

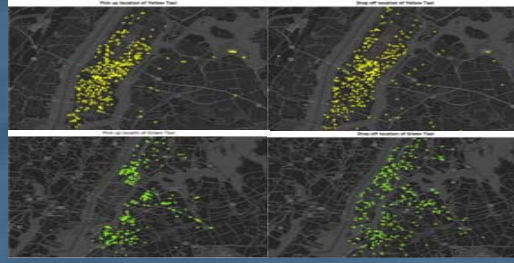
Emerging Competitive Forces for NYC Taxi Industry: Geo-temporal Analysis of Market Share and Ridership Changes

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Introduction

The dominance of colorful yellow/apple green taxi industry in New York City is rapidly changing, affected by innovative technology-driven competitors, primarily by Uber, Lyft and even by impending driverless cars. Uber is favored by many for its convenience and mobile application-driven business combined with the innovative crowd-based car sharing idea. As Uber is getting a bigger share of the market, the existing market player, cab industry, is forever affected, so we need to check what is going on the taxi market these days, and time to suggest better solution for their future direction before anyone can be affected unfairly from that fast change. Through this project, we can check the pattern, trend, an change in taxi industry over all throughout the timeline.

Driving Pattern



These maps are showing the driving pattern of Yellow taxi and Green taxi. As you can see the difference clearly, the driving pattern of Yellow taxi is central to Manhattan. Meanwhile, Green taxi pick up passengers in upper Manhattan and the outer boroughs as we known as a 'boro taxi'.

Customer Analysis

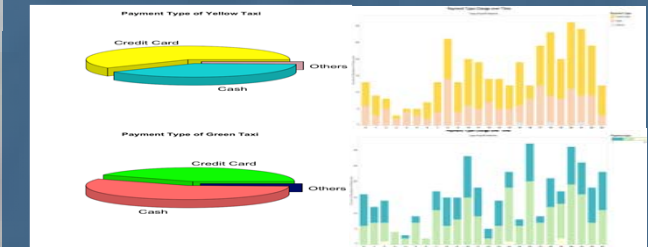
1. Day and Time on usage

The most popular weekday for using a taxi is Thursday for both Yellow and Green taxi, but the busiest time is slightly different as between 8 PM and 9PM for Yellow taxi, and around 4PM ,8PM for Green taxi as you can check it as following.



2. Payment Type

More than half customers use credit card for paying their fare amount, and normally they are using credit card at late time compared to day time.



3. Higher Tip Zone

East of Manhattan, near Herald square is showing higher tip from trip distance compared to the other area of Manhattan. Right side is the detailed maps of JFK & LaGuardia airport with high tip due to long trip distance.



Objective

In this project, to gain an understanding of the real trend in the taxi market,

1. Compared their driving patterns
2. Identified driving routes with visualization maps over time
3. Mapped and charted of difference and changes of ridership and market shares throughout the timeline
4. Analyzed the change of client's location, way to pay their fare, and tip amount for a driver according to location
5. Intended to support transportation policy makers, citizens, and taxi drivers and customers.

Driving Route on One Day

These four maps are showing the driving route of Yellow taxi on 1st July 2015 with 385,940 trips at 09:00/18:00/20:00/24:00 o'clock (clock wise). The central zone of drop off location is scattered from Manhattan to outer boroughs over time change with reducing number of customer.



Data Summary

1. Data Source: Open source from https://www.nyc.gov/html/nyctdot/html/about/nyctdot_record_data.shtml
2. Data Format: CSV
3. Data Period: Jan 2015 - Dec 2015
4. Data Size per month: avg 2GB for Yellow taxi & avg 120MB for Green taxi
5. No of Observations per month: avg 13,000,000 for Yellow & avg 1,800,000 for Green taxi
6. No of Variables: 19 Variables with four categories as following
 - 1) Geo spatial Values: Pick-up, Drop-off location, Trip Distance
 - 2) Amount Values: Fare amount, Tax amount, Tip amount, Tolls amount, Total amount
 - 3) Time Values: Pick-up, Drop-off time
 - 4) Other Values: Payment Type, Passenger No, Rate Code (Discount Code)

Ridership Change



The first graph is showing the number of taxi trips per day from Jul 2014 to Sep 2014 for Carmel, Dial7, Green taxi, Lyft, Prestige, Uber, Yellow taxi as main taxi brands. As per graph, Yellow taxi has a large portion of taxi user in the market overwhelmingly, and Green taxi and Uber are marking a order after Yellow taxi. The interesting thing is that there is no big difference between Green taxi and Uber since they launched closely together. (Green taxi launched Aug 2013, Uber launched in NYC May 2011.) The second graph is telling the pick up location of Yellow/Green/Uber in Sep 2014 randomly chosen by R. As you can see the black dots(Uber) in Manhattan over Yellow dots (Yellow taxi), Uber is taking Yellow taxi's location. Also, Uber is getting bigger share in the market with low cost, usability to use with mobile application, and aggressive marketing strategy such as Uber delivery, Uber Food. Moreover drivers prefer to be a Uber driver due to flexible working hour, so we can guess the market share will be changed rapidly according to Uber's growth.

Sample Summary

1. Data Selection: Randomly selected by R
2. Data Period: Jan, 2015 - Dec, 2015
3. No of observations: 380 for each taxi with 19 Variables
4. Confidence Level: 95%
5. Confidence Interval: 5%
- Formula of Sample size:

Conclusion

- It is good that customer has many options than before like competitive market due to new service supplier.
- On the other hand, existing supplier got huge effect to the bad side, especially on their economic factor such as income, benefit etc.
- Once one supplier is getting bigger disproportionately in the market share, it will be an another problem later again like the vicious circle as monopoly.
- The Yellow taxi is taking a mobile application like Uber started from end of the last year to cover the gap on easiness to request a taxi.
- For the fair competition, there should be strict limitation supported by government not to let any big gap among taxi brands including cost, and to protect drivers with additional benefit. Also, customer needs to use taxi brands evenly.