Hello!

I am Abhay Kulkarni

Here is my Project Report

Introduction

● Business

The owner of the restaurant wants to use POS (point of sale data) to come up with a set of recommendations that can help his Café Chain increase his revenues.

● Objectives

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.

Tools Used

● R

● Tableau

● WPS Presentation

1) Data Cleaning

1) EDA

1) To create the Final Deck

2) Creating New Features

3) To Mine Association Rules

Data Description

- **Date :** Date Of Sale

- **Bill Number** : Bill Number as POS

- **Item Description :** Item Sold to Customer

- **Time :** Time of Sale

- **Quantity :** Quantity of item Sold

- **Rate :** Price of the item (Per Unit)

- **Tax :** Tax incurred

- **Discount :** Discount given

- **Total :** Bill Total

- **Category :** Category of Items

Process

- Explore Data/Cleaning

- EDA

- Generate Association Rules

- Explore Data/Cleaning

- Identify the most popular combos that can be suggested to the restaurant
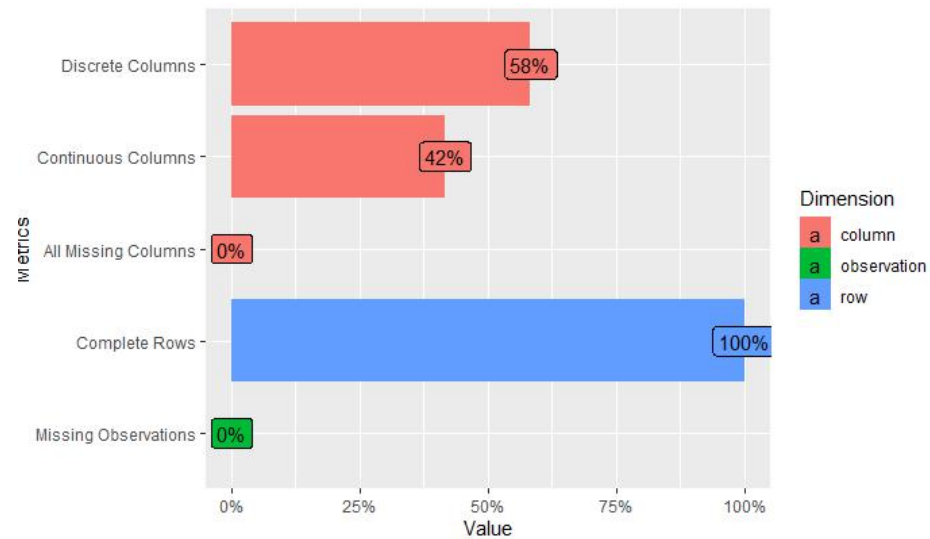
Data Cleaning Process Breakdown

Data Explore

- Check # Rows & Columns

- Create Weekdays and Weekends

- Check Missing Values and NA

- Check for Outliers

- Create Day Column

● *There are 1,45,830 Rows and 10 variables*

There are NO MISSING VALUES

Date	Bill Number	Item Desc	Time	Quantity	Rate	Tax	Discount	Total	Category	day	week
2010-04-01	G0470115	QUA MINERAL WATER(1000ML)	1899-12-31 13:15:11	1	50	11.88	0	61.88	BEVERAGE	Thursday	weekday
2010-04-01	G0470115	MONSOON MALABAR (AULAIT)	1899-12-31 13:15:11	1	100	23.75	0	123.75	BEVERAGE	Thursday	weekday
2010-04-01	G0470116	MASALA CHAI CUTTING	1899-12-31 13:17:35	1	40	9.50	0	49.50	BEVERAGE	Thursday	weekday
2010-04-01	G0470117	QUA MINERAL WATER(1000ML)	1899-12-31 13:19:55	1	50	11.88	0	61.88	BEVERAGE	Thursday	weekday
2010-04-01	G0470283	MOROCCAN MINT TEA	1899-12-31 01:20:18	1	45	10.69	0	55.69	BEVERAGE	Thursday	weekday
2010-04-01	G0470283	QUA MINERAL WATER(1000ML)	1899-12-31 01:20:18	1	50	11.88	0	61.88	BEVERAGE	Thursday	weekday
2010-04-01	G0470118	MASALA CHAI CUTTING	1899-12-31 13:21:34	1	40	9.50	0	49.50	BEVERAGE	Thursday	weekday
2010-04-01	G0470118	MOROCCAN MINT TEA	1899-12-31 13:21:34	1	45	10.69	0	55.69	BEVERAGE	Thursday	weekday
2010-04-01	G0470284	CAPPUCCINO	1899-12-31 01:29:38	1	60	14.25	0	74.25	BEVERAGE	Thursday	weekday
2010-04-01	G0470285	MOROCCAN MINT TEA	1899-12-31 01:29:46	1	45	10.69	0	55.69	BEVERAGE	Thursday	weekday
2010-04-01	G0470285	SUMATRA MANDHELING (REG)	1899-12-31 01:29:46	1	95	22.56	0	117.56	BEVERAGE	Thursday	weekday
2010-04-01	G0470285	BRAZIL BOURBONSANTOS (AULAIT)	1899-12-31 01:29:46	1	115	27.31	0	142.31	BEVERAGE	Thursday	weekday
2010-04-01	G0470120	LEMON ICED TEA	1899-12-31 13:36:33	1	85	20.19	0	105.19	BEVERAGE	Thursday	weekday

Created New Variables 'Day' and 'Week'
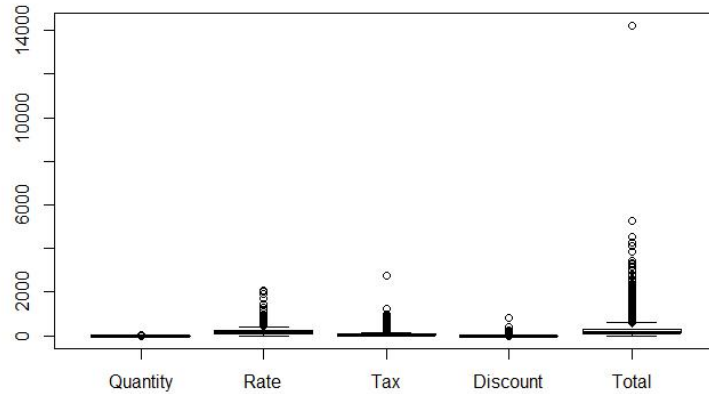
Outiers will not be Treated as we are analysing Association Rules. We will not manipulate data

EDA

- Total Categories

- Total Items

- Items by Category

- Breakdown of Sales by Time

- Breakdown of Sales by Category

- Breakdown of Sales by Items

- Top 5 and Bottom 5 Sales by Category and Item
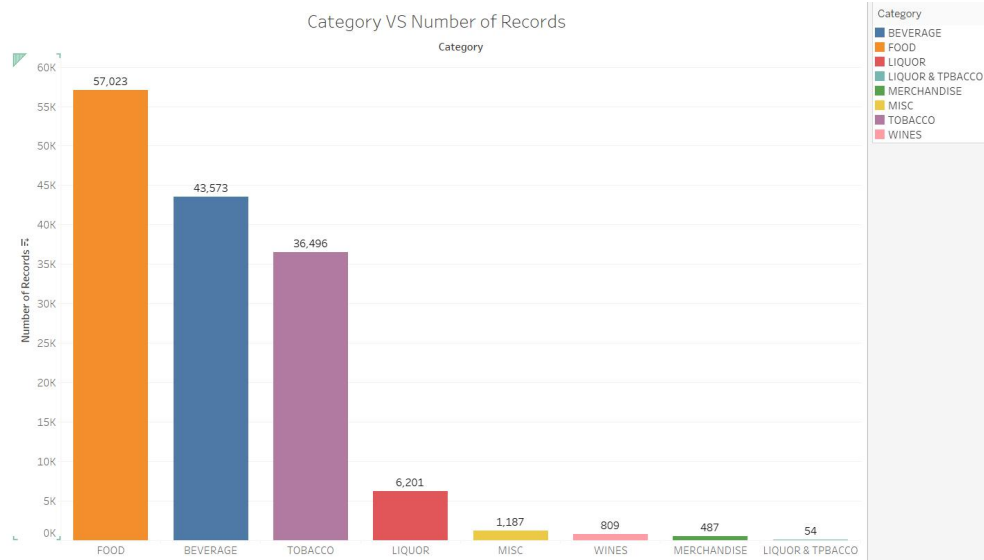
- Top 5 and Bottom 5 Bill Number

Category

- BEVERAGE
- FOOD
- LIQUOR
- LIQUOR & TPBACCO
- MERCHANDISE
- MISC
- TOBACCO
- WINES

There are **8 Categories** in the Menu
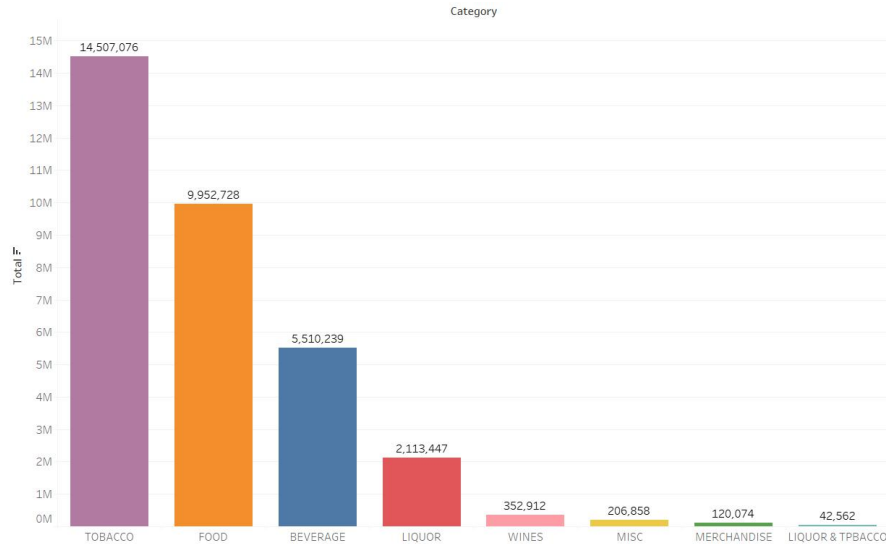
● *There are **580 Items** in the Menu*

Category VS Number of Records

Food has 57,023 Records
Beverage has 43,573 Records
Tobacco has 36,496 Records
Liquor has 6,201 Records
Misc has 1,187 Records
Wine has 809 Records
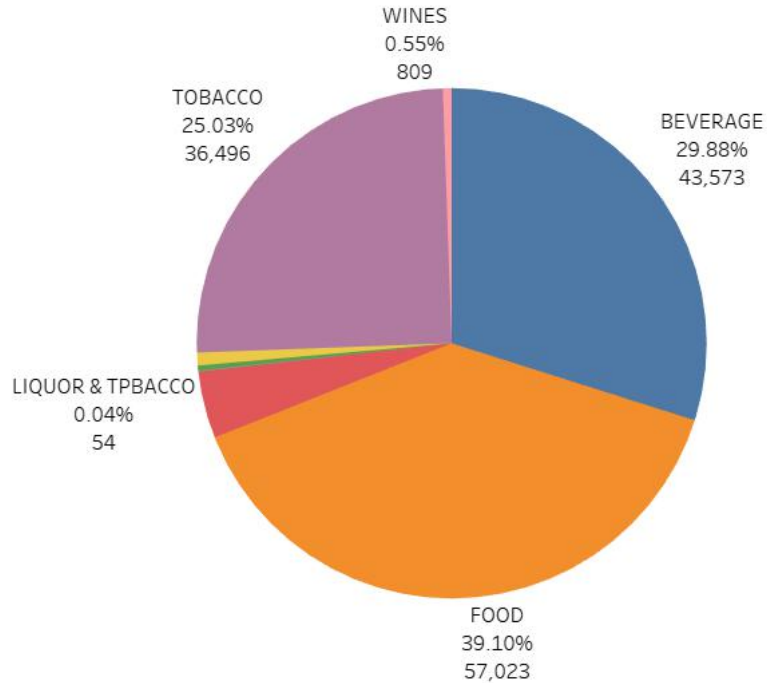Merchandise has 487 Records
Liquor &TP has 54 Records

Category VS Sales

Food has 9,952,728 sales
Beverage has 5,510,239 sales
Tobacco has 14,507,076 sales
Liquor has 2,3,447 sales
Misc has 206,858 sales
Wine has 352,912 sales
Merchandise has 120,074 sales
Liquor &TP has 42,562 sales

Category VS Number of Records (%)

Food has 39.10% Records
Beverage has 29.88 % Records
Tobacco has 25.03% Records
Liquor has 4.25% Records
Misc has 0.81% Records
Wine has 0.55% Records
Merchandise has 0.33% Records
Liquor &TP has 0.04% Records

Top 5 Items in each category

Category	Index	Item Desc	
BEVERAGE	1	CAPPUCCINO	550,252
	2	RED BULL 2+1	378,632
	3	RED BULL ENERGY D..	373,016
	4	LEMON ICED TEA	282,714
	5	BERRY BLAST	258,198
FOOD	1	GREAT LAKES SHAKE	843,122
	2	JR.CHL AVALANCHE	713,566
	3	POUTINE WITH FRIES	580,284
	4	OREO COOKIE SHAKE	405,645
	5	B.M.T. PANINI	391,067
LIQUOR	1	CARLSBERG	538,802
	2	TUBORG	381,052
	3	KF DRAUGHT PITCH..	330,618
	4	KF DRAUGHT (1LTR)	330,074
	5	KF DRAUGHT (1/2LT..	251,397
LIQUOR & TPBACCO	1	BEER HOOKAH	32,324
	2	2 DOM BEER + 1SPL ..	6,563
	3	4 DOM BEER + 1SPL ..	1,969
	4	2 DOM BEER + 1PRE..	1,706
MERCHANDISE	1	GREAT LAKES T-SHI..	13,352
	2	SANDASS	9,845
	3	FLAVOUR 500 GMS	6,379
	4	CH COFFEE MUGS	6,050
	5	CH TINS	5,842
MISC	1	RED BULL 2+1	309
	2	ORANGE ARRABIATA	371
	3	LEMON INFUSED CH..	588
	4	RED BULL SHEESHA	61,182
	5	MEDITER RANEAN P..	260
TOBACCO	1	NIRVANA HOOKAH S..	2,953,135
	2	SAMBUCA	2,291,058
	3	MINT FLAVOUR SIN..	1,840,501
	4	CALCUTTA MINT	1,640,860
	5	N R G HOOKAH	1,193,015
WINES	1	VLN CAB SAUV (GLS)	47,626
	2	RED SANGRIA (CARA..	27,846
	3	SULA BLUSH ZINFAN..	26,964
	4	RED SANGRIA (GLS)..	24,476
	5	VLN CHENIN BLANC ..	22,491

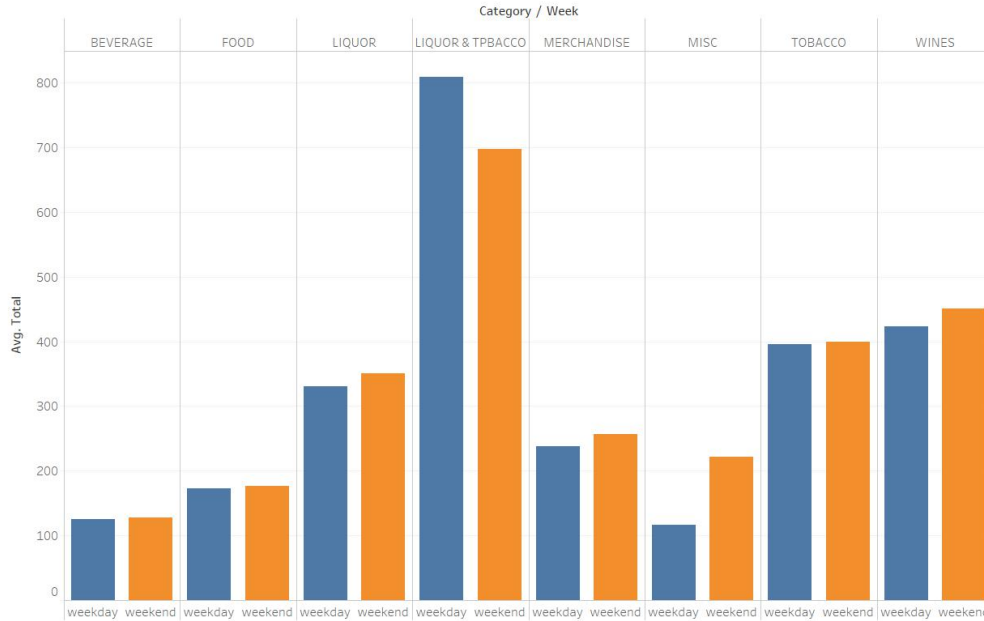These are the **top 5 items** sold in each category across year.

Let's explore more to get detailed insights.

Top 5 Items Sales
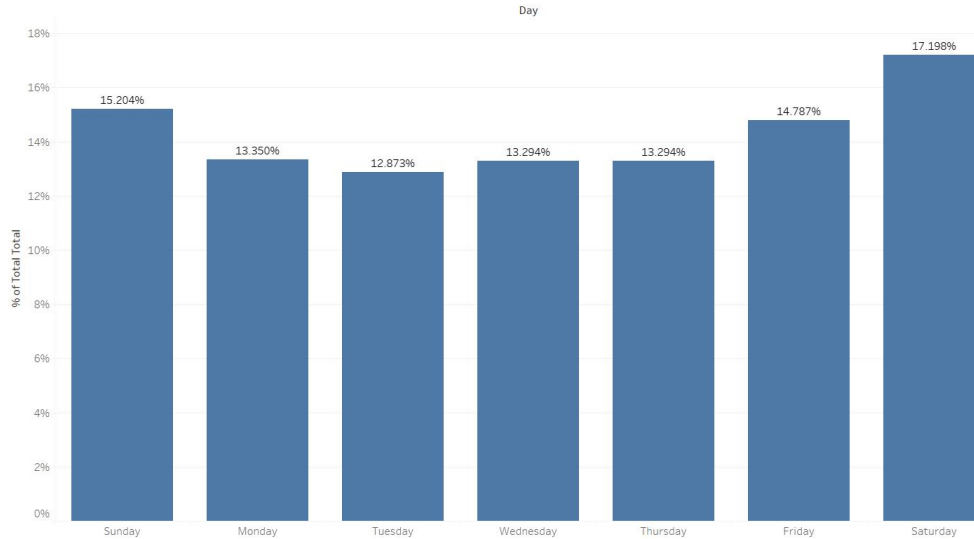

Item Desc
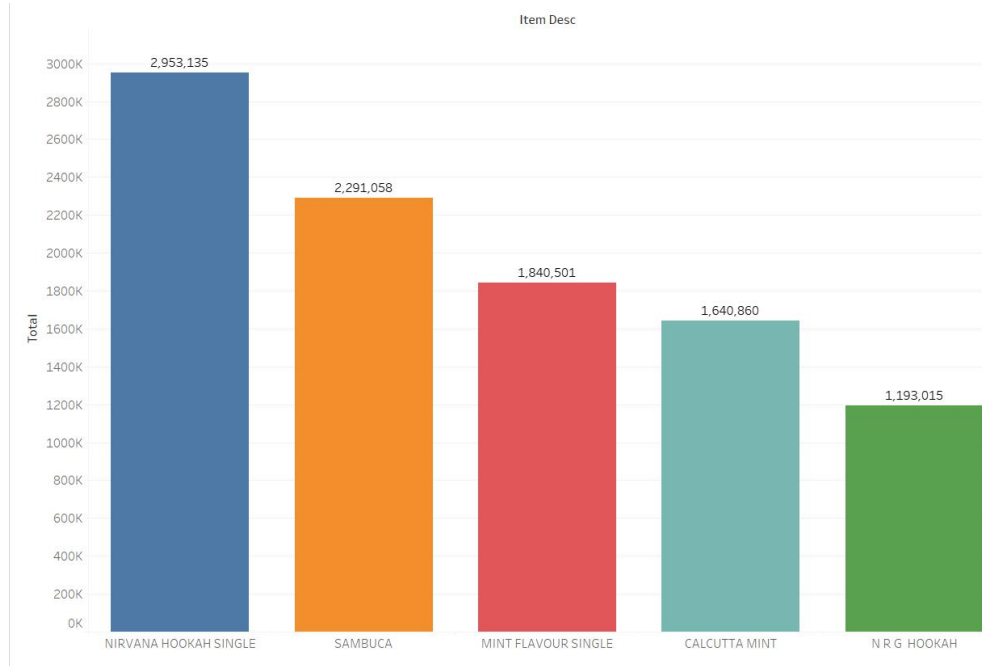
These are the **top 5 items** sold

Avg Sales Weekday vs Weekend

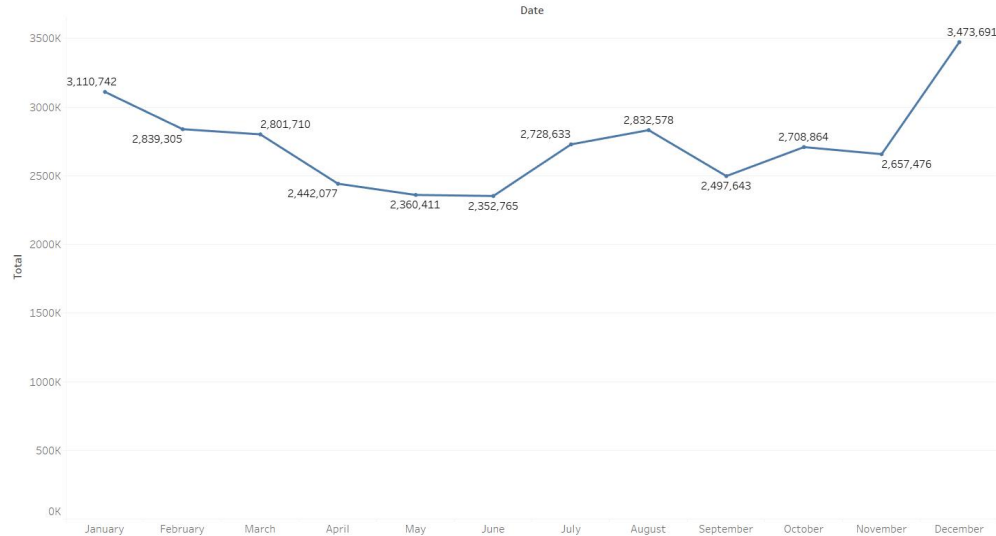Avg Sales of some Category is more on Weekends and some are more on Weekdays

Note: Fri, Sat and Sun considered as weekend

Sales VS Days (%)

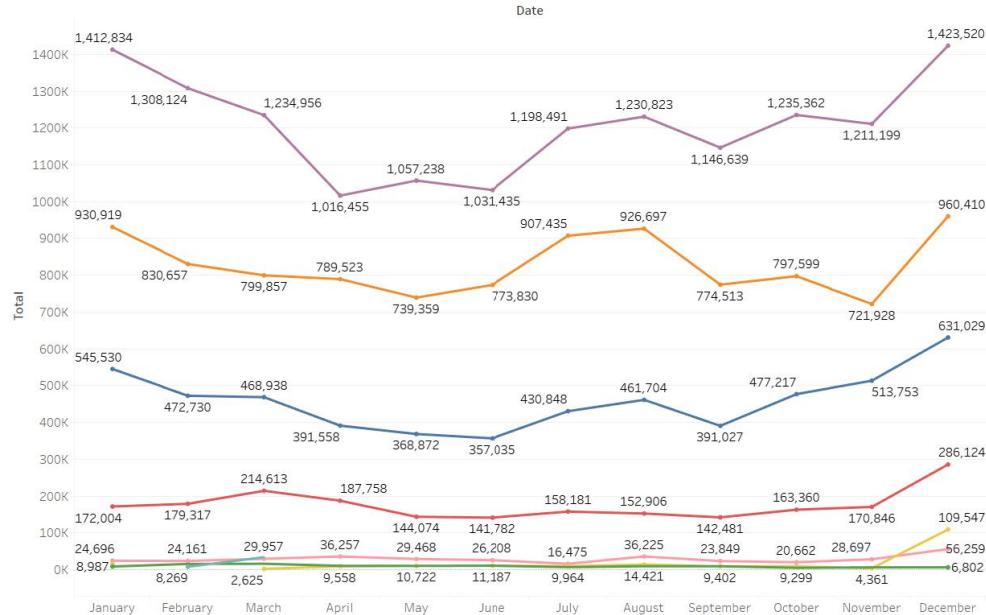Avg Sales is highest on Saturdays at 17.19%. Followed by Sunday at 15.20%

Sales VS Months

* Highest Sales are in December
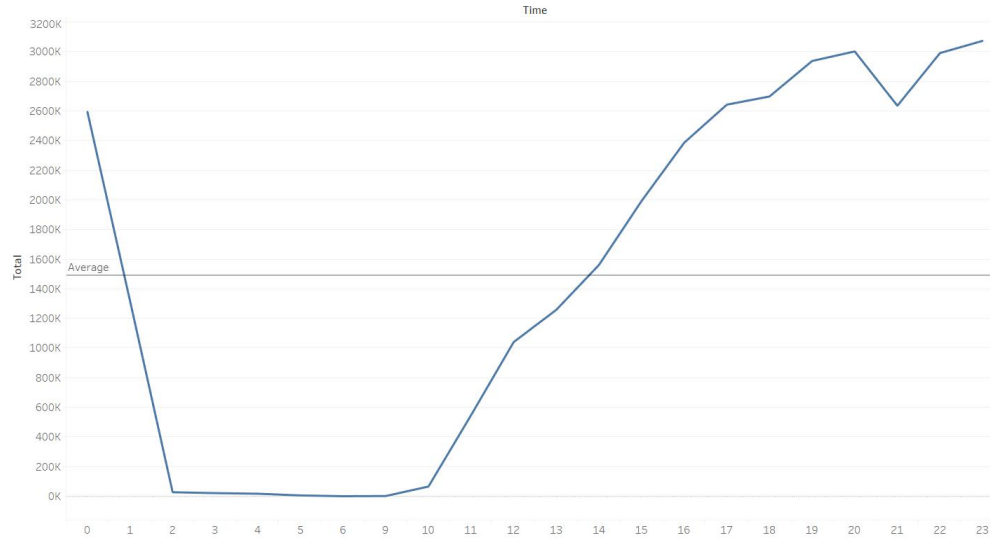
* There is declining trend from March to June.

Sales VS Months (Category)

Sales Trend of each Category Per Month

Sales VS Months (Category)
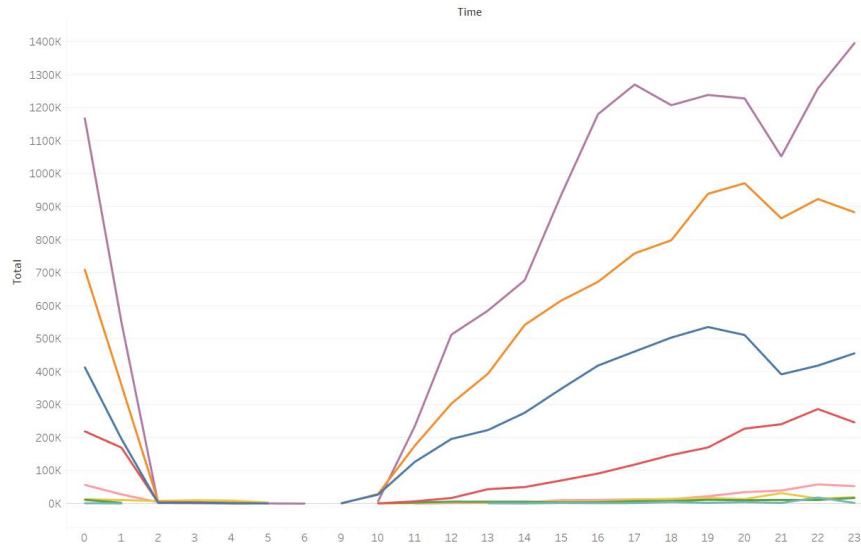

* Sales between 9 AM and 2 PM are below Average

* There is high demand between 6 PM and 11 PM

Sales VS Months (Category)

*Sales Trend of each Category Per Hour

Market
Basket
Analysis

most frequent items

Items	How frequent
NIRVANA HOOKAH SINGLE	8389
MINT FLAVOUR SINGLE	5812
CAPPUCCINO	5468
GREAT LAKES SHAKE	4871
SAMBUCA	4423

Number of Items	Number of Baskets	Number of Items	Number of Baskets
1	31890	11	27
2	19118	12	22
3	9720	13	12
4	4839	14	9
5	2284	15	4
6	1101	16	2
7	511	17	3
8	255	19	1
9	115	21	1
10	66	23	1

Top 10 Frequent Items Plot
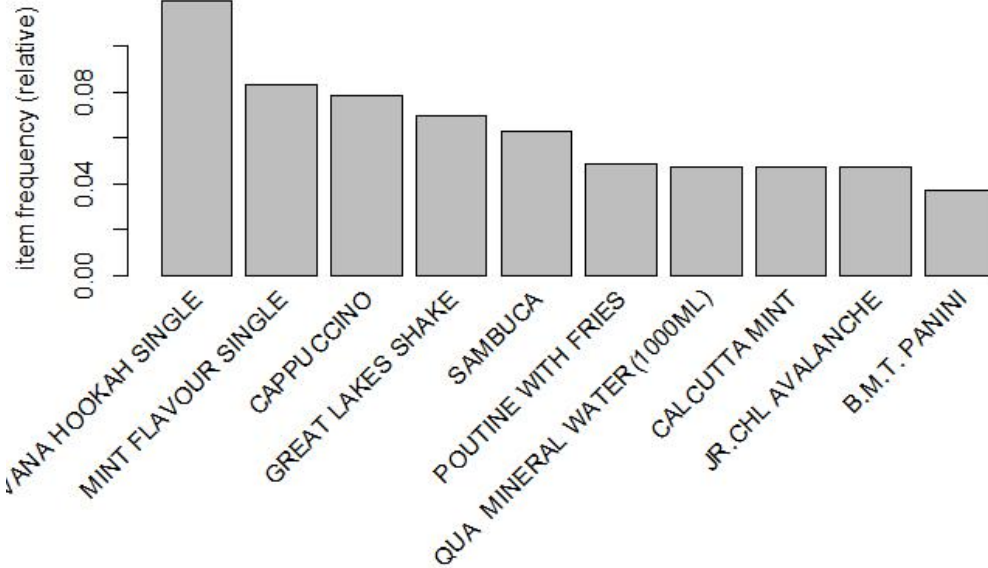
1) NIRVANA HOOKAH SINGLE

2) MINT FLAVOUR SINGLE

3) CAPPUCCINO

4) GREAT LAKES SHAKE

5) SAMUCA

Item Freq Plot with Support 0.05
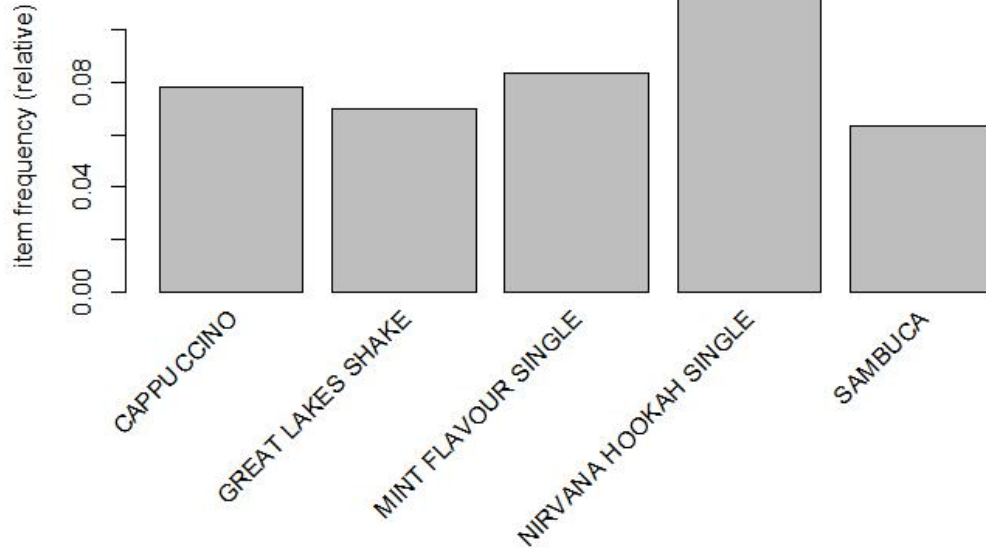
1) Cappuccino

2) Great Lakes Shake

3) Mint Flavour Single

4) Nirvana Hookah Single

5) Sambuca

Top 10 Rules

```
> inspect(basket.sorted2)
    lhs                           rhs                         support    confidence lift      count
[1]  {}                        => {NIRVANA HOOKAH SINGLE}     0.119873682 0.1198737 1.0000000 8389
[2]  {POUTINE WITH FRIES}      => {NIRVANA HOOKAH SINGLE}     0.006330199 0.1297598 1.0824712 443
[3]  {QUA  MINERAL WATER(1000ML)} => {NIRVANA HOOKAH SINGLE}  0.005472836 0.1150841 0.9600450 383
[4]  {RED BULL ENERGY DRINK}   => {NIRVANA HOOKAH SINGLE}     0.004886971 0.1838710 1.5338727 342
[5]  {B.M.T. PANINI}           => {SAMBUCA}                   0.004686919 0.1259117 1.9922119 328
[6]  {B.M.T. PANINI}           => {NIRVANA HOOKAH SINGLE}     0.004601183 0.1236084 1.0311558 322
[7]  {CAFFE LATTE}             => {CAPPUCCINO}                0.004243948 0.1417661 1.8143884 297
[8]  {RED BULL 2+1}            => {SAMBUCA}                   0.004143923 0.2485004 3.9318465 290
[9]  {RED BULL ENERGY DRINK}   => {SAMBUCA}                   0.004043897 0.1521505 2.4073703 283
[10] {B.M.T. PANINI}           => {GREAT LAKES SHAKE}         0.004043897 0.1086372 1.5607988 283
```

Graph for 7 rules

size: support (0.001 - 0.12)
color: lift (1 - 79.364)

ADD HAZELNUT FLAVOUR

NIRVANA HOOKAH SINGLE

CAPPUCCINO

CAFFE LATTE

FRENCH FRIES

ADD HERB ROAST CHICKEN
LEMON INFUSED CHAR GRILLED VEG

GREAT LAKES SHAKE

B.M.T. PANINI

VANILLA ICECREAM

Here are the Rules with LHS Support and RHS Support

```
                                          rules    support confidence       lift count  LHSSupport
1                    {} => {NIRVANA HOOKAH SINGLE} 0.119873682  0.1198737  1.0000000  8389 1.000000000
2    {ADD HERB ROAST CHICKEN} => {LEMON INFUSED CHAR GRILLED VEG} 0.001043125  0.4649682 79.3643934    73 0.002243434
3    {LEMON INFUSED CHAR GRILLED VEG} => {ADD HERB ROAST CHICKEN} 0.001043125  0.1780488 79.3643934    73 0.005858649
4             {ADD HAZELNUT FLAVOUR} => {CAFFE LATTE} 0.001614701  0.5458937 18.2351954   113 0.002957903
5             {ADD HAZELNUT FLAVOUR} => {CAPPUCCINO} 0.001371781  0.4637681  5.9355194    96 0.002957903
6             {VANILLA ICECREAM} => {GREAT LAKES SHAKE} 0.001243177  0.4123223  5.9238632    87 0.003015061
7                 {FRENCH FRIES} => {B.M.T. PANINI} 0.001014547  0.2659176  7.1437411    71 0.003815267
8         {BLACK CURRANT ICED TEA} => {LEMON ICED TEA} 0.001014547  0.1811224  5.7798957    71 0.005601440
9                      {DOPPIO} => {CAPPUCCINO} 0.001114572  0.1488550  1.9051148    78 0.007487640
10                    {ESPRESSO} => {CAPPUCCINO} 0.001228887  0.1660232  2.1248415    86 0.007401903
11          {BUN MASKA & CHAI} => {MASALA CHAI CUTTING} 0.001428939  0.1865672  5.8443793   100 0.007659112
12            {VEG. CLUB WRAP} => {POUTINE WITH FRIES} 0.001100283  0.1348511  2.7642508    77 0.008159241
13            {VEG. CLUB WRAP} => {GREAT LAKES SHAKE} 0.001014547  0.1243433  1.7864483    71 0.008159241
14        {MEZE PLATTER} => {QUA  MINERAL WATER(1000ML)} 0.001157440  0.1300161  2.7340094    81 0.008902289
```

Conclusion

* Products with less sales and high rate should be promoted by employers and feedback should be collected on them as they are most profitable products.

* Inventory Management can be done on the basis of seasonality (More in peak season time like December and less in low sales time like April, May and June) and Product category (like more for tobacco that has more sales than others)

* Happy hours scheme can be applied on the less productive time interval ie .4 Am- 8 Am to attract customers and also staff can be management by the knowing the high and low sales time interval(more and efficient staff on peak hours while new or average and less staff during low sales time periods.

Conclusion

* Bigger Menu for category more in demand. Menu optimization can be performed with the help of high and less sales/ rate products.

* Marketing strategy like coupons for non productive hours and loyalty program can be run to retain the target customers Social media is a good medium to attract our young target crowd.

We can see that no matter what item purchased in lhs

• Nirvana Hookah is bought with 0.1198 support

• If Herb Roast is bought then Lemon infused grilled veg is bought with 0.0010 support

Recomend Cafe to provide discount on Food with Nirvana Hookah. They can do this by creating Bundle or Happy Meal

Conclusion

*We have identified busy days and busy hours of the day, so to increase the revenue of the cafe, we can give more schemes or offers during less busy hours and days, and also initiate happy hours during the less peak hours on the weekdays to improve the weekday sales.