

Project Loyalty Program Analysis

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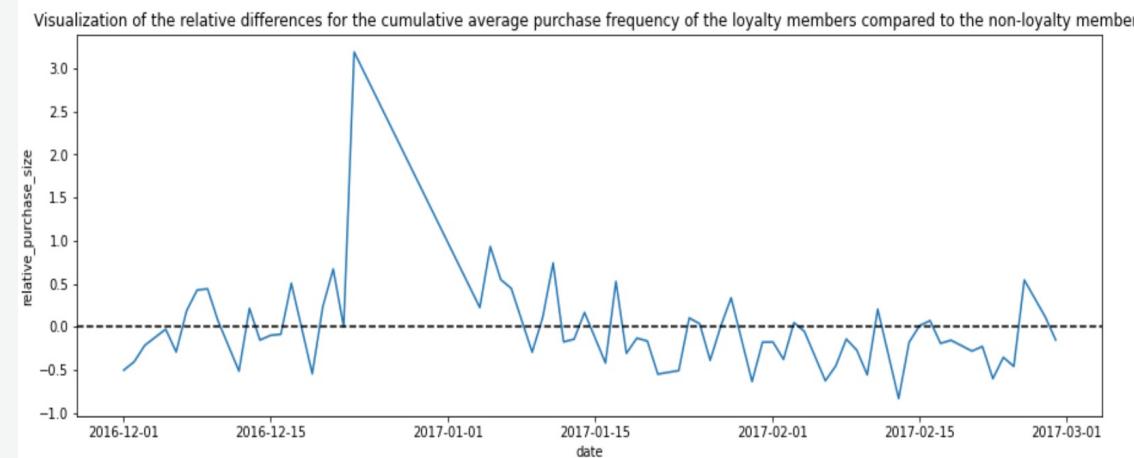
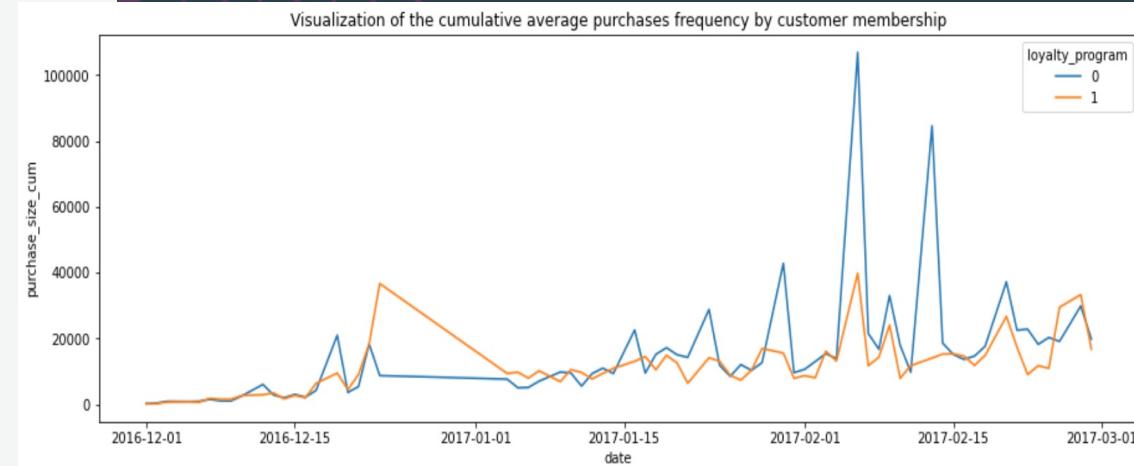
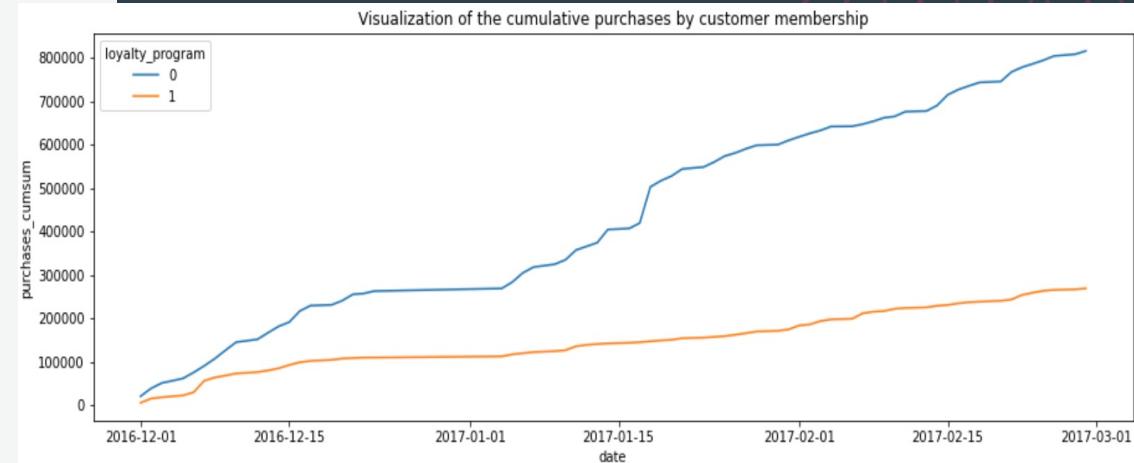


General Conclusions

1. The loyalty program has no effect on increasing customer purchases (\$) and customer purchase frequency.
2. Paying USD20 per month to become a loyalty program member is not make the customer increase their purchase.
3. Most of the customers only made the purchase with the price is USD12. However, we assumed customers who order more than USD39.615 are either outliers or anomalies.
4. Most of the customers only made orders 2 times. While we also assumed customers who order more than 7 orders are either outliers or anomalies.

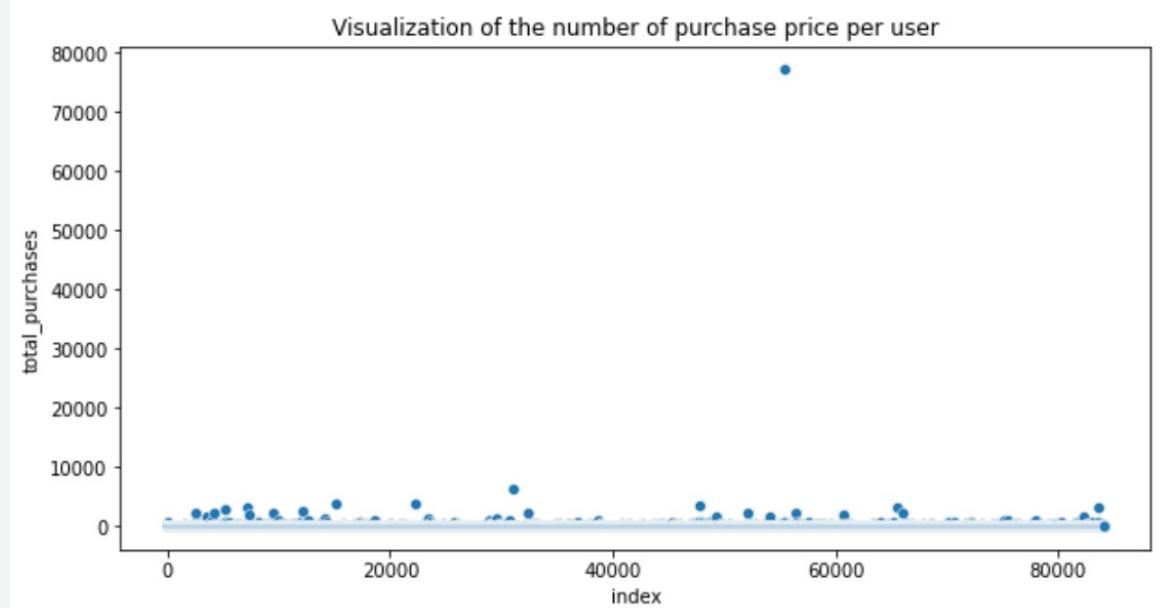
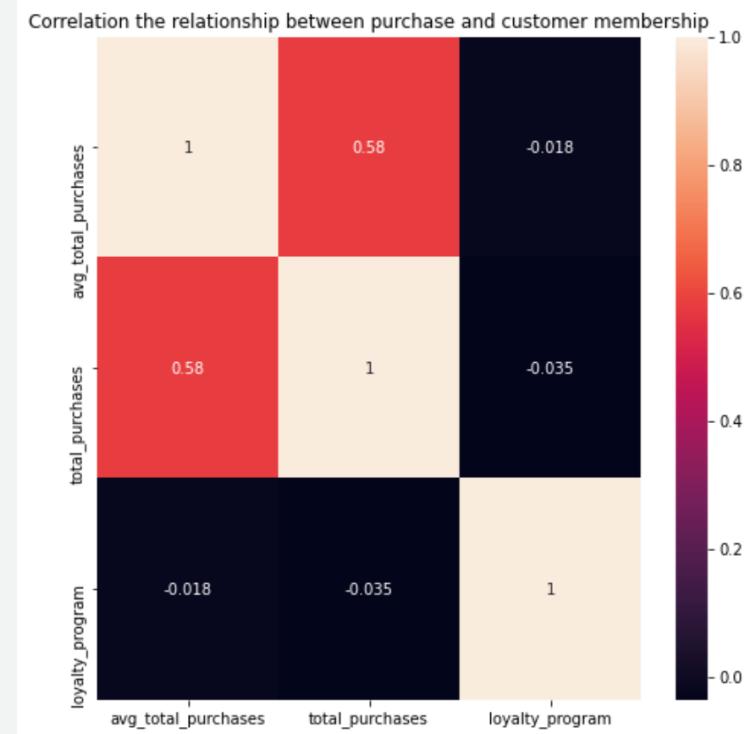
The cumulative purchases in \$ and the average purchase frequency of each customer membership.

1. At the beginning of Dec 2016, the position of the cumulative purchase (\$) of non-loyalty members is slightly higher than loyalty members. Similar things happen to the cumulative purchase frequency.
2. In the mid of Jan 2017, the non-loyalty members took the lead and held on until the end of the data.
3. The average purchase frequency is mostly by the non-loyalty members, which is many lines below the dotted line.



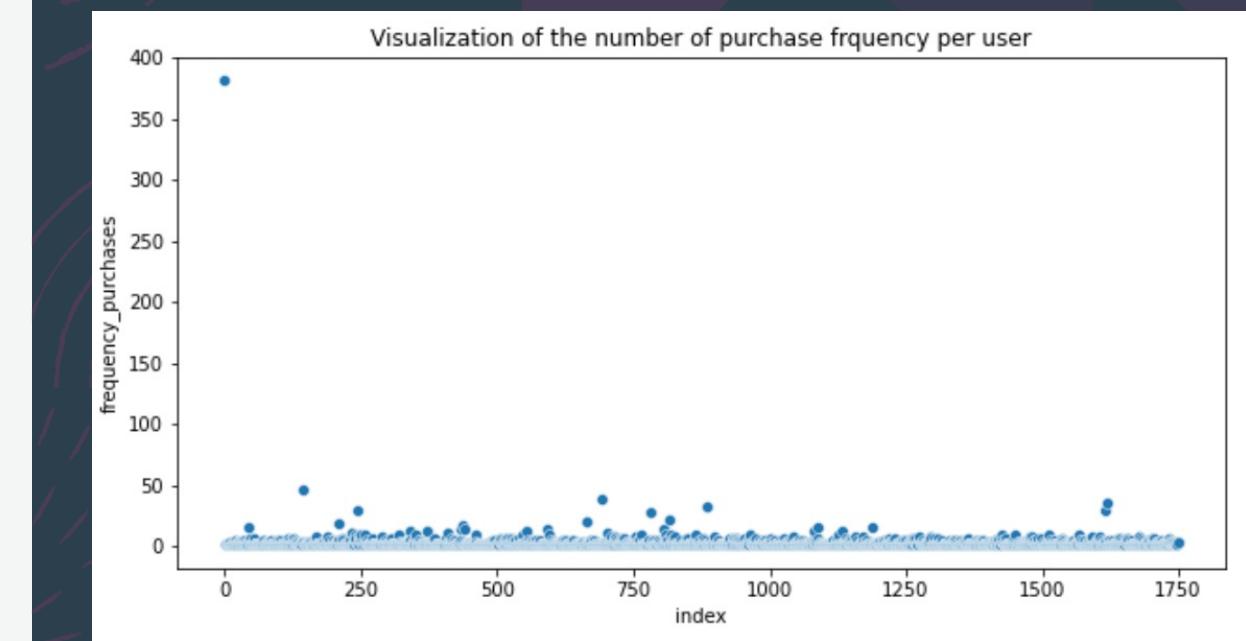
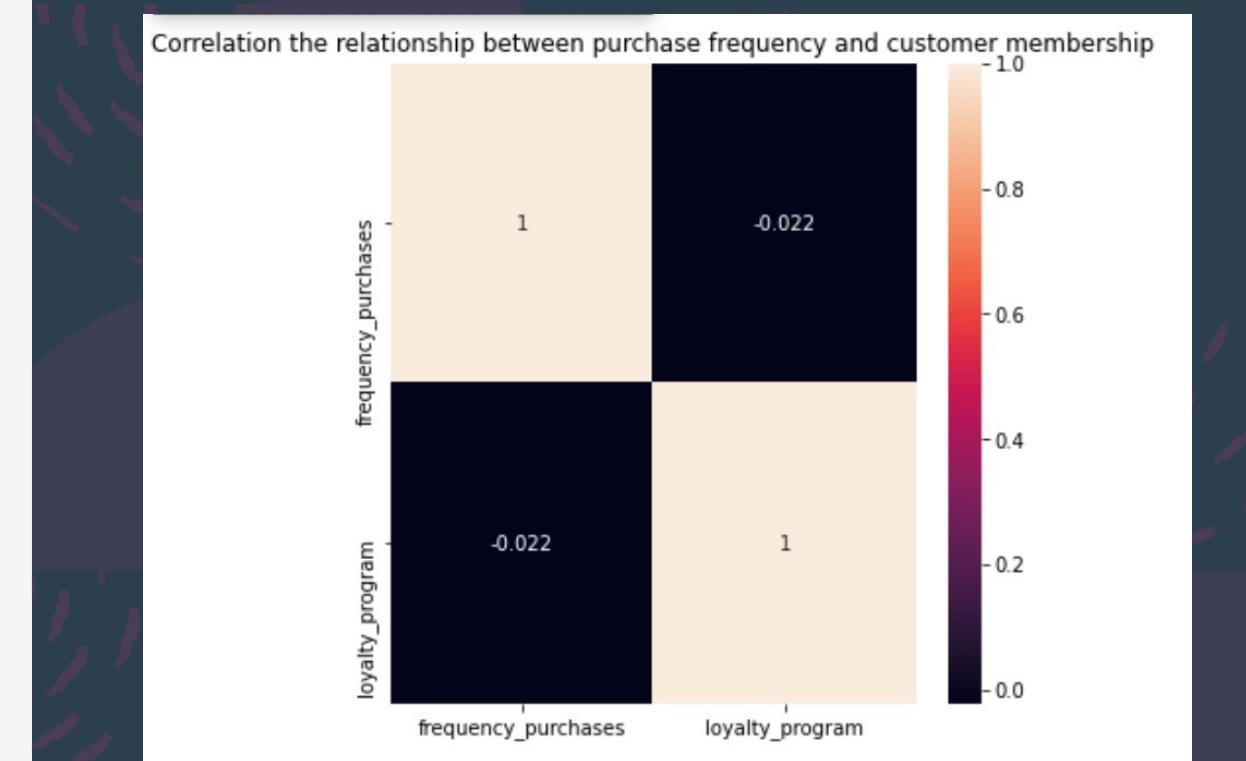
The relationship between purchase and customer membership

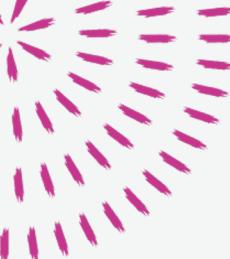
- The average total purchases of loyalty membership customers are less than the non-loyalty membership customer (USD 458 vs. USD 700).
- The correlation matrix shows that the relationship purchase has a negative relationship with customer membership.
- The average purchase price per customer is USD 12. While outliers orders are around > USD 11.
- Of 95% of users made a purchase price of USD 39.615 and below, while 99% of users made a purchase price of USD 143.028 and below.



The relationship between purchase frequency and customer membership

- The average total purchases of loyalty membership customers are less than that of non-loyalty membership customers (2.28 vs. 2.73). The correlation matrix shows that the relationship purchase frequency has a negative relationship with customer membership.
- The average purchase frequency is 2 times. While outliers orders are between 20 to 381 times.
- Of 95% of users made seven purchases and below. Of 99% of users made fourteen purchases and below. The number of users who made purchases for more than seven orders did not exceed 5%. Those who made orders for more than fourteen purchases only amounted to 1%.





Cohort Analysis changes in average purchase size (\$): Loyalty members

age_months	0	1	2	3
first_purch_month				
2016-12-01	11.396165038453558	13.289626373626373	16.24501331754956	12.327837514934288
2017-01-01	7.2464848484856	7.846711409395971	9.453333333333333	
2017-02-01	10.473408360128644	13.082105263157896		

age_months	0	1	2	3
first_purch_month				
2016-12-01 00:00:00	100.0	116.614899212005028	142.548070010698837	108.175315760495124
2017-01-01 00:00:00	100.0	108.283003048527931	130.454055048633677	
2017-02-01 00:00:00	100.0	124.907812369470236		

The average customer purchase (\$) after one month for loyalty members is around 117%, whereas the Feb 2017 cohort was the highest at around 124%.

From Dec 2016 cohort, in the third month after the first month, the average customer purchase (\$) decreased vs. the second month (77% vs. 107%).





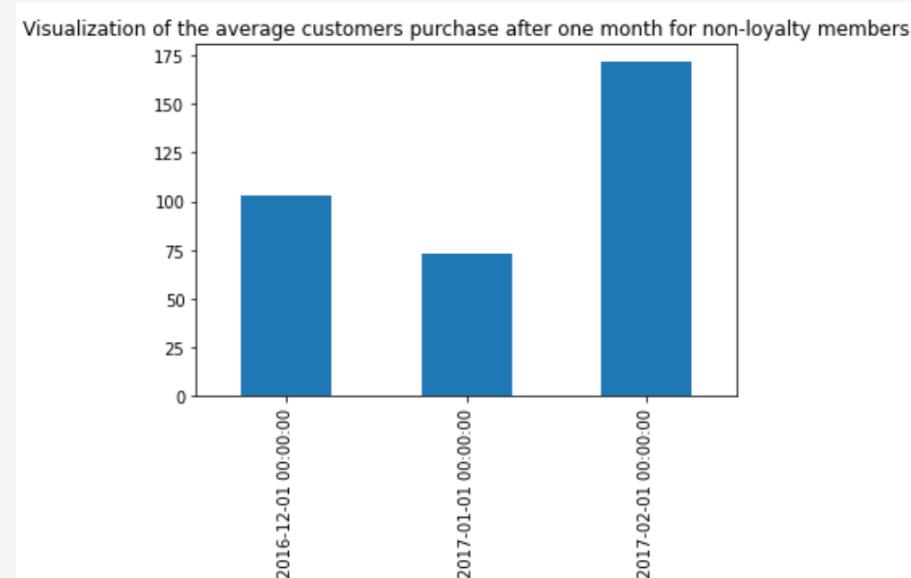
Cohort Analysis changes in average purchase size (\$): Non-loyalty members

age_months	0	1	2	3
first_purch_month				
2016-12-01	11.860994427775228	12.224402606806594	12.698773455377498	9.196761782622636
2017-01-01	23.852209869848171	17.381914268937173	17.264062500000005	
2017-02-01	10.374148039574997	17.879999999999999		
age_months	0	1	2	3
2016-12-01 00:00:00	100.0	103.063893008670178	107.063311872404384	77.537864456679245
2017-01-01 00:00:00	100.0	72.873391454222585	72.379299839314626	
2017-02-01 00:00:00	100.0	172.351502328595046		

The average customer purchase (USD) after one month for non-loyalty members is around 116%, whereas the Feb 2017 cohort was the highest at around 172%.

From Dec 2016 cohort, in the third month after the first month, the average customer purchase (\$) decreased vs. the second month (77% vs. 107%).

There are no differences in changes in average purchase frequency for each cohort for loyalty program members and non-members (117% vs. 116%).



Hypothesis Testing

Formula:

- ❖ The significance level / "alpha" value to be used = 0.05.
- ❖ If $p_value < \alpha$, we reject the null hypothesis, which means there is a significant difference between the average purchase size for loyalty program members and non-members.
- ❖ If $p_value > \alpha$, we failed to reject the null hypothesis, which means there is no reason to consider the average purchase size for loyalty program members and non-members for different.
- ❖ Use the Independent T-Test approach
- ❖ H_0 = The average purchase size (\$) for loyalty program members and non-members was statistically the same (=)
- ❖ H_1 = The average purchase size (\$) for loyalty program members and non-members was statistically significant not the same (/=)

Result:

- ❖ The result of hypothesis testing failed to reject the null hypothesis, which means there is no reason to consider the average purchase size for loyalty program members is higher than non-members (they have similarities).

```
# The hypothesis testing that the average purchase size is higher for loyalty program members than non-members.

alpha = 0.05 # critical statistical significance

results = st.ttest_ind(loyalty_members['avg_total_purchases'], non_loyalty_members['avg_total_purchases'],
                      equal_var=False)

print('p-value:', results.pvalue)

if results.pvalue < alpha:
    print("The null hypothesis is rejected: the difference is statistically significant")
else:
    print("Failed to reject the null hypothesis: we cannot conclude the difference")

p-value: 0.30271522140409063
Failed to reject the null hypothesis: we cannot conclude the difference
```

Recommendations

1. We recommend stopping this loyalty program since the loyalty program has no effect on increasing customer purchases (\$) and customer purchase frequency. It might be because they have to pay USD20 per month to become a loyalty member.
2. We know that the average purchase decreased in the third month after their first purchase month for both cohort loyalty program members/non-members. To solve that, send them a reminder email, such as a voucher/discount/promo buy 2 get 1 free. The promotion can be followed with some Terms & Conditions applied, e.g. setting the minimum purchase.

Thank you

