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Math 245
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NYC Tri-Borough Bikeshare Exploration

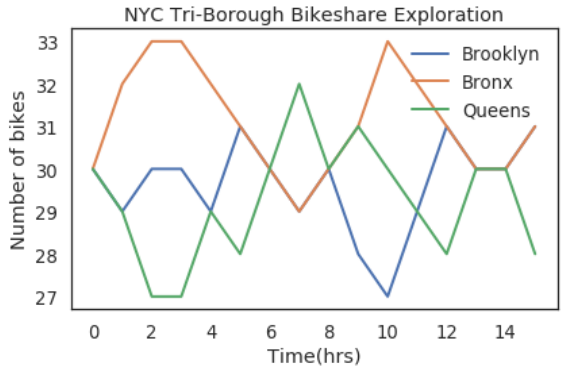
Objective/Problem statement:

How can someone efficiently take a bike from three locations with various distance between them? As the consultants of Mazhar-Regan Inc., we are trying to see how the bikeshare model will work in the Tri-borough(Brooklyn, Bronx, Queens) area of New York City. One of the problems might be to keep track of bikes in a time period of a Bikeshare Exploration system. It is important for the management and consumer both to see how many bikes are available for a specific time and a specific location. There are three different locations in our project, location Brooklyn, Bronx and Queens. The time duration we are picking in this project is 16 hours (6:00 am- 10:00 pm) for a specific day. So, anyone from the management team might ask the question that how many bikes are available in Bronx at 1 PM? So, the management can do any further steps such as increasing number of bikes or decreasing number of bikes in the initial time for each borough based on how many bikes are left at the end time for each borough. We try to answer how many bikes available for a certain borough for a certain time period?

Methodology:

In our model we try to keep track of the number of bikes for each borough at the same time in a 16 hours time period for 3 boroughs and 6 routes. So, the time period we are using for this model is from 6:00 AM - 10:00 PM. This bikeshare exploration only operates in this time interval. There are three assumptions that are made to make this model work. The 1st assumption we assume that each borough has 30 bikes. The reason we choose this assumption because we want to make each borough's number of bike to be equal. Our 2nd assumption is that all the probabilities are equal for each borough to have an unbiased result, on our simulation which is 33% for each borough. The 3rd assumption is were assuming that each bike you take from one borough can go to any other two boroughs. We chose this assumption because we do not know what's the destination for the customer, the customer can go either way, that's why we include all the possibilities. The probability of going from one location to any other two locations are equal, which is 50%. These three assumptions we are using for our Tri-Borough Bikeshare Exploration model.

Result:



This plot shows the number of bikes at each three locations over a 16 hour span between 6:00 AM - 10:00 PM. They each start the simulation at 30 bikes per borough. We made this graph easy to understand because for each borough, we have a different color and the names of the borough with that particular color is on the top right hand corner of the graph. The user can figure out how many bikes each borough has for a certain time. X-axis shows the time interval from 6 AM which is time 0 to 10 PM which is time 16. The Y-axis shows the number of bikes that are left at each borough. It will not look like this every time a user run it, since there is randomness in our model which is the probability of a bike going to one location to any other two locations and the probability of a customer arriving to a certain borough.

Analysis:

Let's recall our question from the objective/problem statement which is anyone from the management team might ask the question that how many bikes are available in Bronx at 1 PM? From the graph, we can answer that Bronx has 29 bikes at 1 PM. We also said the management can do any further steps such as increasing number of bikes or decreasing number of bikes in the initial time for each borough based on how many bikes are left at the end time for each borough. Based on our graph, we can see that Bronx and Brooklyn has 31 bikes, and Queens has 28 bikes at the end time. So, it is our recommendation that Queens can increase their bikes at the initial time. After getting the result, we realized there are a lot of flaws in our model. One borough might have more customers and need more bikes at the initial time. The probability can be very different determining how many bikes are in each borough at time 0. With accurate probability based on the data of how many bikes are used per borough, our model can be improved. Our model only took a certain things into consideration such as the time interval and the number of bikes. There are other factors that come into play such as weather of the

borough, rules and regulation of how bike should operate, traffic of the borough, etc. We try to make our model as simple as possible for our results. As consultants of Mazhar-Regan Inc., our model will work as long as it doesn't take into consideration the factors we did not put in our model and the probabilities for a bike or a customer arriving to each borough are equal.