**Report: ‘Coupons’ Data Analysis**

The **data analyzed (found in this folder under “data”) describes** different variables like the weather, time, gender, coupon types etc. and provides the answer to whether or not the coupon will be accepted by the customer (0 for not accepted, and 1 for accepted). The analysis explores the characteristics of drivers and driving scenarios/variables to find the differences between customers who did and did not accept the coupons. There are five different types of coupons -less expensive restaurants (under $20), coffee houses, carry out & take away, bar, and more expensive restaurants ($20 - $50).

The data has **12684 rows and 26 columns**. The column ‘car’ had 12576 null values (more than 99% of the values were null) and was therefore removed.

When examined for the **percent of data with accepted coupons and non-accepted coupons**, the percentage was 56.8% and 43.2%, respectively. This means that the data is relatively evenly split between the two categories and the analyses for these can be carried out safely (without worrying about bias).

For the **five coupon types** offered to customers, coffee house coupons were the most common (31.5% of the coupons), followed by restaurants<$20 (22%), carryout & take-away (19%), bar (16%), and restaurants $20-50 (11.5%). Most coupons accepted were also in the same order, with most accepted coupons being the coffee house, followed by restaurant<$20) coupons, and so on. Most coupons rejected were the coffee house, followed by bar, and then restaurant$20-50 coupons.

**Additional analysis** broke down different variables and their inputs(values) into **accepted and not accepted coupons**:

-For the **temperature** variable, 54% or majority of the coupons are accepted at 80 degrees F, 29% at 55 degrees F, and 17% at 30 degrees F.

-All **income** values are more likely to accept coupons than not accept coupons, except the income category of $75000-87499.

-All **occupations** except retired, legal, community & social services are more likely to accept coupons than not accept coupons. Unemployed (15%), students (11%), and computer & mathematical (11%) customers have the highest percentage of accepted coupons.

-All **education-level** drivers are likely to accept coupons than not accept coupons, with ‘Some college-no degree’ and ‘some high school drivers’ the most likely and ‘Graduate degree’ drivers least likely.

-For **gender** variable, male drivers/customers are more likely to accept coupons than female drivers/customers.

-Drivers with all values of **marital statuses** except widowed are more likely to accept coupons than not. Given a coupon is offered, single drivers are the most likely to accept it than not accept it.

- Drivers with no **children** are more likely to accept coupons and makeup 56% of the drivers who accepted coupons.

- All **ages** are more likely to accept coupons than not, but ages below 21 are 1.7 times more likely to accept them than not, ages 21 and 26 are 1.5 times, and age 31 is 1.2 times. There appears to be a negative correlation between acceptance proportion of coupons and age.

- Highest percentage of accepted coupons are coffee house and restaurant<$20--because they are offered in highest numbers, followed by carryout & takeaway and then bar coupons. However, of the **coupons distributed for a particular type/category** (e.g., coffee house), only restaurant<$20 and carryout & takeaway coupons are more likely to be accepted than not. Coffee house coupons are approximately equally likely to be accepted or not accepted. Bar and Restaurant$20-50 coupons are more likely to be not accepted than accepted.

**Next analysis focused on the ‘bar’ coupons** to understand characteristics of customers who accept them:

- Of the total number of bar coupons, 41% were accepted and 59% were not accepted.

-Number of accepted bar coupons are lower than non-accepted bar coupons for customers who go to bar ‘never' and 'less1' per month. However, it is vice-versa for customers with bar visiting frequency of '1~3', 4~8', 'gt8’; i.e., customers who visit bars more than 1 time per month are more likely to accept bar coupons.

-Percent of drivers who visit bars 3 or less times per month and accept the coupons are 37%, and percent of drivers who visit bars more than 3 times per month and accept the coupons are 76.9%.

-Percentage of drivers who frequent bar>1 time per month & are>25 yr. age who accept the bar coupons, from the total no. of drivers who frequent bar>1 time per month &are >25 yr. age who were offered bar coupons is 69.5%.

-Percentage of drivers who do not frequent bar>1 & are not >25 yr age who accept the bar coupon, from the total no. of drivers who do not frequent bar>1 &are not>25 yr age and were offered bar coupons is 39.3%.

-Comparing the acceptance rate between drivers who go to a bar more than once a month and are over the age of 25 to all others shows that there is a difference between the two, and the drivers who go to a bar more than once and are >25 have a higher percentage acceptance rate.

-Drivers who accept bar coupons go to the bar more than once per month, are generally 20-26 years of age and tend to be the 'alone' passenger.

**Last analysis focused on the ‘Coffee House’ coupons** to understand the characteristics of customers who accept them:

-Of the total number of coffee house coupons, about 50% were accepted and 50% were not accepted.

-Number of people who accepted the coffee coupons are lower than who rejected the coupons for bar visiting frequency categories of 'never', 'less1'. However, for categories of '1~3', 4~8', 'gt8', the number of people who accepted is way higher than number of people who did not accept.

-Percent of drivers who visit coffee houses < 1 times per month and accept the coupons are 34%, and percent of drivers who visit coffee houses > 1 times per month and accept the coupons are 66%.

-Students are the most likely to accept the coffee coupons if it is offered to them (312/187=1.7), i.e., they are 1.7 times more likely to accept than not accept. This is followed by unemployed people, who are (309/261=1.2) 1.2 times more likely to accept than to not accept.

-10 am is the most likely time for a coffee coupon to be accepted. It is 1.8 times (576/323=1.8) likely for a coffee coupon to be accepted at 10 am than not accepted. Another likely accepted time is 2pm. Other times are likely to be not accepted.

-Below 21 and 21 ages are the most likely to accept coffeehouse coupons. They are 2.3(108/47) and 1.1(463/420) times, respectively, more likely to accept the coupon than not accept. Age 26 are 46 are slightly more likely to accept than not accept. All other age categories are as or less likely to accept than not accept.

-Overall, most coffee house coupons are accepted by drivers/customers 21 years and younger, who are students, and visit coffee houses more than once a month. The highest acceptance is usually in the morning around 10 am, and most often alone or with friends.

Future work would involve exploring other coupon types like Carryout & takeaway, Restaurant<$20, and Restauranr$20-50. Additionally, variables like expiration would be helpful in finding how the time expiry of coupons leads people to accept or not accept coupons. Additional variables like same or opposite direction would be also provide more insight into customer decision making.