

# Customer Analytics

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March 20, 2020

# Laplace's rule of succession

Just another answer

add one positive and one negative review to  $N$  reviews

$$n/N \rightarrow (n+1)/(N+2)$$

- 10 out of 10  $\rightarrow 11/12 = 92\%$
- 48 out of 50  $\rightarrow 49/52 = 94\%$
- 186 out of 200  $\rightarrow 187/202 = 93\%$

# Bayesian Reviews I

## 1 Set-up the model - Binomial dist

what to optimize? what's the model?

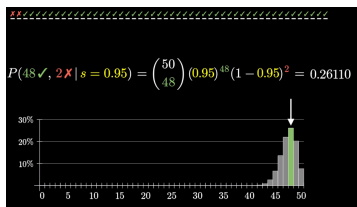
$P(+ve\ rev) = \text{success rate} = \text{we don't know}$ ; e.g. take the review rating of 10/10, underline success rate could be 0.95 (assumption), choose a random num between 0 and 1, if  $> 0.95$  record positive rev else negative review. select 10 random numbers, there's a possibility to get 10/10 in some simulations

WE DON'T KNOW  $P(+ve\ rev)$

Long run frequency???

$P(\text{data} | \text{success rate}) = \text{to get this run simulations multiple times, assuming success rate; the resulting distribution will be Binomial from which you could get the \%age}$

# Bayesian Reviews II



## 2 Bayesian updating - PDF

$$P(\text{success rate} | \text{data}) = P(\text{data} | \text{success rate}) * P(\text{success rate})$$

## 3 Analyse Model - Beta dist

# Churn or Retention Analysis

**Customer Retention Rate:** The percentage of customers who repurchase in a given time period compared to an equal and preceding time period

**Churn Rate:** The inverse of Customer Retention Rate, or the percent of users who did not repurchase or whom you lost



**proactive churns:** losing customers due to cancellations

**passive churn:** failures to renew

# Cohort Analysis and Life Time Value (LTV)

**LTV:** The expected amount of profit/revenue from a user

CLV = NPV (net present value) of the sum of all future revenues from a customer, minus all costs associated with that customer

**Why LTV:** - Tracking your LTV to Customer Acquisition Cost (CAC) ratio: Companies typically use the 3:1 CAC ratio or Cost Per Acquisition (CPA)

- Evaluating your most valuable marketing channels
- Focus on retaining your most valuable customers

**Historic CLV:** sum of the gross profit from all historic purchases for an individual customer

$$\begin{aligned}
 \text{Avg Order Value, AOV} &= \frac{\text{Revenue}}{\text{Orders}} ; & \text{Avg Purchase Rate} &= \frac{\text{Orders}}{\text{NumCustomers}} \\
 \text{Avg Customer Value} &= \frac{\text{AvgPurchaseVal}}{\text{AvgPurchaseRate}} & & \text{gives LTV} \\
 \text{Avg Customer Lifespan} &= \frac{\text{SumCustomerLifespans}}{\text{NumCustomers}} \\
 \text{LTV} &= \begin{aligned} &\text{Avg Customer Value} \times \text{Avg Customer Lifespan} \\ &\text{ARPU} \times \sum_{n=0}^N (1 - CR)^t \dots \text{ [N=num months to examine]} \\ &\text{ARPU} / CR_n \dots \text{ [ARPU=Avg rev per User, for n months]} \\ &\text{ARPU} / CR_n \times DR \dots \dots \dots \text{ [for variable churn \& n months]} \\ &\text{ASP} / CR + m(1-CR) / CR^2 \dots \text{ [for account expansion]} \end{aligned} \\
 \text{CLV} &= \begin{aligned} &\text{AGM} \times \sum_0^{\text{num Transactions}} \text{Transaction} \text{ [AGM=Avg Gross Margin]} \\ &((T_{\text{avg}} \times \text{AOV}) \text{AGM}) \text{ALT} = \text{GML}(\text{gross margin per user lifespan}) \\ &\text{GML}(R / (1 + D - R)); \text{ [account expansion]} \end{aligned}
 \end{aligned}$$

CR=Churn rate; ASP=Avg Selling Price; m=↑ARPU/user/month;  
 T\_avg = avg monthly transactions; ALT=avg User Lifespan (in months)  
 D=monthly discount rate; R=monthly retention rate; DR=Discount Rate to  
 adjusts for mix churn (Annual Renewals, Constant, Declining and Cliff patterns)

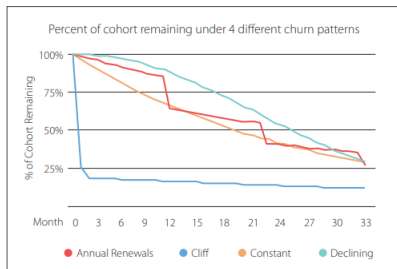
## Steps to LTV:

- Normalizing to Acquisition Date: Bin users into buckets like Day 0, Day 1, Day 2 or Week 0, Week 1, Week 2, and so on.
- Normalized to a Closed Time Limit: Broader questions “What is my total CLTV,” should be replaced with “What is our 3-year or 5-year LTV?” & should be based on:
  - ① Average Customer Lifespan
  - ② Customer Retention Rate
  - ③ Churn Rate: The inverse of Customer Retention Rate.
  - ④ Time to General Profitability Against Acquisition Costs: If your business is a “Loss Leader” Model this time may be a longer length than businesses with lower acquisition costs and lower profitability.
  - ⑤ Rate of Discount

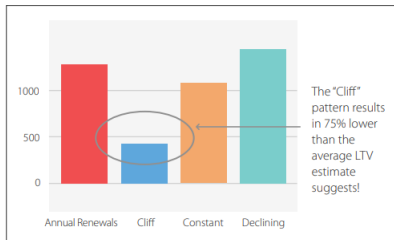


# Types of churn and LTV

- Annual Renewals: larger churn at each contract renewal.
- Cliff churn: majority of the churn within the first month, and then a small constant churn thereafter.
- Constant: steady, constant churn rate (shown as 3.5%).
- Declining: churn rate starts at zero, increases each month.



Effect on LTV:



Box Cox...

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# Types

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# The Kaplan-Meier curve

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# The log-rank test

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# Cox proportional hazards regression

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# Parametric models

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# Frailty models

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# Competing risk models

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# Discrete Time Model using logistic regression

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# Social Network Analysis

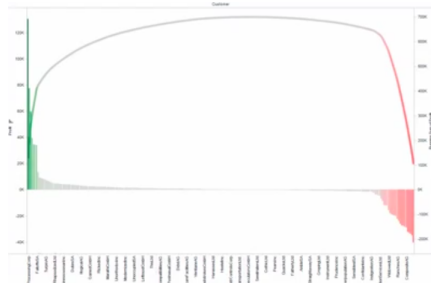
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## Whale Curve Analysis

## Technique to visualize the data

## Sort the data before plotting

**Pareto Principle:** for many events, roughly 80% of the effects come from 20% of the causes



# "Loss Leader" Model

"Loss Leader" Model, where you introduce new customers at a high cost in the hope of building a customer base or securing future revenue?

# Market Basket Analysis

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# Propensity of Cross-sell

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# Thank You!