

CUSTOMER LIFE TIME VALUE PREDICTION

A Case of Mobile Gaming Company



Replace this mark with your
official cobranded logo

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

Business Problem

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?

Literature Review

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)
- MBG/NBD Batislam, Denizel, and Filiztekin (2007), Hoppe and Wagner (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

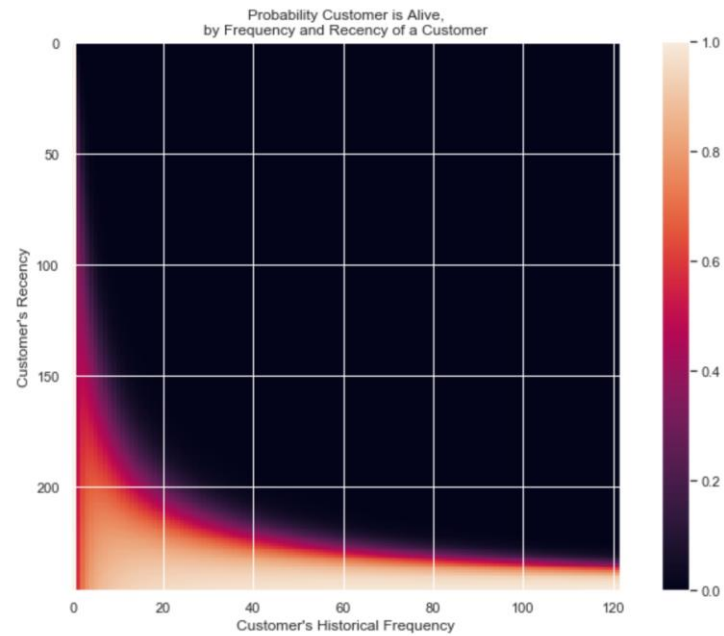
Modeling of BG/NBD Model (Fader, Lee)

- While active, transactions made by a customer in time period t is Poisson distributed with mean λt
- Differences in transaction rate between customers follows a gamma distribution with shape r and scale α
- Each customer becomes inactive after each transaction with probability p
- Differences in p follows a beta distribution with shape parameters a and b

Analysis

	PlayerId	frequency	recency	T	monetary_value	probability_alive	pred_num_txn	exp_avg_sales	predicted_clv	manual_predicted_clv
1	2387818	3.0	166.0	233.0	16.723333	0.562803	0.21	19.343080	4.094933	4.062047
2	5316885	48.0	223.0	236.0	144.556458	0.781034	4.51	145.137995	648.405339	654.572357
3	5974073	3.0	112.0	195.0	12.050000	0.399282	0.18	14.407464	2.562958	2.593343
4	8163396	2.0	98.0	198.0	6.580000	0.370472	0.11	9.744506	1.076248	1.071896
5	8183811	5.0	148.0	228.0	27.826000	0.397085	0.25	29.728997	7.440266	7.432249

<matplotlib.axes._subplots.AxesSubplot at 0x1dd17ce7688>



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

Pavan Kumar Ghantasala

MS Business Analytics and Information Management
Krannert School of Management
Purdue University



Replace this mark with your
official cobranded logo

References and Sources

- [pavanghantasala183/Customer-Life-Time-Value-Prediction \(github.com\)](https://github.com/pavanghantasala183/CLTV-Prediction)
- [History of Buy Til You Die \(BTYD\) Models - Retina.ai](https://retina.ai/history-of-buy-til-you-die-models)
- [palive for BGNBD.DVI \(brucehardie.com\)](https://brucehardie.com/notes/019/palive-for-bgnbd-dvi/)
- [Predicting Customer Life Time Value \(CLTV\) via Beta Geometric / Negative Binominal Distribution \(BG/NBD\) and Gamma Gamma Model | by Burak Doğrul | Geek Culture | Medium](https://medium.com/geek-culture/predicting-customer-life-time-value-cltv-via-beta-geometric-negative-binomial-distribution-bg-nbd-and-gamma-gamma-model-by-burak-doğrul-11992021)