CUHK Business School

Problem Set 1

DSME 6653: Web Analytics and Intelligence (Winter 2023)

Due at 6:30PM, Tuesday, December 12, 2023

Please read the mini case of Uber. Submit a PDF file answering the questions in this case on Blackboard. The total achievable points are 6 for this problem set. Please name your PDF file as

- `Member1LastName_Member1FirstName-Member2LastName_Member2FirstName_PS1.pdf` (e.g., `Chen_Hongfan-Zhang_Renyu_PS1.pdf`)

Please also include the names of the group members on the first page of the PDF file.

Amy is a data science manager of Uber, the world's largest ride-sharing platform. As a leader of Uber's data science team, she is responsible for extracting important insights to advise the product and engineer teams for improving the efficiency, safety, and fairness of the platform. Her fellow data scientists conducted analysis on the following topics: (a) rider complaint; (b) surge pricing; and (c) city entry. She now needs to decide what and how to convey the insights to the colleagues in product and engineer teams.

Rider Complaint

Taxis and Uber are facing head-to-head competitions in the cities where their businesses are running concurrently. One dimension of their competition is rider experience. In particular, both taxis and Uber allow their respective riders to complain about bad riding experiences either through phone calls in the case of taxis, or through the app in the case of Uber. The data scientists collected and analyzed data from a city (City A hereafter). The rider complaint data for the taxis (Uber) in one week is reported in Table 1 (resp. Table 2). The data clearly shows that the complaint rate for taxis is about **0.13%**, whereas that of Uber is about **1.09%**. Furthermore, such a gap is fairly robust with respect to different days of the week.

- Question 1 (2 points): Based on these complaint rates, Amy concludes that taxis provide greater experience to riders than Uber, so she plans to pass this insight to the product team and recommends that the platform should allocate more resource to strengthen its rider experience. **Do you agree with her judgement? Why or why not?**

Surge Pricing

Uber dynamically adjusts the prices based on real-time market demand and supply to better match them. To implement dynamic pricing, Uber's algorithm calculates the "surge" multiplier. For example, when the surge multiplier is 1.5X, it means that riders need to pay 1.5 times the base fare. Amy's team prepared the hourly data in Table that reveals the relationship between the **surge multipliers** and the **number of completed trips** on Uber in City A between 7:00am and 6:00pm on a certain day. The trend is also plotted in Figure 1.

Day	Taxi Trips	Taxi Complaints	Taxi Complaint Rate
Sun.	6,631	8	0.12%
Mon.	4,231	6	0.14%
Tue.	3,155	5	0.16%
Wed.	3,317	4	0.12%
Thu.	3,554	5	0.14%
Fri.	6,448	7	0.11%
Sat.	6,569	8	0.12%
Total	33,905	43	0.13%

Table 1: Taxi Complaint Data

- Question 2 (2 points): Amy finds a clear *positive correlation* between surge multipliers and total completed trips (Table 3 and Figure 1). She finds it surprising because the law of demand states that when price increases, the quantity demanded will decrease. Amy would also like to discuss with the pricing team for the opportunity to increase the base fare of the platform. **Do you agree with her that law of demand is violated? Why or why not?**

City Entry

Uber has entered many cities in the United States and around the world over time. Amy wants to examine the impact of Uber entry on the crime rate of a city. Therefore, her team collected the data on Uber's entry decision and the crime rate of different cities, as shown by Table 4. The data illustrates that the cities with Uber's entry have much higher crime rate than those without Uber's entry (**7.48% vs. 3.03%**).

- Question 3 (2 points): Amy sees a strong positive correlation between Uber's entry decision and the city's crime rate (Table 4). She concludes that Uber's entry has **led to more crimes in the city**, so the platform should take some actions to avoid such negative externalities. **Do you agree with her? Why or why not?**

End of Problem Set 1

Day	Uber Trips	Uber Complaints	Uber Complaint Rate
Sun.	7,352	77	1.05%
Mon.	5,310	60	1.13%
Tue.	5,021	54	1.08%
Wed.	5,126	55	1.07%
Thu.	5,513	62	1.12%
Fri.	7,598	87	1.15%
Sat.	7,763	83	1.07%
Total	43,683	478	1.09%

Table 2: Uber Complaint Data

Time	Average Surge Multiplier	Total Completed Trips
7:00am-8:00am	1.8X	816
8:00am-9:00am	2.3X	1,025
9:00am-10:00am	1.6X	773
10:00am-11:00am	1.3X	612
11:00am-noon	1.2X	623
noon-1:00pm	1.0X	603
1:00pm-2:00pm	1.1X	631
2:00pm-3:00pm	1.0X	611
3:00pm-4:00pm	1.3X	655
4:00pm-5:00pm	1.2X	667
5:00pm-6:00pm	1.9X	903
6:00pm-7:00pm	3.4X	1,879

Table 3: Uber Surge Pricing Data

City	Uber Entry	Crime Rate
A	Y	9.0%
B	N	3.1%
C	N	4.2%
D	Y	5.8%
E	Y	6.9%
F	N	2.2%
G	N	2.6%
H	Y	7.5%
I	Y	7.3%
J	Y	8.4%
Group Average	Y	7.48%
Group Average	N	3.03%

Table 4: Uber City Entry and Crime Rate Data

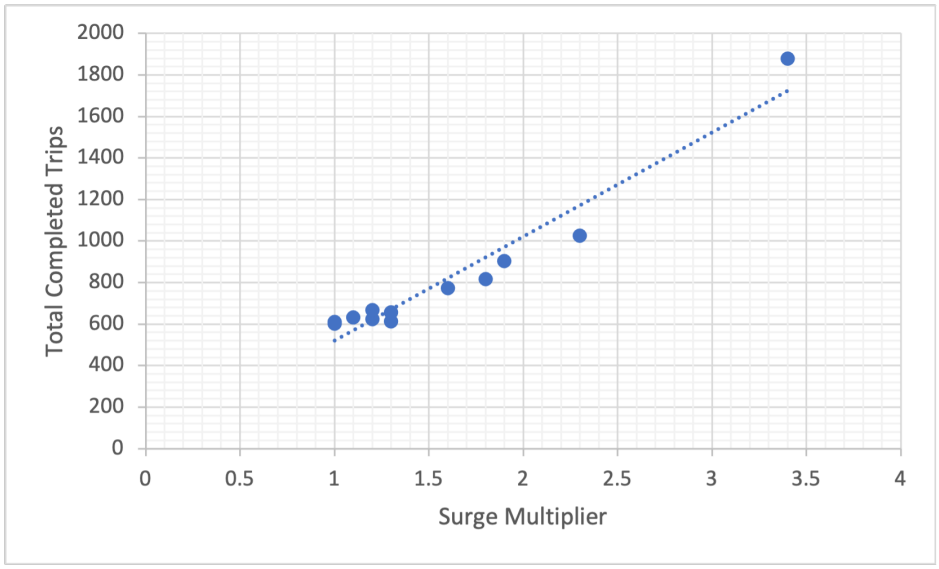

Figure 1: Surge Pricing