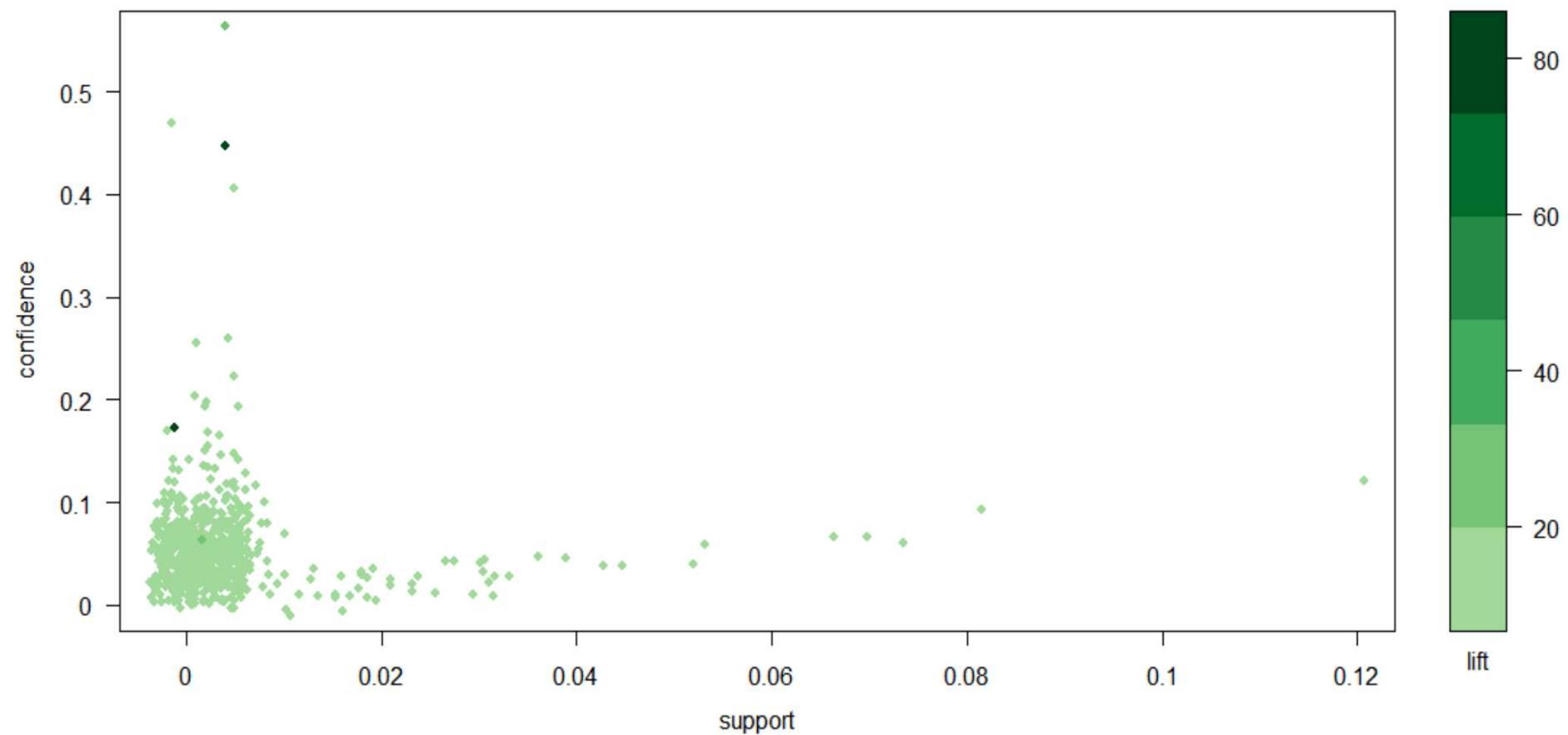
```
summary(first.rules)
```

```
## set of 677 rules
##
## rule length distribution (lhs + rhs):sizes
##   1   2
## 50 627
##
##      Min. 1st Qu. Median  Mean 3rd Qu.  Max.
## 1.000 2.000 2.000 1.926 2.000 2.000
##
## summary of quality measures:
##      support      confidence       lift      count
##  Min. :0.001000  Min. :0.01007  Min. : 0.1464  Min. : 70.0
##  1st Qu.:0.001200 1st Qu.:0.02939 1st Qu.: 0.9843 1st Qu.: 84.0
##  Median :0.001529 Median :0.04755 Median : 1.2857 Median :107.0
##  Mean   :0.003817 Mean   :0.05607 Mean   : 1.8382 Mean   :267.1
##  3rd Qu.:0.002343 3rd Qu.:0.07025 3rd Qu.: 1.7865 3rd Qu.:164.0
##  Max.   :0.119872 Max.   :0.54589 Max.   :79.3655 Max.   :8389.0
##
## mining info:
##      data ntransactions support confidence
## trans2       69983     0.001        0.01
```

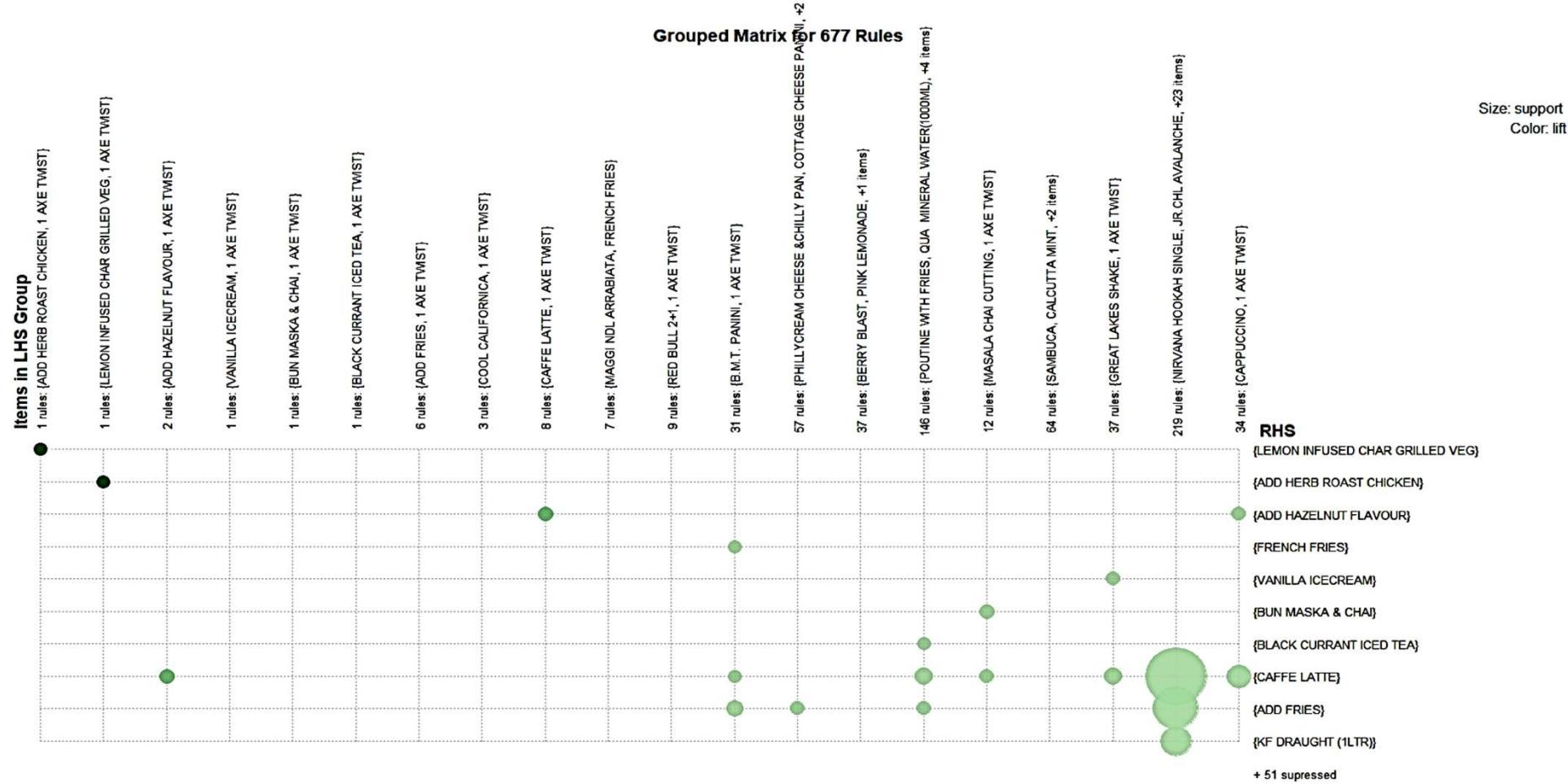
```
print(summary(second.rules))
```

```
## set of 9 rules
##
## rule length distribution (lhs + rhs):sizes
##   1
## 9
##
##      Min. 1st Qu. Median  Mean 3rd Qu.  Max.
## 1      1      1      1      1      1      1
##
## summary of quality measures:
##      support      confidence       lift      count
##  Min. :0.04725  Min. :0.04725  Min. :1  Min. :3307
##  1st Qu.:0.04755 1st Qu.:0.04755 1st Qu.:1 1st Qu.:3328
##  Median :0.06320 Median :0.06320 Median :1 Median :4423
##  Mean   :0.06719 Mean   :0.06719 Mean   :1 Mean   :4702
##  3rd Qu.:0.07813 3rd Qu.:0.07813 3rd Qu.:1 3rd Qu.:5468
##  Max.   :0.11987 Max.   :0.11987 Max.   :1 Max.   :8389
##
## mining info:
##      data ntransactions support confidence
## trans2       69983     0.025        0.04
```

Scatter plot for 677 rules



# Plot-first.rules, method(grouped)



## Rule with CAFFE LATTE and ADD FRIES

```
[r]
bev.rules <- subset(first.rules, subset = rhs %pin% "CAFFE LATTE")
inspect(bev.rules)
````
```

| lhs                             | rhs              | support     | confidence | lift       | count |
|---------------------------------|------------------|-------------|------------|------------|-------|
| [1] {}                          | => {CAFFE LATTE} | 0.029935842 | 0.02993584 | 1.0000000  | 2095  |
| [2] {ADD HAZELNUT FLAVOUR}      | => {CAFFE LATTE} | 0.001614678 | 0.54589372 | 18.2354559 | 113   |
| [3] {ULTIMATE HOT CHOCOLATE}    | => {CAFFE LATTE} | 0.001014532 | 0.06641721 | 2.2186519  | 71    |
| [4] {MASALA CHAI CUTTING}       | => {CAFFE LATTE} | 0.001400340 | 0.04386750 | 1.4653840  | 98    |
| [5] {B.M.T. PANINI}             | => {CAFFE LATTE} | 0.001057400 | 0.02840691 | 0.9489264  | 74    |
| [6] {QUA MINERAL WATER(1000ML)} | => {CAFFE LATTE} | 0.002286270 | 0.04807692 | 1.6059987  | 160   |
| [7] {CAPPUCCINO}                | => {CAFFE LATTE} | 0.004243888 | 0.05431602 | 1.8144143  | 297   |
| [8] {GREAT LAKES SHAKE}         | => {CAFFE LATTE} | 0.002529186 | 0.03633751 | 1.2138462  | 177   |

```
````[r]
fv.rules <- subset(first.rules, subset = rhs %pin% "ADD FRIES")
inspect(fv.rules)
````
```

| lhs                                  | rhs            | support     | confidence | lift      | count |
|--------------------------------------|----------------|-------------|------------|-----------|-------|
| [1] {}                               | => {ADD FRIES} | 0.010745467 | 0.01074547 | 1.0000000 | 752   |
| [2] {SATAY CHICKEN PANINI}           | => {ADD FRIES} | 0.001128846 | 0.08036623 | 7.479082  | 79    |
| [3] {COUNTRY ROAST CHICKEN PANINI}   | => {ADD FRIES} | 0.001243159 | 0.06580938 | 6.124385  | 87    |
| [4] {COTTAGE CHEESE PANINI}          | => {ADD FRIES} | 0.001043110 | 0.04528536 | 4.214369  | 73    |
| [5] {PHILLYCREAM CHEESE &CHILLY PAN} | => {ADD FRIES} | 0.001171713 | 0.04408602 | 4.102755  | 82    |
| [6] {B.M.T. PANINI}                  | => {ADD FRIES} | 0.002157667 | 0.05796545 | 5.394410  | 151   |
| [7] {QUA MINERAL WATER(1000ML)}      | => {ADD FRIES} | 0.001286027 | 0.02704327 | 2.516714  | 90    |

# Top rules sorted by lift- Recommended to café Combo meal

```
top.bev.rules <- head(sort(bev.rules, decreasing = TRUE, by = "lift"), 10)
inspect(top.bev.rules)
```

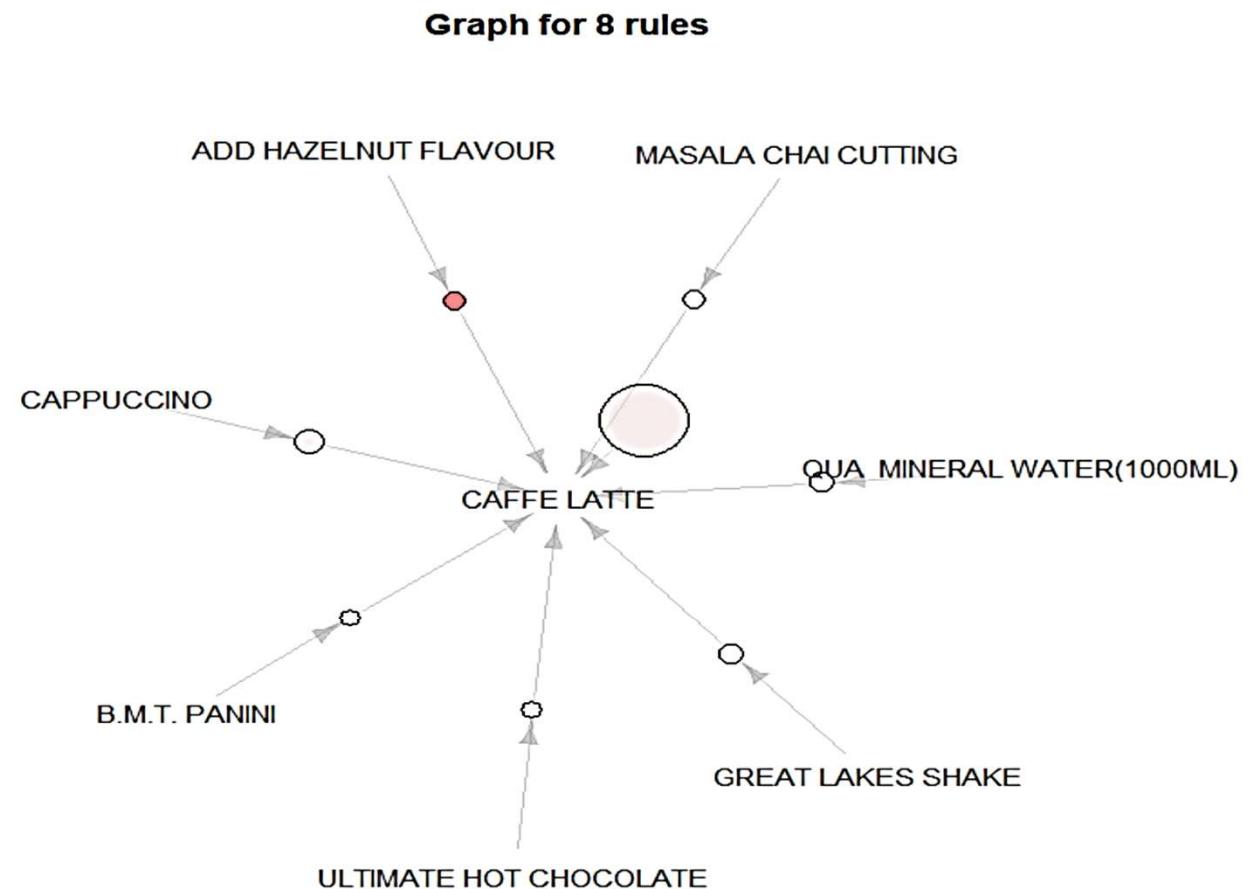
| lhs                             | rhs              | support     | confidence | lift       | count |
|---------------------------------|------------------|-------------|------------|------------|-------|
| [1] {ADD HAZELNUT FLAVOUR}      | => {CAFFE LATTE} | 0.001614678 | 0.54589372 | 18.2354559 | 113   |
| [2] {ULTIMATE HOT CHOCOLATE}    | => {CAFFE LATTE} | 0.001014532 | 0.06641721 | 2.2186519  | 71    |
| [3] {CAPPUCCINO}                | => {CAFFE LATTE} | 0.004243888 | 0.05431602 | 1.8144143  | 297   |
| [4] {QUA MINERAL WATER(1000ML)} | => {CAFFE LATTE} | 0.002286270 | 0.04807692 | 1.6059987  | 160   |
| [5] {MASALA CHAI CUTTING}       | => {CAFFE LATTE} | 0.001400340 | 0.04386750 | 1.4653840  | 98    |
| [6] {GREAT LAKES SHAKE}         | => {CAFFE LATTE} | 0.002529186 | 0.03633751 | 1.2138462  | 177   |
| [7] {}                          | => {CAFFE LATTE} | 0.029935842 | 0.02993584 | 1.0000000  | 2095  |
| [8] {B.M.T. PANINI}             | => {CAFFE LATTE} | 0.001057400 | 0.02840691 | 0.9489264  | 74    |

{r}

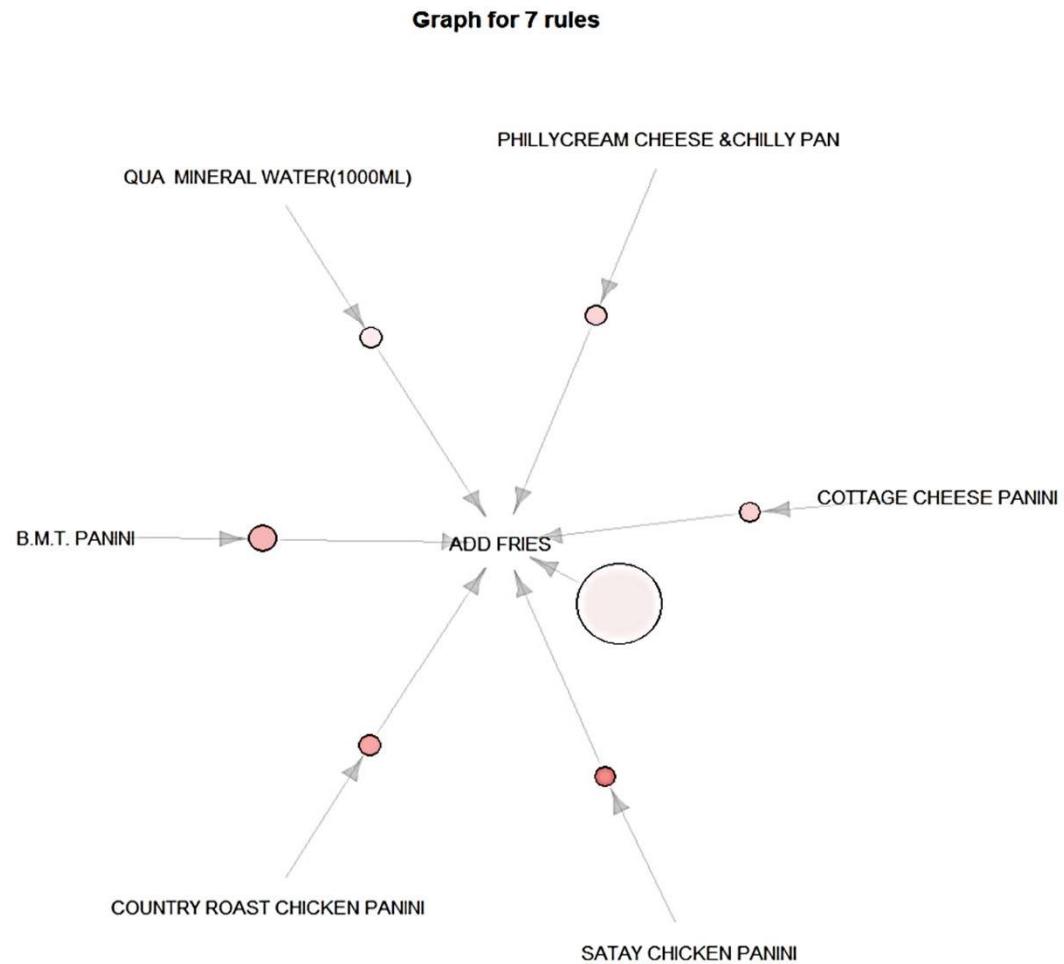
```
top.fv.rules <- head(sort(fv.rules, decreasing = TRUE, by = "lift"), 10)
inspect(top.fv.rules)
```

| lhs                                  | rhs            | support     | confidence | lift     | count |
|--------------------------------------|----------------|-------------|------------|----------|-------|
| [1] {SATAY CHICKEN PANINI}           | => {ADD FRIES} | 0.001128846 | 0.08036623 | 7.479082 | 79    |
| [2] {COUNTRY ROAST CHICKEN PANINI}   | => {ADD FRIES} | 0.001243159 | 0.06580938 | 6.124385 | 87    |
| [3] {B.M.T. PANINI}                  | => {ADD FRIES} | 0.002157667 | 0.05796545 | 5.394410 | 151   |
| [4] {COTTAGE CHEESE PANINI}          | => {ADD FRIES} | 0.001043110 | 0.04528536 | 4.214369 | 73    |
| [5] {PHILLYCREAM CHEESE &CHILLY PAN} | => {ADD FRIES} | 0.001171713 | 0.04408602 | 4.102755 | 82    |
| [6] {QUA MINERAL WATER(1000ML)}      | => {ADD FRIES} | 0.001286027 | 0.02704327 | 2.516714 | 90    |
| [7] {}                               | => {ADD FRIES} | 0.010745467 | 0.01074547 | 1.000000 | 752   |

# Graph of 8 rules



# Graph of 7 rules



## Communicating Result

- Observed the revenue of the café is decreased from 2010 to 2011 ,there may be further analysis required to find out the reason of slow of revenue .
- Café should implement some scheme for morning hours business
- Café along with bill number should be recorded the name and gender and profession of guest
- Menu item which has been not selling over the period should be scrapped from the menus item
- Items found very less frequency of 48 number of daily sale (sum)should be taken out from the menu ( please see the attached excel sheet in next slide)
- Month Nov and Dec café should be introduced some comb new menu items
- More new item and promotional offers along with combo meal for non peak hour can be suggested for additional revenue
- Give top 10 and 7 rules of combo is recommend

# Source Code



PDF File



Microsoft Excel  
Worksheet

[https://public.tableau.com/profile/suprasanna#!/vizhome/MA\\_15705629644190/Story1](https://public.tableau.com/profile/suprasanna#!/vizhome/MA_15705629644190/Story1)

Thank you