LTV Unwired: Exploring Lyft Drivers

A comprehensive overview

Drivers Lifetime Value (LTV)

SF Rideshare/ Regular Rates	UBERX	**LYFT**	TAXI
Base Fare	$3.00	**$2.00**	$3.50
Per Minute (waiting-only for taxis)	$0.30	**$0.22**	$0.55
Per Mile	$1.50	**$1.15**	$2.75
Service Fee		**$1.75**	
Min/Max		**$5-$400**	

"Present value of future cash flows expected from drivers over the entire projected lifetime of a driver"

LTV for a Driver = $$\sum_{m=0} \frac{Margin_m Prob(Active)_m}{(1+WACC)^m}$$

WACC is the discount rate*

The math model: LTV of Drivers

- The LTV over the next 12 months can be divided as the sum of LTV for each month for the next 12 months:

$$L = V_1 + V_2 + \cdots + V_{12}$$

- At each of the month, we can simply say

  LTV= (Cash flow given the Driver Retains) * (Probability of Retention)

* ${m}$ is a time period, e.g. the first month (${m}$=1), the second month (${m}$=2)

* ${n} is the total number of periods the driver will stay before he/she finally churns

* Prob(Active)m is the retention rate/possibility in month m

* Margin is the profit (cash flow) the driver will contribute in the month m

* WACC is the discount rate

Here we assume that WACC is constant in the formula

we look at the existing cash flows of each driver

Table 1

Cash flow	2016-03-28	2016-03-29	2016-03-30	2016-03-31	2016-04-01	2016-04-02	2016-04-03	2016-04-04	2016-04-05
002be0ff dc997bd 5c50703 158b7c2		$246.61		$365.60	$338.02	$220.56			$346.43
007f038 9f9c7b0 3ef9709 8422f90		$56.59							
02e440f 6c20920 6375833 cef02e0				$320.34		$214.78		$34.57	
0938ed7 63cb312 9ae6360 7aaf69d			$239.09	$172.52	$188.53			$107.39	$119.49

Variables Selected Included to calculate LTV (% Retention in the next period)

Profile-related

Behavior-related

Tenure (Time with Lyft)
Prime vs. Regular

Recency [Days]
Ride distance
Ride Duration
Ride Prime Time %
Response Time
Frequency (# rides per month)
Monetary (Cash Flow)

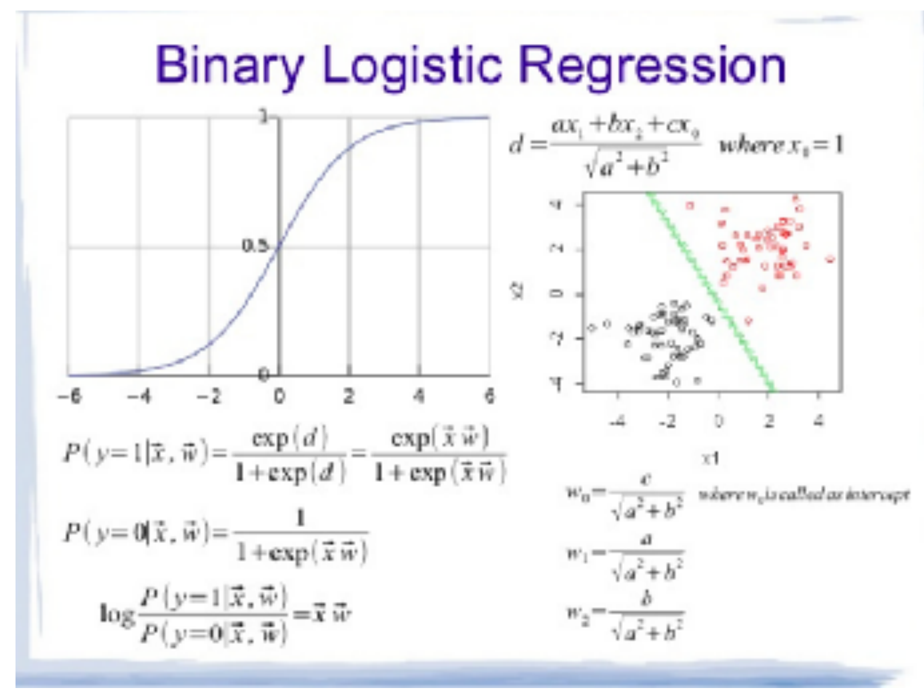
A period is assumed to be 30 days

People with the same # of rides could end up having different LTVs

[redacted]	[redacted]			
Driver	1674103b16c39ab5 6a76884b7c2ca83c	30eedffe19d8ec6c53 841f0d46c8ab51	5ceff5a3983505de6d 021403c69750779	6ff443616dd01da84 2095c0939394baf
Tenure (in month)	27	23	33	3
rides	348	348	348	348
Avg Ride Distance	6560	5968	8265	4592
Avg Ride Duration	834	767	794	794
Prime Ratio	1.5%	2.6%	1.7%	2.1%
Lifetime Value (LTV)	$641K	$738K	$743K	$485K

Decision Tree vs. Logistic Regression

Decision Tree and Logistic Regression can serve as the basis of LTV (predict the driver churn in the next 30 days)



Logistic Regression Prediction

```
getCLV<-function(r,f,m,n,cost,periods,dr,pModel){

        df<-data.frame(period=c(0),r=c(r),f=c(f),n=c(n),value=c(0))

        for(i in 1:periods){
                backstep<-df[df$period==i-1,]
                nrow<-nrow(backstep)
                for(j in 1:nrow){
                        r<-backstep[j,]$r
                        f<-backstep[j,]$f
                        n<-backstep[j,]$n
                        p<-
predict(pModel,data.frame(Recency=r,Frequency=f),type='response')[1]
                        Retains<-n*p
                        df<-rbind(df,c(i,0,f+1,Retains,Retains*(m-cost) / (1+dr)^i))
                        df<-rbind(df,c(i,r+1,f,n-Retains,(n-Retains)*(-cost)  / (1+dr)^i
))
                }
        }

        return(sum(df$value))

}
```

caculating the CLV for a driver with R=0 days,F=10,cash flow=100,WACC/discount rate=5% for 3 periods

v<-getCLV(0,10,100,1,0,3,5%,model)

https://github.com/hq211486/Lyft/blob/master/R%20script%20retention%20model

Next Steps:

- Explore into more indicator variables (in addition to RFM) in the model to predict retention
- Cross-validations
- Drivers analysis: profile segmentation