Deveshwar Singh & Kenley Nicholas February 26, 2020

Math 245 Modeling and Simulation

**Bikeshare Modeling and Simulation**

**Objective**

In a real life bikeshare system, companies might want to know what the optimal number of bikes is to have in their system to maximize their profits. In our simulation, our goal is to see how the number of bikes affects revenue per day. Does having too few bikes affect revenue? Does adding bikes after a certain point not affect revenue? Each bike cost money in real life, but companies hope to make a greater return on each bike. Therefore, having too few bikes will affect the return amount companies can get from the bikes as a whole if there is still is a demand for more bikes. Having too many bikes when there isn’t a demand means bikes will go unused and the cost of a bike will not be offset.

**Assumptions**

We simulated the Bikeshare model by having it simulate a full 24-hour day. We assumed the demand for bikes from Olin to Wellesley would be greater, having a probability of 0.09, and the demand for bikes from Wellesley to Olin would be less likely, having a probability of 0.002. We did this to have our simulation closer to a real life bikeshare system. We also kept the probabilities of people renting a bike constant no matter what time of day or night. We made sure the bikes were split evenly between Olin and Wellesley, Olin getting the extra bike if the total was odd. We did this to eliminate any unwanted variables. We also assumed that the bikes would cost the same amount at both Olin and Wellesley. We choose to monitor the Revenue (total amount of money generated) per day as it can give us insights to how well our bikeshare system works. If we see that the revenue increases with more bikes, it means that people are coming to rent a bike and there aren’t enough bikes. If we see that we add more bikes and the revenue doesn’t increase much, then that’s a sign that there’s a diminishing return on extra bikes.

**Results**A close up of a map

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**Analysis**

After concluding our simulation and analyzing our results, we noted that adding more bikes does increase the revenue generated per day. We also noted that after around 250 bikes, adding more bikes does not increasee the revenue by much anymore, thus showing a diminishing return on the extra bikes. So adding more bikes could be benifical to real world bikeshare systems, up to a certain point that depends on the demand for the bikes. Our model was consistent throughout our test and multiple runs, it proved our expectation that adding more bikes whiles the demand is there, does increase the revenue, but surpirsed us at the cut off point where there is diminishing returns. What we would do differently is change the probabilty of a bike leaving to be higher during “rush hour” and lower during the nights to simulate a closer to real world system.