Chapter 9
Big Data Analytics for Financial Services and Banking

9.1 Introduction

Having surveyed the scenario of the application of techniques of Big Data Analytics in the context of Internet of things (IoT), let us now examine how the application of Big Data Analytics techniques is impacting the financial services and banking section. In a highly competitive business of financial services, we have companies vying with each other to grab their potential customers. This calls for their monitoring closely the customer opinions and feedback in all different platforms of Internet-enabled world, from mortgage applications to twitter postings—which provide unprecedented data for drawing insights. The Big Data phenomenon has resulted in expanding the range of data types that can be processed, enabling the banks and financial institutions to better digest, assimilate and respond in a better way to their physical and digital interactions with the customers.

Financial services companies look into emerging big data tools for discovering hidden customer sentiment on real-time basis [1, 2]. The big data tools enable companies to analyze far greater quantities and types of data in a short span of time. Structured, semi-structured and even unstructured data such as RSS feeds, SMS text messages and emails can be analyzed to uncover the rare insights of customer sentiments. Other sectors such as e-commerce and retail have already deployed and financial services companies need to deploy such tools for analyzing to identify customer segmentation, for product development and also for customer services. In the next few sections of this chapter, we shall delve deeper how these techniques can be deployed in the contexts of banks and financial services companies.

9.2 Customer Insights and Marketing Analysis

In a scenario of customers having business relationships with multiple banks and financial services companies, a specific bank no longer has a clear understanding of how customer behave, the buying patterns and the spending patterns [3, 4]. In other words, a specific bank cannot monopolize on monitoring the customer behavior as many other e-commerce sites such as Amazon, Flipkart, etc., and payment gateways as Paytm and other financial players are engaged with a particular customer. At the same time, it is essential to get a comprehensive picture of customer behavior, in order to continue to achieve customer satisfaction and retention. What is the solution? The banks should be able to obtain such information on customer behavior from all possible other sources such as customer call center records, customer emails, customer postings on social networks as Facebook or Twitter and also the insurance claims of the customer. In 2012, American Express offered several offers as schemes, after studying customer purchase history and other buying patterns by partnering with a location-based platform Foursquare.

In the above scenario, it is possible only for the Big Data technologies to provide a comprehensive view of the ecosystem by being able to augment and integrate the structured transactional data with unstructured data originating either from within the same organization or from external agencies to provide a 360° view of customer behavior and psychography.

Another common problem is that all banks and finance services companies maintain their customer data in silos or islands, independent of each other, in a variety of applications such as savings or current accounts, term deposits, term loans, car loans, housing loans, etc., for the same individual customer. This prevents tracking of customers and prevents the marketing department to offer customized schemes to suit a specific individual or business. Better interest rates can also be considered to be offered by using Big Data technologies. Having single thread of comprehensive customer information is beneficial and helpful in all aspects, from customer credit monitoring, fraud detection and mitigation to offering better deals for the customers. Even the loan default calculations and risk assessment calculations will be possible only with a comprehensive single thread customer data for applying the techniques of Big Data Analytics.

Today large global banks determine at the point of sale (POS), whether to permit the ongoing purchase or not, by evaluating the legitimacy of the transaction by deploying the techniques of high-speed real-time analytics.

For a multidigital customer of today, comprehensive real-time data enables real-time offer management, relationship pricing, all much more current and valuable than the good old trend analysis based on historical transaction systems.

For achieving very effective results in fruitful marketing, it is essential and will be impactful, if the real needs of the individual customers are understood exactly correctly, in advance, in real-time so as to meet the same needs of the customer exactly at the right time. This is possible by the deployment of predictive analytics based on sentiment analysis.

To address the challenges of customer retention, financial services companies need to implement sentiment analysis and predictive analytics. Such tools provide economic value by providing the technology to tailor the financial products according to customer needs and desires as well as help understand fraud patterns, reduce credit risk in addition to building strategy according to customer expectations.

9.3 Sentiment Analysis for Consolidating Customer Feedback

Customers share their thoughts and sentiments through social networks as much as to the representatives of the banks and financial services companies. When appropriately captured and managed, this information provides valuable, unfiltered and un-tampered insights into what exactly the customers are thinking. Distancing away from the traditional customer feedback and customer sentiment analysis by using survey research and focus groups, the sentiment analysis tools can provide the banks and financial services company's innovative ways to improve their financial service products and also predict customer behavior. This will also enable analysis on a real-time basis allowing fast decision-making, including any intervention or reactions to negative sentiments and opinions of the customers that may have emerged by appearing so in social networks. For example, in 2011, when an American financial institute proposed to enhance the fee for debit card, it had to withdraw that proposal due to uproar and protests in the customer feedback against the step.

Banks can assess the possible and potential impact of their decisions by monitoring and capturing customer feedback from social media platforms and customer service interactions among other platforms. They attempt at linking up words in customer feedback in unstructured communications of customers reflecting their emotions, sensing they as key inputs for strategic decision-making.

In the context of loyalty and reward programmes for attracting and retaining the customers, the customer sentiment analysis and feedback play a major role. By examining the customer confidence indices that are given to specific data elements, banks and financial services companies attempt at judging the mood of the market and accordingly reward the customers who are loyal to the bank. While such techniques are still evolving, already matured techniques help identify the likes or dislikes and preferences for deciding financial product improvements and also service improvements, thereby attempt at gaining competitive advantage in a highly competitive banking and financial services sector.

The main applications of Big Data Analytics in financial services and banking are:

1. Fraud detection and fraud prevention is possible by finding exceptions in hidden patterns in data.

2. Segmentation: Customers can be segmented or classified into various categories based on classification techniques for launching sales or promotional marketing campaigns.
3. Support regulatory frameworks.
4. Managing Risk: By adopting efficient central risk management platform for meeting regulatory requirements also.
5. Offering personalized products: Based on customer habits and friends of behavior in expenditure.

9.4   Predictive Analytics for Capitalizing on Customer Insights

Customers have a need for performing inexpensive, fast, easy and simple transactions in both financial sectors and purchasing activity. This itself becomes a challenge, as the customer needs are increasing in diverse directions.

Predictive analytics techniques enable their users to mine large amounts of historical data to determine the likely occurrence of events in the future. In this scenario by querying, visualizing and reporting these past datasets, the financial service companies can get actionable insights of illuminating behavior and transactional patterns to move forward with decision-making on strategies for products and services to offer.

9.5   Model Building

These tools can help companies to build model based on customer spending behavior and product usage to pinpoint which particular products or services are popular and found most useful with customers and which particular ones they should focus delivering more effectively. By doing so the banks can increase their share of incomes, garner loyalty and increase their profitability.

9.6   Fraud Detection and Risk Management

Banks and other financial services companies can effectively deploy predictive analytics to help detect frauds in financial service sector. By compiling large and comprehensive customer's data it will be possible for banks and brokers to better detect fraud, earlier than what was possible by the use of conventional approaches.

'Predictive scorecards' can help determine the likelihood of customer defaulting payments also enabled by the emerging analytics tools to help in risk management and mitigation by the banks and financial institutions.

9.7 Integration of Big Data Analytics into Operations

Both sentiment analysis and predictive analytics techniques can be integrated into the operations and operating model of the banks and financial institutions.

9.8 How Banks Can Benefit from Big Data Analytics?

Internationally, banks have started deploying the techniques of Big Data Analytics to derive utility across various spheres of their functionality, ranging from sentiment analysis, product cross-selling, regulatory compliance management, reputation risk management, financial crime management and for many more possibilities. In India and other developing countries also, the banks are attempting to catch up with this trend.

In all the cases, the analysis is of primary nature while the data used is secondary data.

9.9 Best Practices of Data Analytics in Banking for Crises Redressal and Management

When a bank is in crisis in terms of lack of customer satisfaction resulting in customer migration or loss, what can be done? The following steps of redressal can be taken up:

1. Determine the root cause of drop in customer satisfaction.
2. Analyze the spending patterns of the cardholder customers.
3. Channel usage analysis—debit/credit description and payment modes ATM/Cards.
4. Customer behavior and cross-selling.

Methodology

The methodology begins with analyzing the customer satisfaction measurement data to identify the cause of drop out whether due to poor services or any other cause.

After segmenting the issue with the help of feedback analysis, it is possible to identify the reasons for the drop and accordingly suggest or recommend a remedy as an action to be taken by the bank as improvements.

Customer segmentation also can be performed by using classification techniques and accordingly financial products can be suggested or recommended to meet the requirements of different customer segments, based on their type.

Feedback Analysis

In any organizational context, the feedback analysis becomes critical to identify the

exact problem and to attempt to solve it. In the context of a bank, the feedback is to be taken from customers, from there who visited the bank branches and also those who used online services. This feedback was taken in writing or online from customers who availed the services of the bank. They were asked to evaluate the banking services in a scale of 1–5 on the parameters as follows:

1. Customer rating of quality of service.
2. Customer rating of speed of service.
3. Customer rating of response to their queries.

The above data, when collected for a large number of customer (20,000 or more), we can analyze by plotting a graph of the data on service quality or speed or query response against time. Such graphical analysis can bring out all the surprising or unknown happenings in time. Drop-in service quality or speed or query response in time indicates a problem situation, while their improvements show the benefit of the effective steps taken by the bank to redress the situation. Steps that result in improvement can be identified and recommended.

Online Transactional Analysis
The Analysis of online transactions of the customers indicates the spending patterns. The causes for spending patterns (say drop) can be identified (such as recession or job losses or functional seasons or vacation periods, etc.). Accordingly, some suggestions or recommendations can be made to facilitate the customers.

Channel Usage Analysis
Customer behavior can be analyzed based on expenditure channel (ATM or card versus online transactions). If surplus funds are identified with certain customers, they can be offered investment plans according to their surplus capacity.

Consumption/Expenditure Pattern Analysis
If a customer demonstrates a certain type of consumption/expenditure pattern, specific products can be offered accordingly. For example, if a customer spends heavily at a particular time a credit scheme or card can be offered to him/her.

Security and Fraud Analysis
A potential threat to the banking system can be identified based on the historical transactions and consumption capacity of the customers. Frauds already performed also can be identified accordingly. The bank can take appropriate steps accordingly. This will result in improving active and passive security.

9.10   Bottlenecks

How banks and financial services companies can maximize the value of their customer data? What are the bottlenecks to be overcome? The following are the usual bottlenecks.

1. **Silos of Data**

Customer data resides in individual silos such as CRM, portfolio management, loan servicing, etc. Legacy systems can become impediments in data integration.

2. **Skills and Development Gap Needs Closing**

New skill sets are required to be developed in Big Data Analytics. New data management skills, new platform skills (e.g., Hadoop family) mathematical and statistical skills and their platforms (as R, Matlab, Weka, etc.). Data scientists need to be deployed.

3. **Lack of Strategic Focus**

Big Data is usually viewed as yet another IT project top management needs to recognize the radical change that Big Data Analytics brings in (and not look at it as another IT Project). To give top priority, prepare for investments to implement Big Data Analytics in the organization.

4. **Privacy Concerns**

Privacy concerns limit the adoption of Big Data Analytics on customer data. Analysis of sensitive and correlated customer information may become an objectionable issue for the customers.

9.11   Conclusion

In this chapter, we have summarized the possible methodologies of application of Big Data Analytics to banking and financial services sector.

9.12   Review Questions

1. Explain how banking and financial services sector is variously getting impacted by the Big Data phenomenon.
2. Explain how customer sentiments and marketing analysis are possible to be processed in Big Data.
3. Explain how sentiment analysis and customer feedback can be processed in banking and financial services sector.
4. Explain how prediction analytics can be applied in banking and financial services sector.
5. How model building is possible in Big Data Analytic in banking and financial service sector.
6. How banks can utilize Big Data Analytics for crisis redressal and management in banking?

7. What are the best practices for Data Analytics in banking for crisis redressal and management?
8. How feedback analysis is performed and what are its benefits? Explain with specific examples in banking and financial services sector.
9. What are the bottlenecks experienced by banking and financial services sector in implementing Big Data Analytics techniques.
10. Summarize the way in which Big Data Analytics techniques can be deployed in banking and financial services sector.

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