Ultimate Data Science Challenge

Business problem at hand

Managers of Ultimate Gotham and Ultimate Metropolis want their cab drivers of both cities by reimbursing inter-city tolls.

1. Several metrics can be used to determine success of this experiment. One of them can be the average duration of cab rides. If drive partners are serving both cities, we would expect drivers to be making longer trips an average that they used to. The other metric would be the number of tolls paid and/or collected for intercity trips. If toll costs are to be reimbursed, then drivers will be more encouraged for intercity trips. The tolls collected could be the clearest indication that this experiment is a success.
2. A/B tests should be conducted to determine the success of the experiment. Ideally, this experiment would be conducted in the non-winter months as people are more likely to spend time outdoors during this time. Let us assume that we are conducting this tests during the summer months. For two months, we could record parameters like the average duration of trips by city. We can record separate observations for weekdays and weekends. Then, we repeat the process with tolls being reimbursed. For the next two months, we collect observations for the same parameters. Let us assume that the numbers are higher. We can then conduct t-tests to determine if there was any statistical significance by determining a preset alpha value. If we record statistical significance, it could be an indication that indeed, drivers are making more intercity trips.

   We can further confirm this with the number of tolls collected. Just as described above, let us assume that this experiment is happening in the summer. We record the number of tolls collected at tollbooths of both cities for weekdays and weekends. After the first two months, we can record observations with the tolls reimbursed. If the tolls collected are higher when the tolls are reimbursed, then we need to run statistical significance tests. Using a predetermined value of alpha, if we do record a statistically significant result after performing the t-tests, then this could serve as the clearest indicator that intercity trips have increased and it was not by chance that we recorded a higher number of tolls collected. To make this experiment more robust, we could try and restrict to observations of just the driver partners to be collected.

   Statistical significance indicates that there is a significant difference in the means of both sets of observations. This proves that the higher numbers observed were not a result of random chance. To further confirm our tests, we can compute the cohen's distance metric, which will give us an idea about the practical significance of our result. If the cohen's distance metrics also indicate that the two sets of observations are indeed different, then we can convince the managers of the city operations to implement their idea.