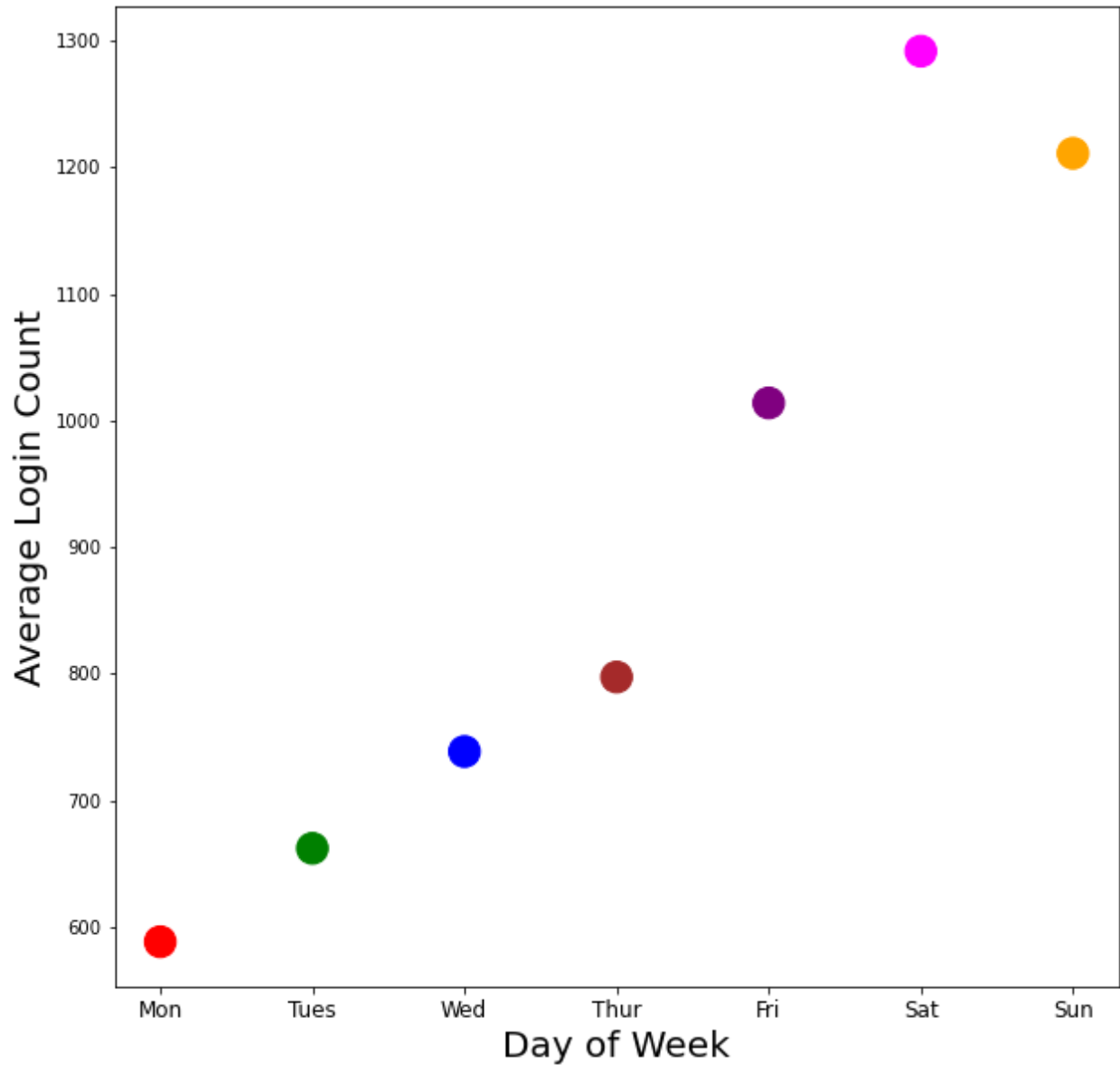
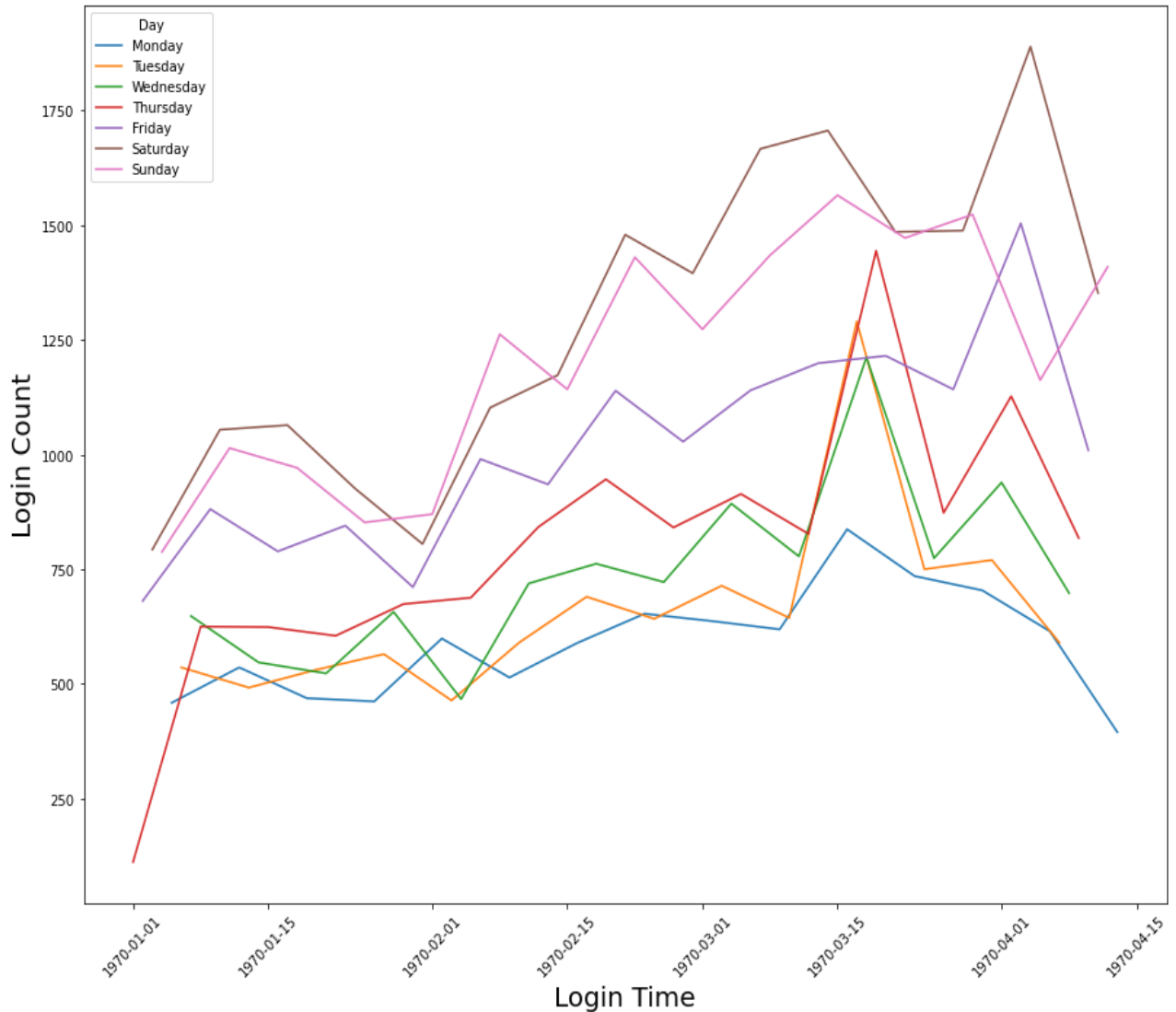


# Ultimate Technologies Inc. Challenge

## Part 1 – Exploratory Data Analysis

The dataset contains 93,142 login timestamps for 103 days in the dataset.





From the above plots, it is obvious that Saturday has the highest average login counts, Sunday the second, and Friday the third.

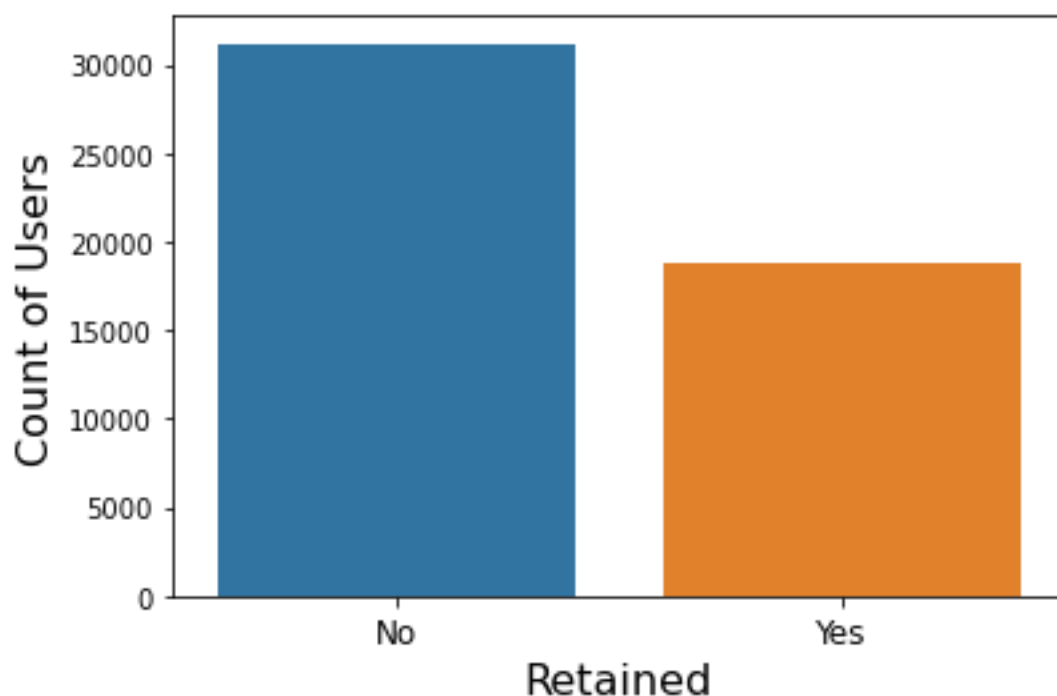
## Part 2 – Experiment and metrics design

1. For the goal of increasing the inter-city rides, I will choose the total number of crossing the toll bridge in the testing period.
2. Randomly select 100 drivers and send them the offer of reimbursement of total toll costs. Randomly select another 100 drivers with no toll cost reimbursement offer. The experiment lasts for 4 weeks. Collect data on the

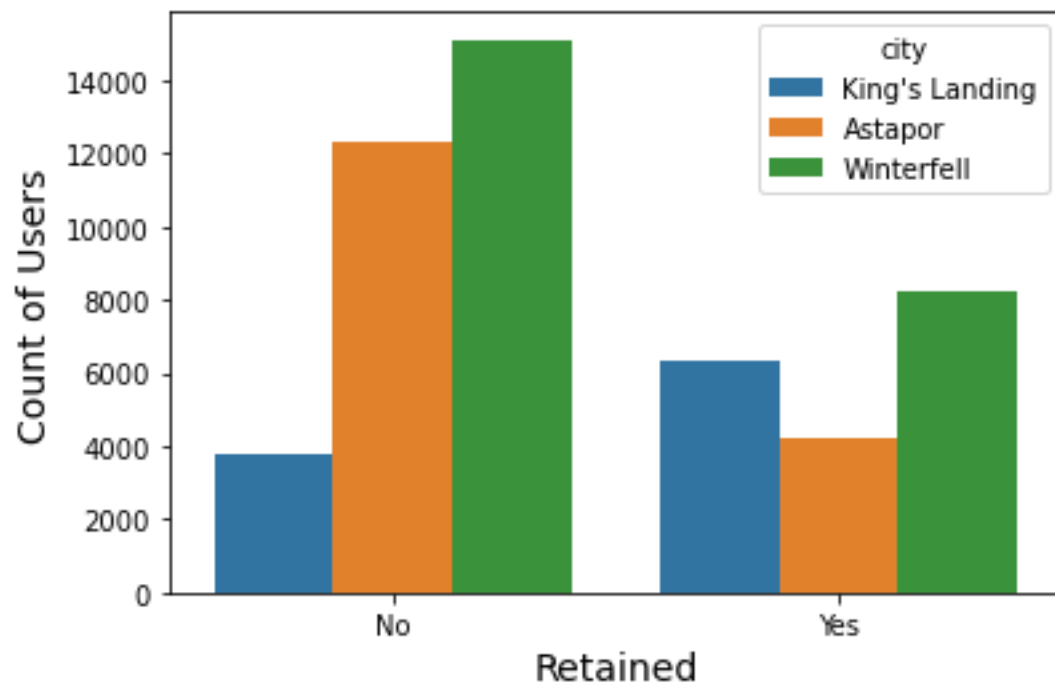
number of trips they have made across the toll bridge for each member and conduct A/B testing between these two randomly selected groups. Will conduct a z-test to verify the significance of the observation. Based on the results, I can inform the Ultimate managers of city operations how many more trips the group with toll cost reimbursement offer have made than the group with no toll cost reimbursement offer by days and weeks, and find whether any significant events during the testing period that might have impact on the test results.

### Part 3 – Predictive Modeling

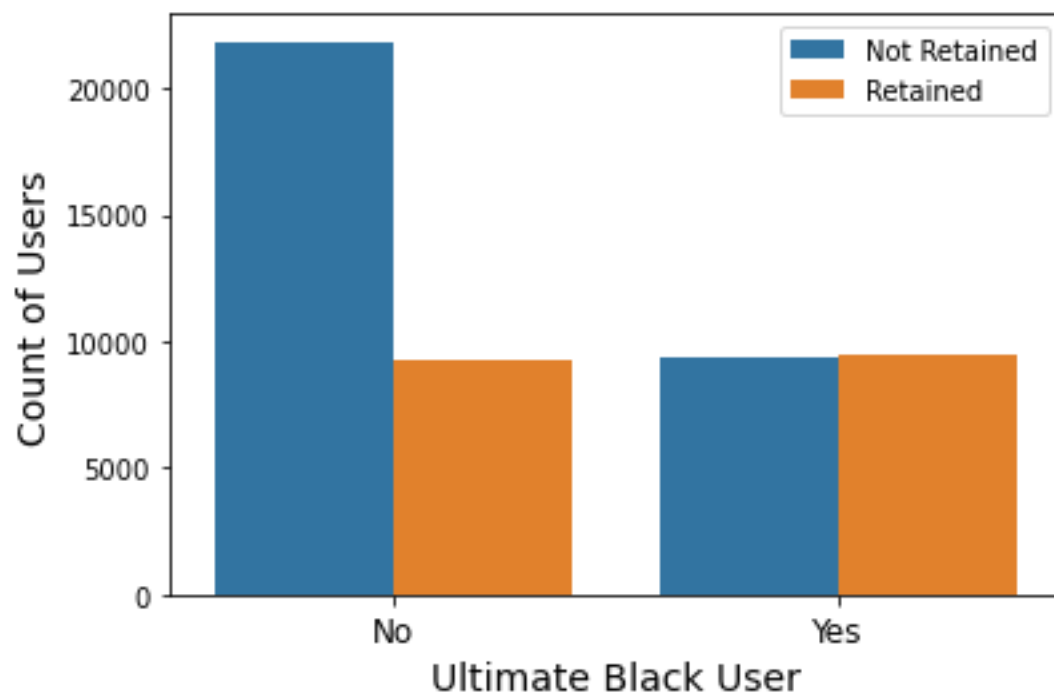
There are 18,804 out of 50,000 users are retained in their 6<sup>th</sup> month on the system.



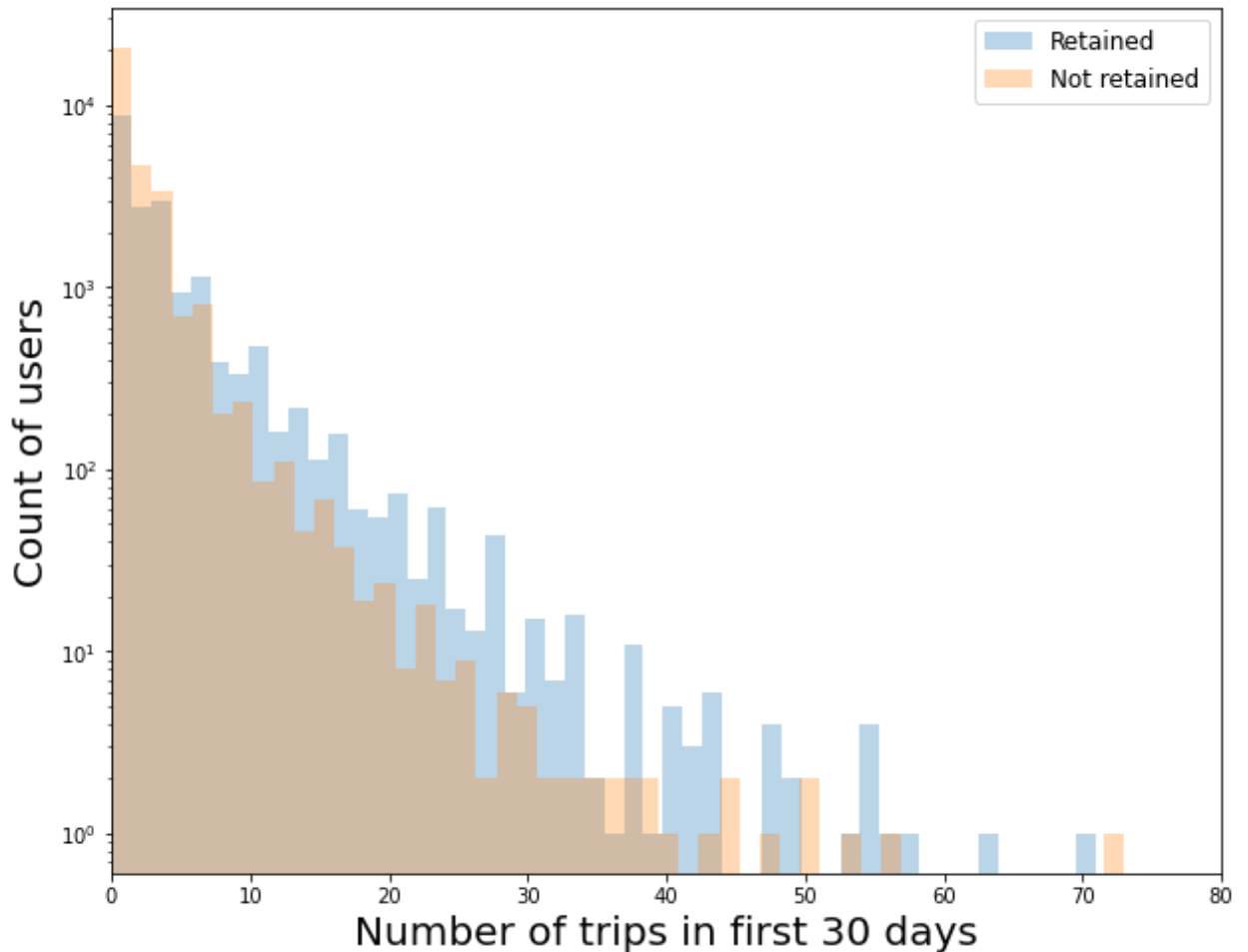
Through explanatory data analysis, I found that users who signed up in King's Landing have 62.81% retention rate, which is much higher than 35.19% and 25.57% in Winterfell and Astapor respectively.



Ultimate Black users have 50.37% retention rate which is much higher than the Non-Ultimate Black users' retention rate 29.88%



Also, the higher number of trips that a user took in the first 30 days, the more likely that the user will be retained.



I built a logistic regression model that achieved about 70% accuracy and a Random Forest Classifier that achieved above 71% accuracy in predicting whether a user is retained or not in their 6<sup>th</sup> month on system. The three features mentioned above are the most important predictors for retention.

Suggestions for the business management:

1. Promote the use of Ultimate Black.
2. Find out why retention rate is higher in King's Landing, and how other cities can learn from it.
3. Promote the use of Ultimate in a user's first 30 days.