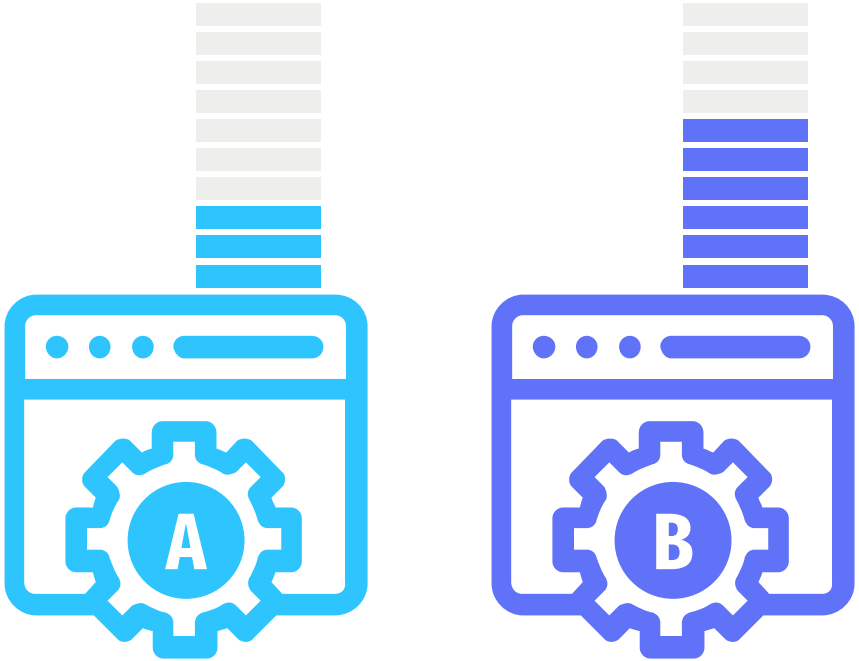


# Campaign A/B Testing

Portfolio
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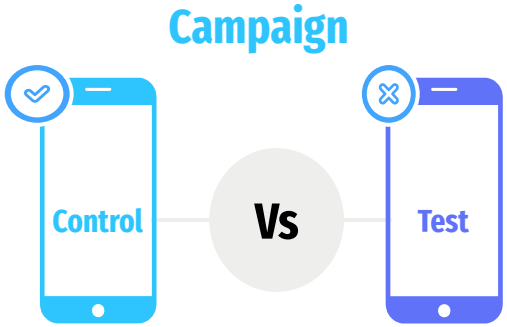
Please kindly check my code by clicking here

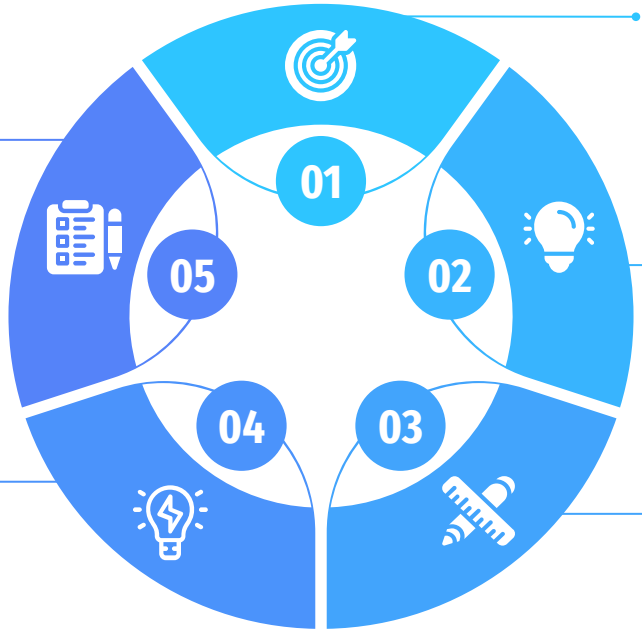
# Case

| Features | Explanation |
|---|---|
| Date | Date of the record |
| Spend | Amount spent on the campaign in dollars |
| of Impressions | Number of impressions the ad crossed through the campaign |
| Reach | The number of unique impressions received in the ad |
| of Website Clicks | Number of website clicks received through the ads |
| of Searches | Number of users who performed searches on the website |
| of View Content | Number of users who viewed content and products on the website |
| of Add to Cart | Number of users who added products to the cart |
| of Purchase | Number of purchases |
| CTR | Click Through Rate |
| Activity | Total Action by users |
| CPA | Cost per Action |
| Conversion Rate | An action you want people to complete |




- The Company has performed two types of Campaign, but they don't know which one is the best. The Company has decided to do A/B Testing to evaluate the best Campaign between two types of campaign.
- The Company has 30 (30 days) sample data for control and test.
- I suggest they has done power analysis to determine the size of sample data.

# Objectives




## Define The best Campaign

To get the best campaign between control and test

## Get the Insight

Exploratory Data Analysis to get the insight of the dataset

## A/B Testing

Did A/B Testing to get the best campaign

## Report

Create the report based on the result of A/B Testing and create the recommendations

## Conclusion

Create the conclusion of Campaign A/B Testing, based on the results of A/B Testing and exploratory data analysis

# Hypothesis

**H0**

There is no significant difference statistically between the control and test campaign.

**H1**

There is significant difference statistically between the control and test campaign.


If the p-value is less than 0.05, it is considered significant, else is not significant.

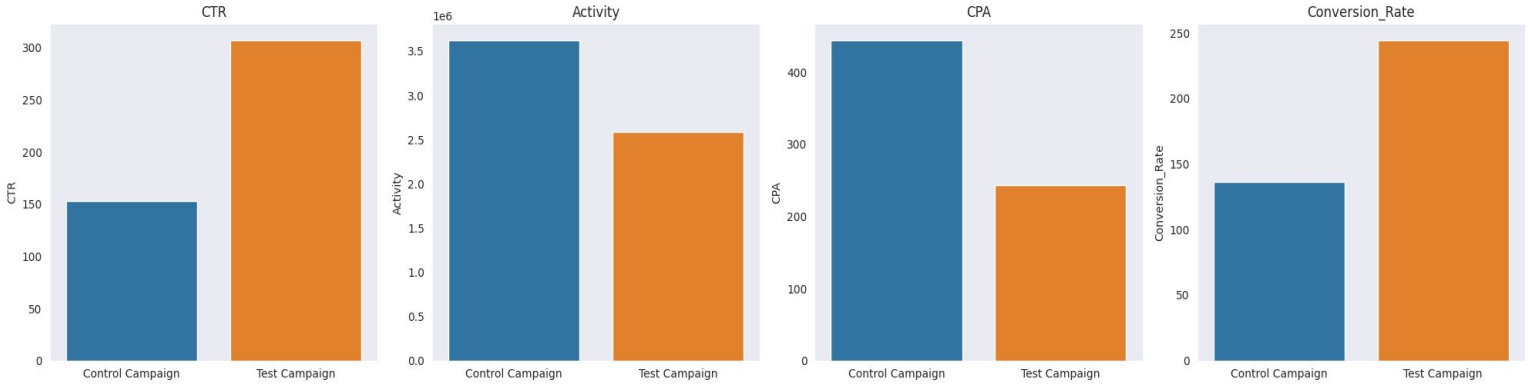
# Normality & Variance Assumption

| H0 | H1 | H0 | H1 |
| --- | --- | --- | --- |
| The assumption of normal distribution is provided | The assumption of normal distribution is not provided | Variances are homogeneous | Variances are not homogeneous |


- If the p-value is less than 0.05, it is considered significant and a non-parametric test (mann whitney u test) will be used. Else z-test.
- If the p-value is less than 0.05, then the data are not homogeneous, I recommended to use non-parametric test (mann whitney u test).

# Exploratory Data Analysis

# Total Control vs Total Test




| Campaign_Name | Total Spend [USD] | Total Impressions | Total Reach | Total Website Clicks | Total Searches | Total View Content | Total Add to Cart | Total Purchase |
|---|---|---|---|---|---|---|---|---|
| **Control Campaign** | **$68,653** | **3,286,792** | **2,665,347** | **159,623** | **66,639** | **58,313** | **39,000** | **15,683** |
| **Test Campaign** | **$76,892** | **2,237,544** | **1,604,747** | **180,970** | **72,569** | **55,740** | **26,446** | **15,637** |

- The Control Campaign has better awareness than the Test Campaign.
- The Control Campaign has higher Impressions and Reach than the Test Campaign.
- The Test Campaign is more effective than the Control Campaign, since the Test Campaign has higher CTR then the Control Campaign.
- Seems like the Control Campaign is better on before entering the website, this indicated by it's higher Impressions and Reach than the Test Campaign, but the Test Campaign is better on the after entering the website, this indicated by it's lower Add to Cart and higher conversion rate than Control Campaign, but the Test Campaign has similar purchase with the Control Campaign.

# A/B Testing

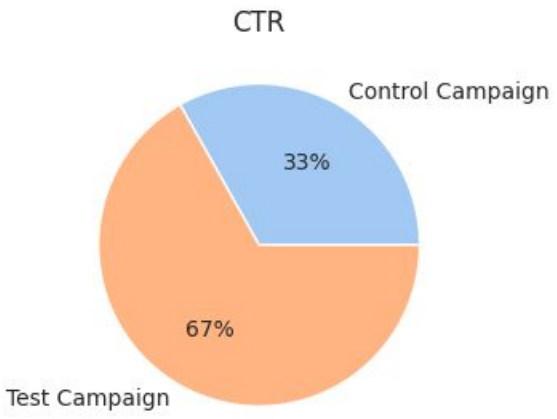
# Normality & Variance Homogeneity

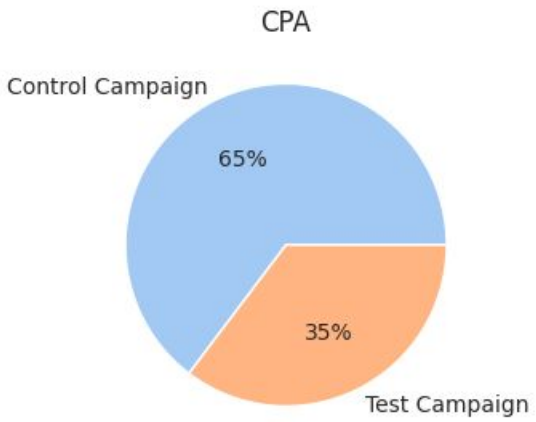
| Campaign_Name | CTR Normality | Activity Normality | CPA Normallity | Conversion Rate Normality |
|---|---|---|---|---|
| **Control Campaign** | 0.2807 | 0.1392 | **0.0000*** | 0.2823 |
| **Test Campaign** | **0.0004*** | 0.1221 | **0.0005*** | **0.0144*** |
| **Conclusion** | **Mann Whitney U Test** | **T Test** | **Mann Whitney U Test** | **Mann Whitney U Test** |

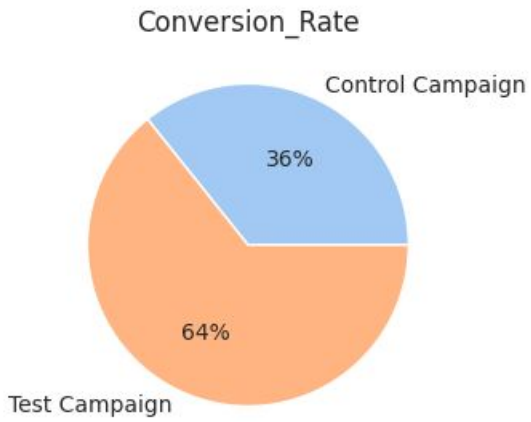
| Features | Variance Homogeneity Results | FInal Conclusion |
|---|---|---|
| **CTR** | **0.002*** | **Mann Whitney U Test Results** |
| **Activity** | **0.005*** | **Mann Whitney U Test Results** |
| **CPA** | 0.094 | **Mann Whitney U Test Results** |
| **Conversion Rate** | **0.001*** | **Mann Whitney U Test Results** |

- Based on the results of normality and variance homogeneity, the A/B Testing would better done with Mann Whitney U Test.
- If the p-value is less than 0.05, it is considered significant and a non-parametric test (mann whitney u test) will be used. Else a parametric test (t-test).
- If the p-value is less than 0.05, then the data are not homogeneous, I recommended to use non-parametric test (mann whitney u test).
- * means significant.

# A/B Testing Result



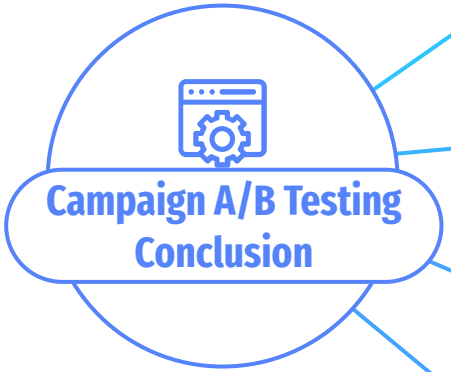




| Features | Mann Whitney U Test Results |
|---|---|
| **CTR** | **0.0002*** |
| **CPA** | **0.0198*** |
| **Conversion Rate** | **0.0001*** |

- Based on Mann Whitney U test, CTR, CPA, and Conversion Rate has significant different.
- Based on the visualization, Test Control has 67% of total CTR, 35% of total CPA, and 64% of total Conversion Rate
- a high CTR and Conversion rate is more likely to lead to a lower CPA.
- a high CTR is more likely to lead to a Conversion Rate.
- * means significant.

# Conclusion



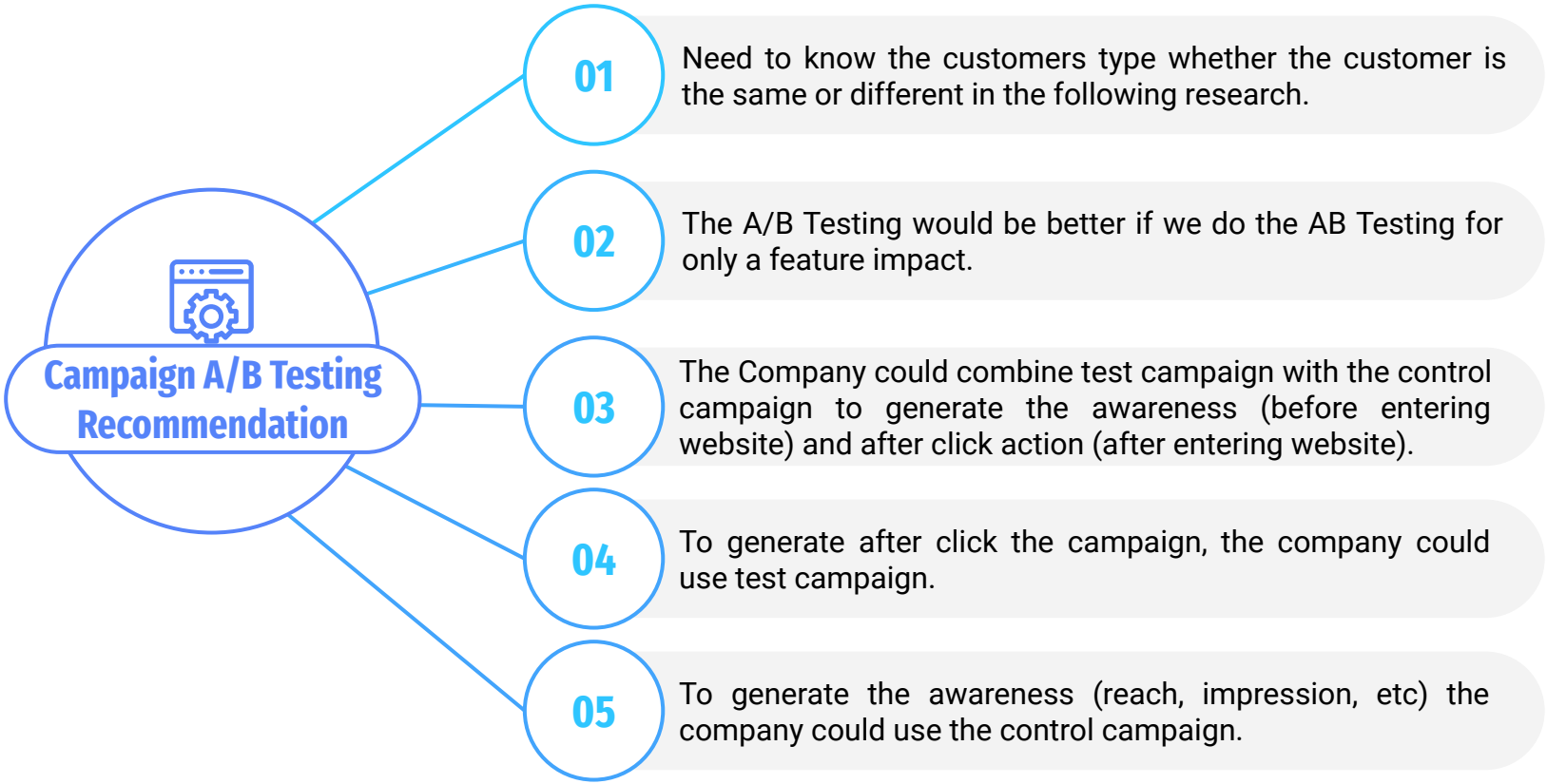

01 There is statistically significant difference between the control and test campaign on CTR, CPA, and Conversion Rate.

02 Based on Mann Whitney U Test results, There is statistically significant difference between the control and test campaign.

03 Based on the visualization results and Mann Whitney U Test the test campaign is the best campaign.

04 The Test Campaign could raise 49.68% of CTR, reduce 54.62% of CPA, and raise 55.66% of conversion rate compared to the Control Campaign.

# Recommendation



# Thank you!