Big Data In Banking: A Bird’s Eye View

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Abstract

Banking industry is the backbone of any economy. It plays a very significant role in leading the country towards the growth path by improving the gross capital formation, which consecutively improves the GDP. Success of the banking industry depends on its ability to serve its customers efficiently and expeditiously. The functionality of the CRM (Customer Relationship Management) can be effectuated by felicitous use of customer data. Banks have voluminous data about their customers, which most of the banks failed to utilize in a well-timed manner. Banks can fortuitously satisfy their customers by offering much personalized and focused services by pursuing big data analytics and other hi-tech tools or applications. Big data analytics can be actuated in key areas like customer segmentation, offering customer lifetime value, fraud detection, risk modeling, etc. Preeminent banks in the industry are utilizing big data to leverage the accumulated customer data for improvising their services. Big data offers a promising scope of ventures to banks which consider it strategically. This article is attempts to present an overview of the big data application in the banking industry.

Keywords: Big data, Banking, Data Analysis

Introduction

Banking industry occupies a predominant position in every country, as it plays a decisive role in the economic growth and prosperity of the country. As banks have control over the major part of money circulation, they possess the ability to drive the economy of the country. Success of the banking industry largely depends on its proficiency to serve its customers accurately and swiftly. This could be possible on the appropriate and timely usage of customer data. Though banks accumulate volumes of data about their customers, utilizing it in a germane manner is a major challenge confronting banks today. Big data analytics helps banks to transform the captured data in offering more personalized and focused services to customers.
Big data is a term that describes the large volume of data like both structured and unstructured which inundates in business on a day-to-day basis. But it’s not the quantum of data that’s important. It’s what organizations do with the data that matters. Big data can be analyzed for insights that lead to better decisions and strategic business moves. It can take data from any source and analyze it to find answers that enable the cost reductions, time reductions, new product development and optimized offerings, and smart decision making. Banks can combine big data with high-powered analytics to accomplish various business-related tasks such as: diagnose causes of failures, issues and defects in near-real time; generate coupons at the point of sale based on the customer’s buying habits; recalculate the risk portfolios in minutes; detect fraudulent behavior before it causes effects.

Ability to process Big Data brings in multiple benefits, such as- businesses can utilize outside intelligence while taking decisions. Access to social data from search engines and sites like Facebook, twitter are enabling organizations to fine tune their business strategies. It improved customer service: Traditional customer feedback systems are getting replaced by new systems designed with Big Data technologies. In these new systems, Big Data and natural language processing technologies are being used to read and evaluate consumer responses. The early identification of risk to the product/services will provide the better operational efficiency. Big Data technologies can be used for creating a staging area or landing zone for new data before identifying what data should be moved to the data warehouse. In addition, such integration of Big Data technologies and data warehouse helps an organization to offload infrequently accessed data.

**The role of big data in the banking industry**

The banking industry has evolved by leaps and bounds over the past decade, when it comes to operations and service delivery. Surprisingly though, most banks have failed to utilize the information within their own databases. However, that’s all about to change as the banking sector gears up to process immense volumes of data created and collected. The internet and data analytics have already made it so much easier to monitor and evaluate the progress of the banks, which have been entrusted with tons of their clients’ personal information. But with big data, banks can now use this information to constantly monitor their client’s transaction behaviors in real time, allowing them to provide the kind of resources that their clients need. This real-time evaluation will boost the overall profitability. As the volume of banking customers’ increases, it is almost bound to affect the level of service offered. But it is important for the banks to be on top of everything as they are responsible for the security of their clients’ funds, as well as their personal data. Small scale databases simply cannot keep with the increasing volume of information. So, if the banking sector fails to successfully implement Big Data, their databases are almost certain to fail. Switching to Big Data will allow them to process this information faster, avoiding any potentially embarrassing situations. Big Data might comprise of an enormous system, but its job is to simplify tasks. Whenever a name or account number is entered into system, it sifts through all the data and
provides only the required information. This will allow banks to streamline work processes, and saves both time and costs. Big Data will also allow organizations to identify and rectify problems, before they affect their clients. Sometimes the clients can also be the source of an issue. For example, investors might make a decision, but then change their mind at a later point of time. Big Data will help the banking industry to change their method of service delivery in a way where such erroneous clients won’t be able to walk out on their commitments. It will allow the banking industry to track customers’ credit card and loan limits, ensuring that they don’t over spend. By keeping up with Big Data and other contemporary global trends, the banking industry will be able to have a better understanding of client’s requirements, so that they can provide the needy services in a timely manner. The task of implementing Big Data on a large scale is just taking shape, with many IT departments concerned about the transition to high-tech IT infrastructure.

**Big Data ascendancy in Banking**

The usage of digital channels is unavoidable growth in financial services. New technologies provide customers with unprecedented ways while driving internal efficiencies. Customers now have access to accounts and can transact across mobile, social, and other self-serve channels. The branch’s role is changing to focus on more complex issues while consumers use Facebook, mobile apps, and virtual wallets to conduct financial business in a new ecosystem. Today’s consumers share more information about their needs, risk tolerance, and personal profile than ever before. Their expectations are higher, shaped by experiences outside banking. They are better informed as they use internal and external channels to research products and services. They look beyond banks to fulfill financial needs, engaging players such as Google Wallet, PayPal, Paytm and more. Consumers connect to brands and share their experiences with one another through social media. They are willing to take advantage of low cost channels if they find them valuable and relevant to their daily lives. Many actually prefer them.

There is much potential to balance internal efficiencies with a superior customer experience in this new reality. But achieving the balance requires banks to optimize the unprecedented amounts of customer data now generated to make information actionable and relevant. New sources of customer Big Data consist of:

- Transactional data
- Product usage data
- Web registration data
- Customer value data
- Channel usage data
- Web clickstream data
- Third-party data
Social media data

Banks are beginning to explore the opportunity to differentiate with these insights. The industry is still in its nascent stage, however. According to a recent study, only 24 percent of banks surveyed had implemented a Big Data solution, most commonly around risk and fraud monitoring or product and service marketing. But of those who have had a Big Data initiative in place for more than a year, 70 percent had met or exceeded business expectations. And to highlight data's potential, 90 percent of those surveyed said they think that successful Big Data initiatives will define the financial services winners in the future.

Provide consistent multichannel experiences. Consumers can now interact with a bank through multiple channels for information and transactions. Banks must provide a seamless experience across whatever channels are used. Employees in the branch must know if a customer has called the contact center or visited the website; transactions started in one channel can be completed in another. This will create satisfied, engaged customers.

Acquire new, mobile-savvy customers. Young, digital native consumers are beginning to open accounts and create lifelong relationships with financial services firms. They're mobile and they expect the companies they do business with to be mobile, too. Banks will succeed reaching this new customer group if they deliver insight-driven experiences through mobile devices.

Sense and respond with effective targeting. Reaching the right customer with the right offer at the right time is the holy grail of sales and experience. And banks can generate new revenues through proactive engagement and outreach to certain customers groups at the proper time.

Right size the customer experience. Use Big Data to find the most appropriate channels based on customer needs, value, and behavior, and then go deeper to understand the best way to migrate customers to serve them in the most efficient and effective channels.

Identify new sources of revenue and acquisition. Mine unstructured social data to activate advocates and identify new customers. Optimize pricing based on customer segments, products, channels and geographies, and remove any revenue leaks such as ineffective lead generation, poor follow-up, low conversion ratio, or high attrition to achieve sustainable revenue sources that are less sensitive to risk, sticky, and recurring.

Build loyal relationships. Surprise and delight by knowing customers more intimately than ever before and meeting their needs, whether they are verbalized or not. Show that the bank has its customers' best interests at heart, and they will reward with their loyalty.

Improve service to sales. By mining customer service data and defining trends, banks can respond to customer needs and make systemic changes to processes that
can even result in up-sell success. For example, rather than responding to and resolving complaints around monthly service fees, offer direct deposit or other products and services as part of the care response that would eliminate these charges.

- **Invest smartly in the retail branch.** Understand branch-level data and optimize investments in the network. Learn what types of customers visit the branch and why. Focus branch initiatives on what matters most to those customers.

### Applications of Data Science in Banking Sector

Companies need data to develop insights and make data-driven decisions. In order to provide better services to its customers and devise strategies for various banking operations, data science is a mandatory requirement. Furthermore, banks need data to grow their business and draw more customers.

- **Risk Modeling:** Risk Modeling a high priority for the banking industry. It helps them to formulate new strategies for assessing their performance. Credit Risk Modeling is one of its most important aspects. Credit Risk Modeling allows banks to analyze how their loan will be repaid. In credit risks, there is a chance of the borrower not being able to repay the loan. There are many factors in credit risk that makes it a complex task for the banks. With Risk Modeling, banks are able to analyze the default rate and develop strategies to reinforce their lending schemes. With the help of Big Data and Data Science, banking industries are able to analyze and classify defaulters before sanctioning loan in a high-risk scenario. Risk Modeling also applies to the overall functioning of the bank where analytical tools used to quantify the performance of the banks and also keep a track of their performance.

- **Fraud Detection:** With the advancements in machine learning, it has become easier for companies to detect frauds and irregularities in transactional patterns. Fraud detection involves monitoring and analysis of the user activity to find any usual or malicious pattern. With the increase in dependency on the internet and e-commerce for transactions, the number of frauds has increased significantly. Using data science, industries can leverage the power of machine learning and predictive analytics to create clustering tools that will help to recognize various trends and patterns in the fraud-detection ecosystem. The process of Fraud Detection involves –
  
  - Obtaining the data samples for training the model.
  - Training our model on the given datasets. The process of training involves the implementation of several machine learning algorithms for feature selection and further classification.
  - Testing and Deploying the model.
Customer Lifetime Value: Customers are an essential part of the banking industries. They ensure a steady stream of revenues. Formally speaking, a Customer Lifetime Value offers a discounted value of the future revenues that are contributed by the customer. Banks are often required to predict future revenues based on past ones. Also, banks want to know the retention of customers and if they will help to generate revenues in the future as well. Banks want their customers to be satisfied and nurture them for the current as well as future prospects. Businesses like banking sectors are required to predict their customer lifetime value. Data Science in banking plays an essential role in this part. With predictive analytics, banks can classify potential customers and assign them with significant future value in order to invest company resources on them. While the classification algorithms help the banks to acquire potential customers, retaining them is another challenging task. With the growth in the competition, banks require a comprehensive view of the customers to channel their resources in an optimized manner. There are various tools that are used in data preprocessing, cleaning and prediction.

Customer Segmentation: In customer segmentation, banks group their customers based on their behavior and common characteristics in order to address them appropriately. In this scenario, machine learning techniques like classification and clustering play a major role in determining potential customers as well as segmenting customers based on their common behaviours. One popular clustering technique is K-means, that is widely used for clustering similar data points. It is an unsupervised learning algorithm, meaning that the data on which it is applied does not have any labels and does not possess an input-output mapping. Some of the various ways in which customer segmentation helps the banking institutions are –

- Identification of customers based on their profitability.
- Segmenting customers based on their usage of banking services.
- Strengthening relationships with their customers.
- Providing appropriate schemes and services that appeal to specific customers.

Analyzing customer segments to implement and improve services.

Recommendation Engines: Providing customized experiences to clients is one of the major roles that a bank plays. Based on customer transactions and personal information to suggest offers and extended services. Banks also estimate what products the customer may be interested in buying after analyzing historical purchases. With this, banks will be able to recommend the product of the companies that have tied up with them. It also recommends customer centric or product-centric offering based on their preferences. Banks can also recommend offers that are highly appealing to customers. There are two types of recommendation engines that are used by the banks –
Real-Time Predictive Analytics: Predictive Analytics is the process of using computational techniques to predict future events. Machine Learning is the main toolbox of predictive analytics. Machine Learning is an ideal tool for improving the analytical strategy of the banks. With the rapid increase in data, there is an abundance of use cases and the exigency of analyzing data is at its peak. There are two types of major analytics techniques –

- **Real-time analytics**
- **Predictive analytics**

Real-time analytics allows customers to understand problems that impede businesses. Predictive Analytics, on the other hand, allow the customers to select the right technique to solve the problems. There are areas like financial management of banking sectors that allow the industries to manage the finances and devise new strategies.

Advantages of Big Data for the Banking Industry

- **Fraud Detection & Prevention:** One of the biggest problems faced by the banking sector is fraud. And Big Data will allow banks to make sure that no unauthorized transactions will be made, providing a level of safety and security that will raise the security standard of the entire industry.

- **Enhanced Compliance Reporting:** Banks now have access millions or even billions of customers’ needs, and they can now use Big Data to cater to them in a more meaningful way. Cloud based analytics packages can sync in real time with big data systems, creating actionable insight dynamically. Big Data will expand the banking industry in a way that will allow them to earn more revenue through cost reduction. And by cutting down on unnecessary costs, the banking industry can provide customers with exactly what they're looking for, instead of irrelevant information.

- **Customer Segmentation:** Big Data will give banks deep insights into customer spending habits and patterns, simplifying the task of ascertaining their needs and wants. By being able to track and trace each and every customer transaction, banks will be able to categorize their clients based on various parameters, including commonly accessed services, preferred credit card expenditures, or even net worth. The benefit of customer segmentation is that it allows banks to better target their clients with relatable marketing campaigns that are tailored to cater to their requirements.

- **Personalized Product Offerings:** Customer segmentation can further be used to create and deliver new schemes and plans, aimed directly at the specific requirements
of their customers. By analysing past and present expenses and transactions, a bank can get a clear understanding of how to get the highest response rate from their clients. Creation of personalized product offerings will cater to an untapped niche of personalized services that gives banks the ability to create more meaningful client relationships.

- **Risk Management**: The early detection of fraud is a large part of risk management, and Big Data can do as much for risk management, as it does for fraud identification. Big Data locates and presents big data on a single large scale that makes it easier to reduce the number of risks to a manageable number. Big Data plays a pivotal role in integrating the banks requirements into a centralized, functional platform. This reduces the banks chances of losing data, or ignoring fraud.

- **Efficient risk management that helps detect errors and frauds in real-time**: Business Intelligence (BI) tools that function on top of big data to provide analytics can identify the risks in sanctioning loans to potential customers. Banks can analyze the market trends according to regional data available and decide on lowering or increasing interest rates in that segment. Errors while copying data from forms manually are reduced to minimum. Other data entry errors are also rectified before they can affect the working of the bank, as big data analytics can point out anomalies in customer data. Bank frauds often go unnoticed till they disrupt the functioning of the banking services. With big data, banks can identify fraudulent transactions or entries at the onset as they vary from the acceptable standards set in the analytics dashboards.

- **Analyze consumer behavior and provide personalized banking solutions**: Often, banks miss out on customers, as they do not connect emotionally with them. Sales representatives and relationship managers can leverage the inputs from the big data analytics that help identify investment patterns of the customers, their financial and personal backgrounds, and their motivations to invest, so that they can provide personalized investment solutions that are a combination of accounts, insurances, loans. Essentially, complete systematic investment plans that will ensure that the customers trust the bank with their finances.

- **Regulatory compliances are easier to file using big data**: 68% of bank employees say that their biggest concern in banking services is ensuring that they meet all the regulatory compliances set by the Government. BI tools can help analyze the regulatory requirements by checking each individual application from the customers. When the regulatory compliance criteria are fed to the analytical dashboard, the business rules can be applied to big data to validate customer applications.

- **Performance analytics using big data help in budgeting and innovation**: Branch goals are based on employee performance, and the targeted revenue for the year. Big data analytics can generate suggestions based on the figures available from the current sales of employees, and help bank allocate budget for each branch. Even the services
themselves can be analyzed for performance, to know what works and what needs to be changed. This fosters innovation amongst the marketing teams.

Challenges of Big Data for the Banking Industry

- **Difficult to harness siloed data:** Banking services data is highly diverse, and stored in different departments. It is difficult to profile a customer based on his/her investment behavior as his accounts, loans, insurances, etc. may be spread over various branches and departments of the bank. Big data needs to collate all such data first, in order to provide comprehensive intelligence.

- **Legacy infrastructure needs to be upgraded before integrating big data capabilities:** Most banking solutions are not equipped to handle constant influx of data, which is a pre-requisite for big data, even if they have moved to cloud solutions. Integrating big data requires a complete revamp of most of the existing bank solutions in partnership with a big data consulting company. This is not easy to implement, as the system needs to be constantly up even when the changes are being deployed.

- **Dedicated resources and tie ups with big data consulting company mandatory for correct implementation** As mentioned above, it is highly unlikely that banks would have in-house data experts in big data, and hence, partnership with firms specializing in designing, developing and deploying big data solutions is a must.

- **Big data is not yet viewed as a strategic asset:** Non-technical managers and top-level executives often bypass the need of big data by relying more on human decisions rather than the automated marketing solutions offered by the analytics dashboard. This results either in the bank not opting for big data or sidelining the actionable inputs from the big data implementations.

- **Customer concerns about privacy:** Although the data logged by big data systems is anonymous at the high level, if the bank wishes, they can track behavior patterns of each individual customer. It is advantageous in detecting illegal activities, but is a serious security threat to the customer if it falls into wrong hands. Several concerns have already been raised with the Government about monitoring the use of big data.

- **Elevate the importance of business-savvy data scientists.** While there's always a high demand for quantitative professionals to be part of the team, progressive banks are looking to complement that talent with creative business professionals who see business opportunities in trends that produce bottom-line results.

- **Organize for one version of the truth.** Too many banks are still organized in product- or channel-centric silos. The bank can't knit together a comprehensive picture of the customer. Silos need to be redefined along with analytics practices. Online and offline data must be integrated into platforms across channels that
facilitate a comprehensive understanding to enable predictive analytics and inform real-time interaction strategies.

- **Don't underestimate the integration challenge.** Today banks need to extract insights from structured and unstructured data, statistical data, social media streams, click stream data, smartphone data, videos, etc. Small-scale experiments using Big Data are recommended to start, with slow rollout from there.

- **Integrate intelligence into customer-facing business practices.** The biggest opportunity for Big Data is the potential to identify and integrate insights into customer-facing applications in real time. Analytics have come a long way, but many banks neglect to push the intelligence to front-line applications.

- **Use Big Data to accelerate the customer-centric transition.** Customer centricity is no longer a nice to have strategy for banks, it's the only differentiator. And data is the backbone. It's critical to think beyond technology and analytics to what organization, process, and people-related changes are necessary to really put the data and insights to work.

**Conclusion**
Banking industry can leverage the benefits of data science to serve its customers effectually. Banks all over the world have initiated to analyze data with the intention to provide better experiences to their customers. There are several key areas like Fraud Detection, Risk Modeling, Customer Lifetime Value, Real-Time Predictive Analytics etc on which the banks could focus. A successful big data strategy must be coordinated across the enterprise which is much promising. Those that do will be able to understand the needs of the customers more intimately and offer real time cliental experiences. On the efficiency side, it will harmonize channels by defining multichannel journeys that make sense to the user and eliminate redundancies. And overall, banks that create Big Data dominance will influence customer behavior across channels to make interactions more effective and efficient, gaining loyalty and financial strength in the process.

**References:**


