# HYPOTHESIS TESTING REPORT

### **Problem Statement**

This dataset was an autolib dataset that contained details about the operation of

cars within Paris. It showed a compilation of dates when the blue cars were picked

from and returned to particular addresses. The claim being investigated was

whether or not the average number of blue cars taken was different from the

average number of blue cars returned during that period.

**Null hypothesis:** the average number of blue cars taken is not different from that

of the blue cars returned

**Alternative hypothesis:** the average number of blue cars taken is different from

that of the blue cars returned.

The interest of this hypothesis is important for the understanding of the data and its

distribution.

### **Data Description**

The dataset used for this investigation was an open dataset about cars in

Paris. It contains variables like the postal code of the area which was paris, the

dates of data collection. The dates ranged between January and July of 2018. It

also had the number of daily data points that were available for aggregation on the

particular days of aggregation within the specified time periods. The days of the

week were the usual Monday to Friday with the specifications and special

assignments of days. Weekday or weekend the dataset had the specific days within

the time period. The blue cars that were taken and returned, the utilib data and the

slots set of data were also contained in the dataset. The problem under

investigation was on the averages which would make the null and alternative

hypothesis.

This was a dataset that had already been collected. However, if I had to collect

such comprehensive data, I would have used my data response team to go out in the field,

collect the data and perform the analysis from which conclusions would later on be

made.

### **Hypothesis Testing Procedure**

The dataset was large with 16, 085 \* 13 entries. Hence a sample from it was picked

using stratified sampling methods. This method of sampling was used because

with it, the sample would be unbiased. Stratified sampling required me to group the

data into different sets of strata and then randomly pick a sample from the strata.

However since Python Programming was used to generate my sample, it was

quite easy and efficient. Since the dataset only had the count and dates of picked

and taken bluecars, these were used to determine the hypothesis.

The logic behind the null and alternative hypothesis is that, since it was not

going to be easy for me to manually group the data or identify the clusters and the

sample in them, I decided to work with an average. It was interesting to know

whether the average number of cars that were picked in a day were similar to

the average number of cars that were returned on that very day. This way it would

be easier to determine the future trends of business operations relating to blue cars

in the autolib electric car sharing company.

From stratified sampling a sample of 296 \* 4 entries were achieved. This meant

that n > 30. Also the z-score was used to determine the p-value. Normality tests were

Performed on the data since the static used needed so. The Alpha level of significance

Used was 0.05.

### **Hypothesis Testing Results**

From the hypothesis test, it was found that there was not sufficient evidence to prove

that the average means of the blue cars taken and the bluecars returned are not

equal. The z-score was -1.3163 and as a result, the null hypothesis was not

rejected. The z-critical value was 1.959963984540054 with the confidence interval

being:

Confidence interval:

(38.67676993633314, 80.92458141501822)

The p-value was 0.0940 which was greater than the significance level.

### **Discussion of Test Sensitivity**

Sensitivity in a statistical test is the measure of performance of a binary

classification test. It measures the proportion of the actual positive i.e. the

probability of a null hypothesis being true. Therefore, in this case the sensitivity was 91%.

### **Summary and Conclusions**

The project was comprehensive and demanding. Exploratory data analysis was performed with the hypothesis testing as its implementation. In conclusion we failed to reject the null hypothesis because there was not enough evidence for the null hypothesis to be rejected.

**Null hypothesis:** the average number of blue cars taken is not different from that of the blue cars returned.

**Alternative hypothesis:** the average number of blue cars taken is different from that of the blue cars returned.