Leveraging Customer Behavior to increase Mortgage Lending Wallet Share using Analytics

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Abstract— The consumer demand and behavior in changing and the change is majorly driven by the expectations of consumers from the brands. Every consumer is looking for amazonization of their experience with brands and due to this consumer are leaving lot of their behavior traces on digital properties and elsewhere. Banking as a business is a highly customer focus business and has got troves of consumer behavior data. With the advent of Machine Learning banks can use utilize this behavior data to acquire new customers for Mortgage Lending. Such data driven customer acquisitions have a very high propensity to convert to real customers for Banks

Index Terms— Machine Learning, Data, Customer Behavior, Banks, Lending, Mortgage.

1 INTRODUCTION

Consumers are redefining and revolutionizing the way business are done. Consumers are everchanging! And in that Indian customers are changing more rapidly than their western counterparts. The change is majorly driven by the expectations of the consumers that brands should understand them and offer customized services. Businesses must respond to this change in consumer behavior and use this for improving business outcomes.

Indian Banking as a business is under tremendous pressure to respond to the changing consumer behavior. Banks must utilize power of Analytics to understand consumer better and improve lending. Indian Banks are stuffed with credit to lend however which prospects to reach out to for better conversion is million-dollar question. Adding to this complexity is competition from new digital native lenders & fintech

According to IBEF India Research [1]:

1) By 2040, real estate market to grow to Rs 65,000 crore (US$ 9.30 billion) from Rs 12,000 crore (US$ 1.72 billion) in 2019.
2) Real estate sector in India is expected to reach a market size of US$ 1 trillion by 2030 from US$ 120 billion in 2017 and contribute 13 per cent of the country's GDP by 2025.
3) Retail, hospitality and commercial real estate are also growing significantly, providing the much-needed infrastructure for India's growing needs. Indian real estate increased by 19.5 per cent CAGR from 2017 to 2028.

2 WHAT INDIAN BANKS CAN DO DIFFERENTLY

Indian Banks need to target right prospect with right message at right channel at right time. Analytics can do this for banks. But how? A mechanism of **Behavior Insights** to understand your prospects and target them with personalized messages(campaigns) needs to be developed:

1) Understand prospects behavior and gauge their intent to buy.
2) Once the buy intent of the prospect is established, next step is to reach out to these prospects with right messages(campaigns) at right time.

But how to understand prospects behavior. Here is where banks have troves of data (customer banking transaction data, customer behavior data, financial health data and other data points) on existing customers.

What banks need to do is –Mine the existing data to extract behavior patterns of existing mortgage customers and marry these patterns to prospects behavior patterns. Behavior Patterns that prospects leave on digital properties.

This marriage is enabled by Analytics (models built using Machine Learning). Basically, using Machine Learning to extract patterns from behavior data to predict the intent of the prospect for conversion.

As per Gallup Research [2] globally the organizations that leverage customer behavioral insights outperform peers by 85 percent in sales growth and more than 25 percent in gross margin. Customer data is strategic.

In Indian Banking context, customer behavior analysis (real time insights) into behavior of prospects is the new frontier that every bank, NBFC must fight it out if they want to stay relevant.

3 BEHAVIOR ANALYTICS FOR LENDING

The core of any behavior analytics is events and identifying events critical to achieve business goals.

Events, Event properties and User properties. Events describe any action a prospect performs on any digital properties - either banks or partners or third party. Properties describe the details of the events. E.g. – What event and how long on a Bank Lending App OR Market Place Lending Website etc. User Properties and properties of users – Gender, Demographics, Location etc.

Defining Events & Critical Events that correspond to business goals.

Defining Events & Sending optimal event data to the analytics platform is the key for achieving correct Behavior Analytics.

Once we have the optimal event data, we need to zero-in to the most appropriate Machine Learning model for Behavior Analytics.

In our case, we will use a stacking ensemble approach for this Behavior Analytics model. Stacking ensemble for this scenario, can be achieved by ensemble of Decision Layer (Decision Tree (Classification Model)) stacked with lower layer of clustering (k-means(clustering)). Let's dive straight-in into this stacking

ensemble.

4 BEHAVIOR ANALYTICS MODEL DETAILS

Stacking ensemble Model technique is one of the many modelling techniques that can be used for the model.
Model Details:
Layer 1(d1) – Segment Externally Similar Prospects
Layer 2(d2) – Segment Internally & Externally similar (Prospects of Interest)
Layer 3(d3) – Risk Profiling of Prospects of Interest with Customers (Micro Segmentation of Prospects on Interest
Layer 4(d4) – Estimate Prospects Potential Profitability for Mortgage (Nano Segmentation & Prediction)
Layer 5(d5) – Decision Layer – Recommendation of prospect for Mortgage

5 MODEL LAYER DETAILS

Below given are model layer details at high level

5.1 Layer1(d1) – Segment Externally Similar Prospects

1) Events - Based on browsing behavior - How long was prospect on the site, what all pages surfed, nontraditional credit variables - such as how a customer fills out a form, how they navigate a bank website, digital property etc.
2) Critical Path Events - Search Products on the bank digital property or Lending Market Places.
3) Properties of such events - What all products(type)considered, Pricing comparison, Product reviews, location data, age, phone number, salary are properties that correspond to Behavior (Critical Path).

Path Analytics for prospects path journey and Segmentation Models with features such as average time spent on the site, max of time spent on lending products etc., can be used for this segmentation.

5.2 Layer2(d2) – Segment Internally and Externally similar (Prospects of Interests)

Behavior Pattern of externally similar prospects clubbed with existing lending customer's internal behavior data (consumption, spending habits, interests etc...), Old Campaign Data, Offers Data, offer responded data, offer rejected data.
Features such as average of account balance-maintained post mortgage payments, salary, mortgage products, mortgage products surfed etc., can be used for this segmentation

5.3 Layer3(d3) – Risk Profiling of Prospects of Interest

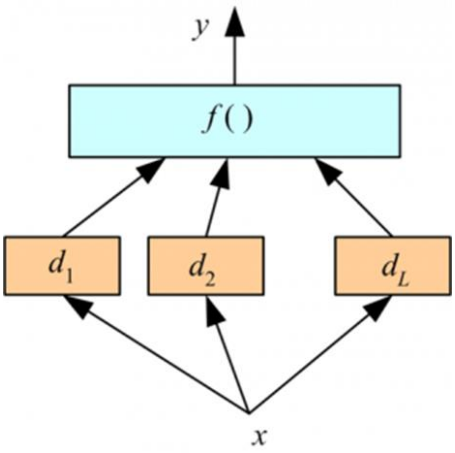
Analyze the financial health/behavior of recently acquired customers (in a geo/area) in lending by mapping to income & other details provided by prospects.
Logistic Regression can be used for this risk profiling of prospects of Interest.

5.4 Layer4(d4) – Estimate Prospects Profitability for Mortgage Lending

Predict prospect profitability for lending offer.

5.5 Layer5(d5) – Decision Layer – Recommendation of prospect for Mortgage

The decision layer [3] (decision tree) predicts the prospects that are finally to be targeted for campaigns.



Based on the outcome of above model prospects can be targeted and banks can determine the most appropriate offers — including what lending product, through what channel and what message.

6 IMPACTED BUSINESS KPI'S FOR BANKS

Following are some indicative business KPI's that will positively impact as banks target the prospects recommended by the behavior analytics model.

1. Prospect Conversion rates (Better prospect conversion rates to customer and hence improved loan book)
2. Customer Acquisition Cost (Lower CAC and hence better cost to income ratio)
3. Risk (Lower Financial Risk)
4. Customer Churn (Lower churn as better & accurate product, targeting from the start of engagement by bank)
5. Marketing Budget Spend (Optimized)

7 CONCLUSIONS

Deep data and credible information are now the drivers of growth and profitability in Indian banking more than ever. Banks are sitting on gold mine of information and behavioral data; banks are also having decent sizeable analytics and Digital marketing capability as well. And hence leveraging all the existing capability for Behavior Analytics for business benefits looks to be a plausible case.
Benefits such as:

1) Knowing the customer upfront, rather than post acquisition
2) Acquire "New to bank"

3) Keep NPA's low and find profitable customers.

The benefits of such ensemble models (described above) is that these models are flexible and can be layered as per business case/usage.
Some additional business cases where these models can be used by banks are:

1) Cross sell to existing home loan customers
2) Acquire Mortgage transfer cases from other banks

What remains to be seen is if our bankers are ready to take the plunge.

REFERENCES

[1] https://www.ibef.org/industry/real-estate-india.aspx
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