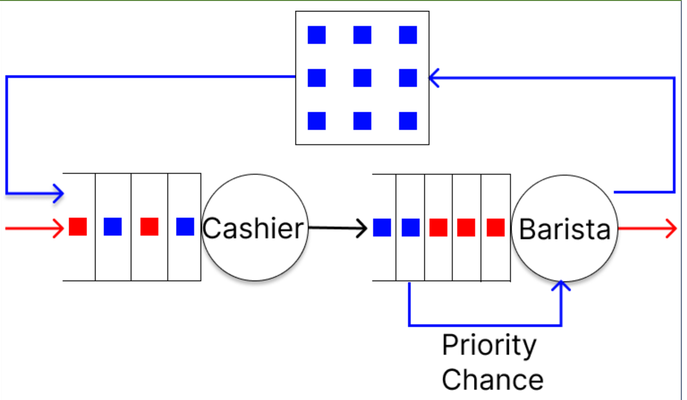
Prioritizing Repeat Customers at Starbucks

Maksym Sherman ‘24, Advisor: Professor Gardner, Department of Computer Science

1. Introduction

How much time do you spend waiting in queues in places you visit the most? Imagine if the places you visit everyday prioritized your orders as a repeat customer. My research looks at the impact of prioritizing repeat customers—loyalty program members—at a Starbucks store. The store simulation considers the impact of different priority policies and customer memories on store throughput—a proxy for store revenue and profitability—and average wait time of each group of customers.

2. Model



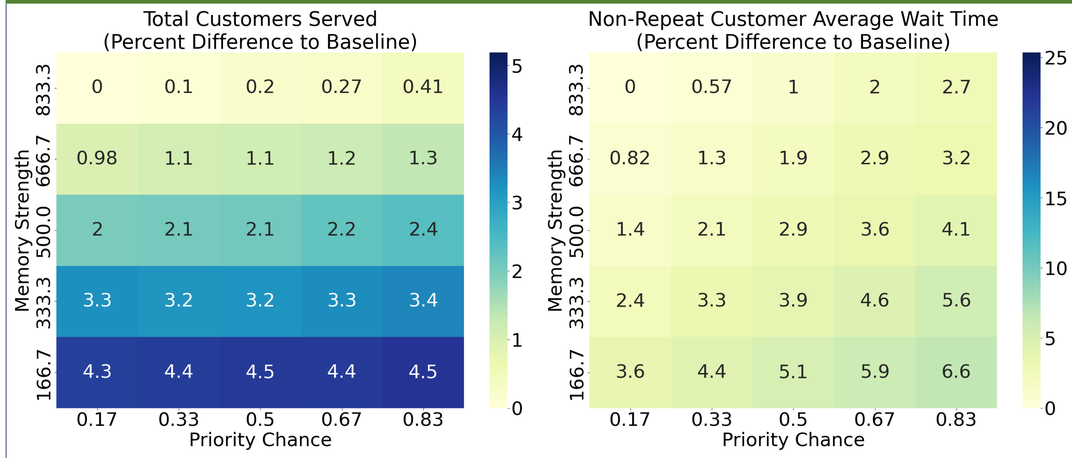
Repeat customers (1000 total): come many times. The return time is determined by memory, where the return time is normally distributed with a mean of 9,000 + (memory strength × last wait time) and standard deviation of 100.

Non-repeat customers: arrive at a constant rate regardless of wait times

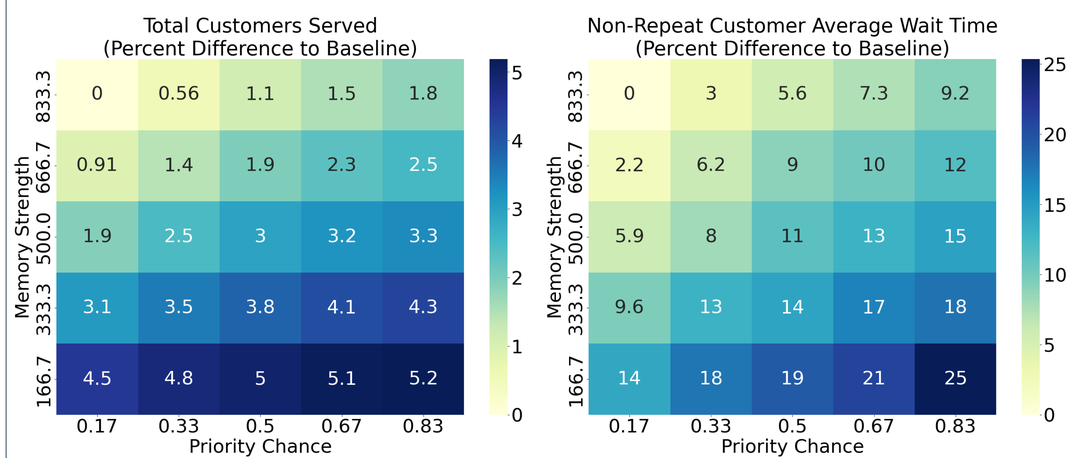
Cashier: first come first serve. On average, serves two customers per unit of time.

Barista: with a (priority) chance serves a repeat customer; (1-priority) chance serves first order in queue. On average, serves one customer per unit of time.

3. Results



With the low non-repeat customer arrival rate (0.3 customers per unit of time), higher priority chance increases the the number of total customers served (proxy for revenues and profits) for any level of memory. The impact of priority policies on total customers served is relatively low for any level of memory. The average wait time of non-repeat customers does not unacceptably suffer regardless of priority chance and memory strength, for a maximum of 6.6% above baseline.



With the high non-repeat customer arrival rate (0.6 per unit of time), higher priority chance has a larger impact on the number of customers served than with a low arrival rate. Similarly, higher priority chance increases number of customers served for any level of memory. The impact of priority chance increases with the strength of memory (~0.7% increase in customers served for 166 memory and ~1.8% increase for 833 memory). However, the wait time of non-repeat customers increases significantly, potentially up to 25% longer compared to baseline.

4. Conclusion

For any memory level, prioritizing repeat customers maximizes the number of customers served. At higher arrival rates, the tradeoffs between an increase in customers served through priority chance and the wait time of non-repeat customers become more pronounced. Hence, prioritizing repeat customers is a sensible policy when a Starbucks is not very busy but produces adverse effects during rush hours.

5. Future Work

- Simulating a system of regional coffee shops
  - Would the system become irrelevant to repeat customer priority; everyone might only visit their most frequented coffee shop
- Priority based on recent store visit
- Investigating what the memory function should look like
- Considering store interventions to influence memory (e.g., get 10 drinks get 1 free)
- Memory for non-repeat customers (e.g., Google Maps ratings)
- Impact of perceived unfairness of the policy

6. Acknowledgments

I would like to express my gratitude to Professor Gardner for her guidance and support. I would also like to thank Tairan “Ryan” Ji ‘26 and Rachel Lin ‘25 for their insights and shared debugging efforts throughout this research.