**Coupon Acceptance rate: Data Analysis**

**Context**

Imagine driving through town and a coupon is delivered to your cell phone for a restaraunt near where you are driving. Would you accept that coupon and take a short detour to the restaraunt? Would you accept the coupon but use it on a sunbsequent trip? Would you ignore the coupon entirely? What if the coupon was for a bar instead of a restaraunt? What about a coffee house? Would you accept a bar coupon with a minor passenger in the car? What about if it was just you and your partner in the car? Would weather impact the rate of acceptance? What about the time of day?

Obviously, proximity to the business is a factor on whether the coupon is delivered to the driver or not, but what are the factors that determine whether a driver accepts the coupon once it is delivered to them? How would you determine whether a driver is likely to accept a coupon?

**Overview**

The goal of this project is to use what you know about visualizations and probability distributions to distinguish between customers who accepted a driving coupon versus those that did not.

**Data**

This data comes to us from the UCI Machine Learning repository and was collected via a survey on Amazon Mechanical Turk. The survey describes different driving scenarios including the destination, current time, weather, passenger, etc., and then ask the person whether he will accept the coupon if he is the driver. Answers that the user will drive there ‘right away’ or ‘later before the coupon expires’ are labeled as ‘Y = 1’ and answers ‘no, I do not want the coupon’ are labeled as ‘Y = 0’. 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).

**Data Structure**

<class 'pandas.core.frame.DataFrame'>

RangeIndex: 12684 entries, 0 to 12683

Data columns (total 26 columns):

# Column Non-Null Count Dtype

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0 destination 12684 non-null object

1 passanger 12684 non-null object

2 weather 12684 non-null object

3 temperature 12684 non-null int64

4 time 12684 non-null object

5 coupon 12684 non-null object

6 expiration 12684 non-null object

7 gender 12684 non-null object

8 age 12684 non-null object

9 maritalStatus 12684 non-null object

10 has\_children 12684 non-null int64

11 education 12684 non-null object

12 occupation 12684 non-null object

13 income 12684 non-null object

14 car 108 non-null object

15 Bar 12577 non-null object

16 CoffeeHouse 12467 non-null object

17 CarryAway 12533 non-null object

18 RestaurantLessThan20 12554 non-null object

19 Restaurant20To50 12495 non-null object

20 toCoupon\_GEQ5min 12684 non-null int64

21 toCoupon\_GEQ15min 12684 non-null int64

22 toCoupon\_GEQ25min 12684 non-null int64

23 direction\_same 12684 non-null int64

24 direction\_opp 12684 non-null int64

25 Y 12684 non-null int64

dtypes: int64(8), object(18)

memory usage: 2.5+ MB

After cleaning the data and eliminating the null values, the data has been thoroughly explored to understand how different scenarios, demographical factors and behaviour, drives a decision to accept or not accept a coupon.

Following are some of the plots to understand the data preliminarily:

A graph of different colored bars

Description automatically generated with medium confidence

The above plot describes the number of coupons provided based on each coupon category. Most of the coupons are for Coffee House followed by cheap restaurants and then take-away coupons. Least number of expensive restaurant coupons were provided.

A graph with blue bars

Description automatically generated

The above plot shows that the sample set were surveyed mostly in hotter weather conditions.

Now, looking at specifically the ‘Bar’ coupon category:

Proportion of bar coupons accepted: 41%

Digging further into the data, the following was observed:

Acceptance rate for those who visit a bar 3 or fewer times a month: 37%

Acceptance rate for those who visit a bar more than 3 times a month: 77%

Further analysis provided the following evidence:

Acceptance rate for drivers who go to a bar more than once a month and are over 25: 69%

Acceptance rate for all other drivers: 67%

the acceptance rate drivers who go to bars more than once a month: 69%

the acceptance rate drivers who had passengers that were not a kid: 43%

the acceptance rate drivers who had occupations other than farming, fishing, or forestry: 41%

Acceptance rate of drivers who had all the above three conditions: 71%

The acceptance rate of drivers who go to bars more than once a month, had passengers that were not a kid, and were not widowed: 71%

The acceptance rate of drivers who go to bars more than once a month and are under the age of 30: 72%

The acceptance rate of drivers who go to cheap restaurants more than 4 times a month and income is less than 50K: 44%

Based on the observations, the tendency of the driver to accept the bar coupon depends majorly on the following factors:

- habit of going to the bar more than once a month

- co-passengers along

- income

- eating out habits

Major evidence can be seen as to the acceptance rate of drivers to accept a bar coupon increases for who had adults as their co-passengers and were widowed and already have a habit of going to the bar more than once a month. It also increases if the driver is under the age of 30.

Similar to the above exploration, analysis was done of the Coffee House coupon category:

A graph of blue bars

Description automatically generated with medium confidence

No major difference observed on coffee house coupon acceptance behaviour for different times of the day.

A graph with blue bars

Description automatically generated with medium confidence

The tendency to accept the coffee house coupon increases slightly for a hotter day.

On further analysis, it can be observed that the acceptance rate is slightly more for the drivers who are alone and below the age of 30 than drivers above 30 and driving alone.