Project: Analyzing a Market Test

Step 1: Plan Your Analysis

- **What is the performance metric you'll use to evaluate the results of your test?**
  The goal of the experiment is to determine whether the menu change will lead to at least 18% increase in the profit growth. So, the performance metric will be the gross margin.
- **What is the test period?**
  The test ran for a period of 12 weeks (2016-April-29 to 2016-July-21)
- **At what level (day, week, month, etc.) should the data be aggregated?**
  Weekly level

Step 2: Clean Up Your Data

In this step, the goal is to prepare the data for the **AB Analysis**. For AB analysis, we need also AB control and AB Trend tools, all are described in the following:

AB Control

- **AB control** tool matches one to ten control units (in our case: ***stores***) to each member of a set of previously selected test units, based on criteria such as **seasonal** patterns and growth trends for a key performance indicator (for example, sales or **traffic**), along with other user-provided criteria (for example, trade area or demographic characteristics).
- In this project, we should use 3 numeric measures to **match** treatment and control stores.
  - **Trend**
  - **Seasonality**
  - **AvgMonthSales** (This should be determined by looking at the correlation between the appropriate numeric variables in the round roasters stores file AvgMonthSales and Sq_ft with the performance metric gross margin.)
- We need to calculate **trends** and **seasonality** using AB Trend tool.
- We will match **two controls** units to each treatment unit.

AB Trend

- **AB trend** tool creates measures of trend and seasonal patterns (one value per test unit, such as a store or a customer) that can be used in helping to match treatment to control units for A/B testing.
- The performance metric in our project is the **invoice count per week** which represent weekly foot **traffic**.

AB Analysis Tool

- AB Analysis is used to compare the ***percentage change*** in a **performance measure** (in our project it is weekly gross margin) to the same measure either over the same time period one year earlier (controlling for possible seasonal effects) or a user-specified time period, for two different groups (a treatment group and control group).
- The test performed to make the comparison is Welch's two sample t-test*.

In order to use above tools, we need to prepare the following:

1. For AB trend tool we need **Weekly Traffic dataset**
2. For AB control we need a **list of store data** with criteria we need for matching: trend, seasonality, average sales, Sq_ft, region and a variable that indicates whether it is treatment or not.
3. For AB analysis we need the **data produced by AB control plus sales data.** The sales data should be weekly aggregated for each store and have the performance metric (in our case the sum of weekly gross margin)

Weekly Traffic

All transactions are aggregated by store and week and filtered to the proper date range

Store ID
Invoices Count
Week No
Week Start
Week End

Stores list:

All transactions are aggregated by store and week and filtered to the proper date range. Also, stores are labelled as treatment and control stores

Store ID
Average Month sales
Square feet
Test Group (CC or TC)

Sales data: All transactions are aggregated by store and week

Store ID
Week No
Week start
Week end
Sum of gross margin

Step 3: Match Treatment and Control Units

Apart from trend and seasonality...

1. **What control variables should be considered?**
    - Average monthly sales
    - Square feet

2. **What is the correlation between each potential control variable and your performance metric?**
   The correlation is calculated using Pearson Correlation in Alteryx

FieldName	Sum_Gross Margin	Sq_Ft	AvgMonthSales
Sum_Gross Margin	1	-1.93446587718747e-02	0.790357979780347
Sq_Ft	-1.93446587718747e-02	1	-4.69673570248425e-02
AvgMonthSales	0.790357979780347	-4.69673570248425e-02	1

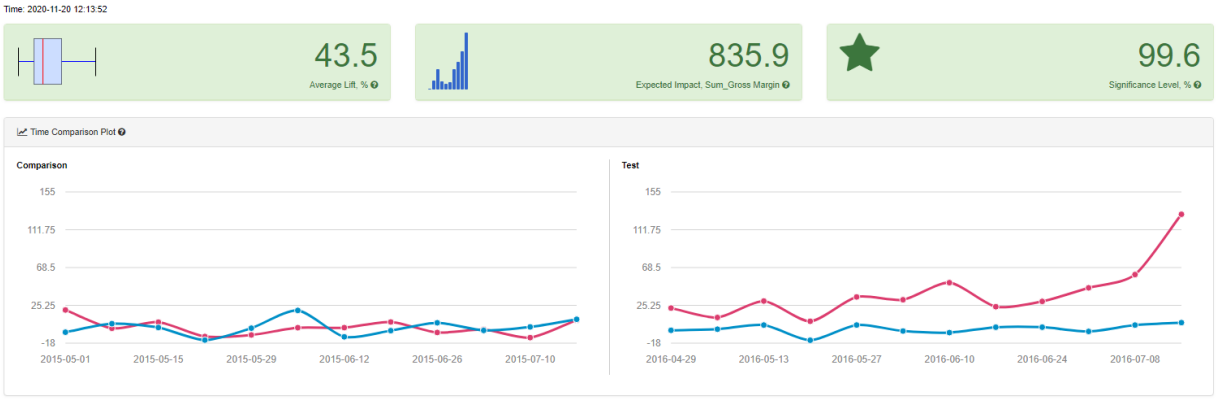
3. **What control variables will you use to match treatment and control stores?**
   I will use average month sales since it has positive relationship of .79 with the performance metric.
4. **Please fill out the table below with your treatment and control stores pairs:**

Treatment Store	Control Store 1	Control Store 2
1664	7162	8112
1675	1580	1807
1696	1964	1863
1700	2014	1630
1712	8162	7434
2288	9081	2568
2293	12219	9524
2301	3102	9238
2322	2409	3235
2341	12536	2383

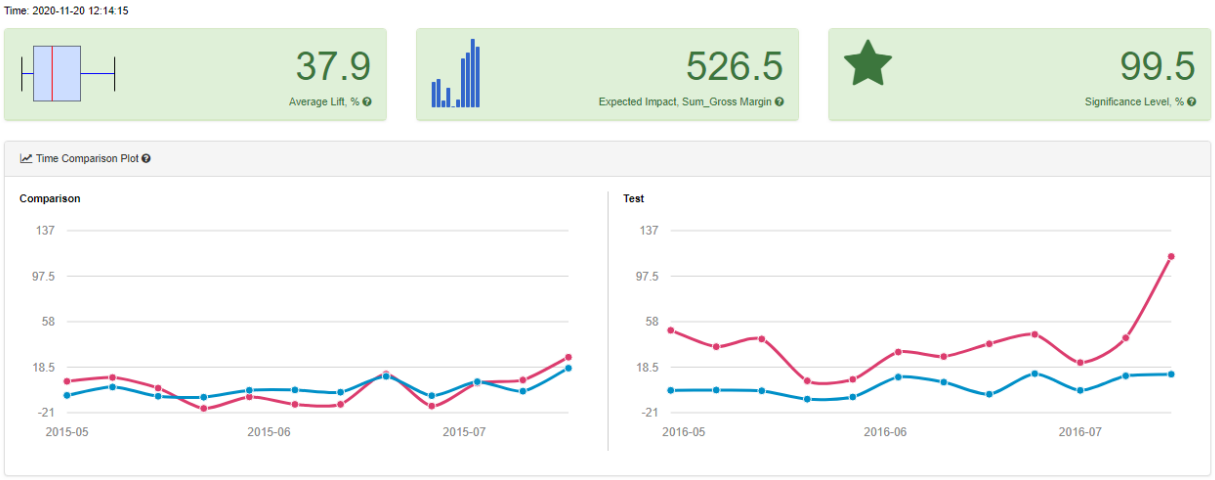
Step 4: Analysis and Writeup

1. **What is your recommendation - Should the company roll out the updated menu to all stores?**
   Yes. The results indicate that the increase in gross margin exceed our criteria i.e. 18%
2. **What is the lift from the new menu for West and Central regions (include statistical significance)?**
   The lift from the new menu for Central region is 43.5% with a statistical significance of 99.6%. The lift from the updated menu for West region is 37.9% with a statistical significance of 99.5.
3. **What is the lift from the new menu overall?**
   40.4 %

The Test analysis result for Central region



The Test analysis result for West region



The Test analysis result for both regions