CUSTOMER LIFETIME VALUE PREDICTION

A Case of Mobile Gaming Company
Background

BTYD Models

- Targeted promotions increase the LTV of customers
- CLTV research is dominated by Buy Until You Models
- Two important factors to be modeled
- Distribution of Revenue
- Distribution of churn
Questions to Answer

- How many customers are active?
- How many customers will be active one year from now?
- Which customers have churned?
- How valuable will any customer be to the company in the future?
The different BTYD model implementations include:

• NBD (Ehrenberg 1959)

• Pareto/NBD Schmittlein, Morrison, and Colombo 1987)

• BG/NBD (P. Fader, Hardie, and Lee 2005)

• Pareto/NBD (HB) Ma and Liu (2007)


• Pareto/NBD (Abe) Abe (2009)

• BG/BB (Fader, Hardie, and Shang 2010)

• Pareto/GGG Platzer and Reutterer (2016)
Data

Revenue

- PlayerId
- BrandId
- DepositDate
- Deposit
- Income

Registrations & Demographics

- PlayerId
- Registration Date
- Age
- Gender
- Country
While active, transactions made by a customer in time period $t$ is Poisson distributed with mean $\lambda t$

Differences in transaction rate between customers follows a gamma distribution with shape $r$ and scale $\alpha$

Each customer becomes inactive after each transaction with probability $p$

Differences in $p$ follows a beta distribution with shape parameters $a$ and $b$
### Analysis

<table>
<thead>
<tr>
<th>PlayerId</th>
<th>frequency</th>
<th>recency</th>
<th>T</th>
<th>monetary_value</th>
<th>probability_alive</th>
<th>pred_num_txn</th>
<th>exp_avg_sales</th>
<th>predicted_clv</th>
<th>manual_predicted_clv</th>
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</table>

![Graph showing probability of customer being alive by frequency and recency](image)

**Note:** The graph illustrates the probability of a customer being alive, categorized by frequency and recency of their transactions. The axes represent the customer's historical frequency on the x-axis and recency on the y-axis. The color scale indicates the probability, with darker shades representing a higher probability.
Future Work

- BTYD models suffer from algorithmic complexity and fail to scale to large number of customers
- BG/NBD model assumes independence between transaction and churn process
- Pareto methods allow the use of co-variates
- Monte Carlo and Markov Chain simulations outperform BTYD models but they are expensive to generate
- BTYD models are limited by parametric family assumptions
THANK YOU

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References and Sources

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