Scotiabank

Case Study

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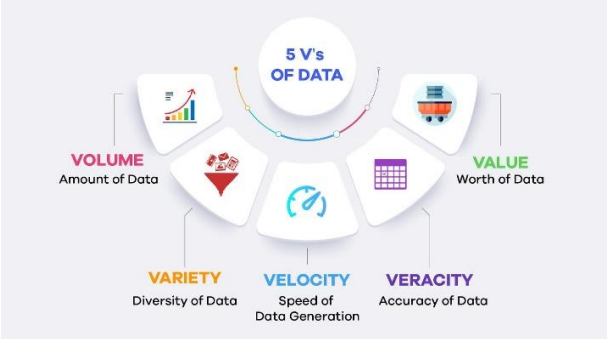
BIG DATA ANALYTICS

Big data analytics is the act of identifying patterns, trends, and correlations in an immense amount of unprocessed data in order to support data-driven decision-making. These procedures employ well-known statistical analysis methods, such as clustering and regression, to analyze bigger data sets with the help of newer tools.

The five properties of volume, value, variety, velocity, and veracity are frequently used to characterize big data, which is a compilation of information from several sources.



HOW CANADIAN BUSINESSES HAVE BEGUN ADOPTING BIG DATA AND HOW THEY ARE USING THIS DATA POSSIBLY TO THEIR ADVANTAGE

Big data tactics are being aggressively used by Canadian firms in order to obtain insights, increase decision-making, and boost their overall competitiveness. Here are some examples of how Canadian companies have started utilizing big data:

1. **Supply Chain Optimization:**
   Big data analytics is being used by Canadian companies to streamline their supply chain processes. Businesses enhance inventory management, lower costs, and guarantee on-time delivery by evaluating data on inventory levels, transportation routes, and customer demand trends.

2. **Healthcare and Pharmaceuticals:**
   Big data analytics are being used in the healthcare industry to better medical research, optimize treatment regimens, and improve patient care. To spot trends, forecast illness outbreaks, and provide individualized treatment choices, Canadian healthcare institutions are collecting patient data from clinical trials, electronic health records, and patient data.

3. **Smart Cities:**
   Big data efforts are being adopted by a number of Canadian communities to better urban planning and citizens' quality of life. Cities may improve resource allocation, transportation systems, and sustainability initiatives by integrating data from a variety of sources, including sensors, traffic systems, and public services.

A SINGLE CANADIAN BUSINESS USED FOR CASE STUDY - SCOTIABANK

The Bank of Nova Scotia, operating as Scotiabank, is a Canadian multinational banking and financial services company headquartered in Toronto, Ontario. One of Canada's Big Five banks, it is the third-largest Canadian bank by deposits and market capitalization. It serves more than 25 million customers around the world and offers a range of products and services including personal and commercial banking, wealth management, and corporate and investment banking. With more than 92,001 employees and assets of Can$1,136 billion (according to 2020 annual report), Scotiabank trades on the Toronto (TSX: BNS) and New York (NYSE: BNS) exchanges. This case study shows problems which were faced by Scotiabank before applying big data analytics and how they used big data concepts to improve their system.

PROBLEMS FACED BY SCOTIABANK BEFORE APPLYING BIG DATA ANALYTICS

Scotiabank encountered several challenges that impacted its operations, decision-making processes, and customer experience. This case study examines some of the key problems faced by Scotiabank and how the application of big data concepts helped address those challenges.

1. **Limited Customer Insight:**
   Before leveraging big data, Scotiabank faced the challenge of limited customer insights. The bank struggled to gather and analyze vast amounts of customer data effectively. As a result, it was challenging to understand customer preferences, behavior patterns, and anticipate their needs. This limitation hindered the bank's ability to personalize services, offer targeted products, and create tailored marketing campaigns.

2. **Inefficient Fraud Detection:**
   Another key problem for Scotiabank was fraud detection. Traditional fraud detection techniques depended on rule-based algorithms, which could only recognize patterns of fraud that were already well-known. These systems weren't good at spotting newly developed fraud schemes. To detect fraud in real-time and reduce financial losses, Scotiabank needed a more sophisticated strategy.

3. **Manual and Time-consuming Data Processing:**
   Massive amounts of data required laborious human processing and analysis for Scotiabank. Traditional data processing techniques were expensive and frequently prone to mistakes. This made it more difficult for the bank to gain insightful information, and respond quickly to developments in the market.

4. **Siloed Data and Inefficient Data Integration:**
   Another challenge was the presence of siloed data within different departments and systems across the bank. The lack of data integration hindered a holistic view of customer interactions and prevented the bank from utilizing data effectively. It also hampered cross-functional collaboration and hindered the bank's ability to leverage data-driven insights for various business processes.

5. **Suboptimal Risk Management:**
   Scotiabank faced challenges in risk management, particularly in assessing credit risk and identifying potential defaults. The bank needed a more comprehensive and accurate risk assessment mechanism to improve credit decisions, minimize default rates, and ensure a healthy loan portfolio.

HOW SCOTIABANK USED BIG DATA CONCEPTS TO SOLVE THE PROBLEMS

“Scotiabank's approach to data, analytics and AI is intended to protect and deliver the best experience for our customers," said **Grace Lee, Senior Vice President, Chief Data & Analytics Officer at Scotiabank**. "This technology is transforming the business of banking. It's allowing us to achieve scale without compromising the value of personalized and meaningful interactions with all – not some – of our customers. We are proud that the Bank's efforts to drive forward our data, analytics, and AI capabilities have been recognized by The Digital Banker."

Scotiabank continues to publish data and analytics breakthroughs during the epidemic. The Bank introduced its **Global AI Platform** in the fall of 2020 to give consumers faster information and better guidance. The technology gives the Bank the tools it needs to give consumers sage and individualized financial guidance. The Bank has been implementing several client models into its retail banking operations across the Americas throughout the year utilizing the new platform.

To leverage the power of data and gain valuable insights, Scotiabank has embraced a few big data analytics concepts which are listed below.

1. **C.MEE technology:**
   - **C.MEE** is a technology which used the Global AI platform to analyses data across customer touchpoints — branch, mobile, online, contact centre and email — to determine what advice is most relevant for a customer at any given interaction point.

- The C.MEE technology was introduced by Scotiabank in February 2021. The AI-driven technology uses big data to further improve customer experiences.
- By taking information from consumer activity, C.MEE evaluates clients' life stages and financial behaviors to increase the relevance of the advise given.
- The C.MEE technology from Scotiabank is now used in Canadian retail banking, and it will eventually be scaled throughout the Bank's whole worldwide presence in the Americas. With the help of its large talent pool of data scientists and data engineers as well as via the Bank's relationships with top academic institutions, the Bank continues to investigate the potential of AI and deep learning.

2. **Data Integration and Aggregation:**
    - Scotiabank gathers information from a variety of sources, including web channels, market data feeds, client profiles, and transaction records.
    - The Scotiabank uses data aggregation and integration methods to make sense of this varied data. They gather data from many systems and channels, harmonizing it so that it is prepared for analysis.
    - Scotiabank is able to get a complete picture of its clients, transactions, and market trends through integrating and aggregating data.

3. **Predictive Analytics:**
    - The practice of analyzing data to predict future events is known as **"Predictive analytics"**. To uncover patterns that might possibly anticipate future behaviour, the technique makes use of data analysis, machine learning, artificial intelligence, and statistical models.
        - The Scotiabank uses predictive analytics as a key idea to predict consumer behaviour, evaluate risk, and make strategic business choices. To examine previous data and forecast future results, the bank uses advanced analytics approaches, such as machine learning algorithms.
        - Predictive analytics, for instance, are used by Scotiabank to evaluate creditworthiness, spot fraud, and spot possible cross-selling possibilities.

4. **Sentiment Analysis:**
    - **Sentiment analysis** involves examining digital text to identify if the message's emotional tone is positive, negative, or neutral.

- Scotiabank uses sentiment analysis techniques on a variety of data sources, including social media platforms, customer feedback, and online reviews, to measure consumer sentiment and analyze brand perception.
- By analyzing customer sentiments, the bank can identify areas of improvement, proactively address customer issues, and enhance its overall reputation.

BIG DATA ANALYTICS TOOLS USED BY SCOTIABANK

Scotiabank, one of the largest banks in Canada, employs various big data analytics tools to enhance its operations and improve customer experience.

1. **SOFIA:**
    - The Bank has created a cashflow prediction tool called **SOFIA**, or **Strategic Operating Framework for Insights and Analytics**, that forecasts what clients might expect over the next four weeks using historical commercial banking data, including deposits and trends from the previous year.
    - The Bank is better able to identify which customers are most likely to be affected by the economic downturn and how to effectively respond to them thanks to this rolling average, which is updated in real-time. Relationship managers can, for instance, proactively contact people whose cashflow may be constrained and provide support, such as by informing them about customer assistance programs or short-term credit choices.
    - The technology also makes the Bank more effective by enabling risk managers to concentrate their efforts more effectively on the appropriate clients at the right moments and by hastening the yearly review procedure. This cashflow forecast tool's insights also assist the Bank in planning, such as how much money to set aside for contingencies.
    - The tool itself was built, long before the emergence of COVID-19. Its original purpose was to digitize and speed up the review process for commercial banking accounts, which had previously been done largely manually and annually, said **Yannick Abba, Scotiabank's Vice-President of the Analytics Centre of Excellence in Global Risk Management**. The Bank launched a regional pilot of the cashflow tool in Commercial Banking and Retail Banking early in its fiscal first quarter.

2. **Ethics Assistant:**
    - In an effort to improve its investments in data and analytics and produce more precise, biased-free, and customized client insights, **Scotiabank and Deloitte Canada jointly introduced the Ethics Assistant.**
    - Additionally, Ethics Assistant makes sure that Scotiabank's data is utilized in a way that emphasizes the value of openness and confidence in how customer information is accessed and used.
    - As we continue to unlock the potential of data and analytics, Ethics Assistant helps us advance how we responsibly collect, share, store, and use data," says **Grace Lee, Senior Vice President and Chief Data & Analytics Officer, Scotiabank.** "This new solution gives us the confidence that the enhancements we are making to develop personalized solutions for our customers are aligned with and strengthen our data ethics practices."
    - By utilizing the Artificial Intelligence (AI) Impact Assessment tool from Deloitte, Scotiabank was able to develop and successfully launch Ethics Assistant, which promotes ethical AI-based innovation and adoption to benefit and improve how data is used to provide value to and foster customer trust in the Bank.

CUSTOMER METRICS

The examples that are typical ones that focusing on customer metrics and can aid us in learning "How" banks employ big data technology, which are listed in the below picture.

Customer Metrics	Benefits to Banks	Sources of Data	Methodology	How?
Customer	Enhance products, services and marketing strategies	Social network, blogs, customer survey, call-logs, websites etc	Text Analytics Algorithm	Naïve Bayes can analyze documents and categorize them into positive and negative sentiments which can be scored as -1 and +1. This gives an overall total sentiment without having to read the entire text. Keywords can also be extracted for insights.
Opinions, Feelings and Attitudes			Link Analysis and Graph Theory	This methodology helps identify the most influential customers by providing them a leadership score. Decision trees are created to evaluate the interaction of that customer (considered as a node) with other customers. The high scoring customers are then targeted with offered and given special attention.
Customer Profile and Relationship	Understand customer profile, lifecycle, potential attrition	Customer KYC, transactions, social media feeds etc.	Neural Networks	Neural Networks can help predict the general financial condition and health of the bank. This methodology generates a two-dimensional map to identify problematic entities.
			Classification Algorithm	KNN clustering partitions the data points into small number of clusters, where K points are placed in space representing objects being clustered. These data points are initial centroids. Then each object is placed closest to that centroid which is most associated with. For example: customers with investments more than $500,000 are considered profitable and targeted with better credit offers at a better rate.
			Survival Analysis	This technique helps to predict if a customer is about to leave the bank or not. It divides customers into segments and compares them across time series.
Customer Goals and Objectives	Acquire new customers, Deepen existing relationships, Encourage product bundling	Transaction history, Profile data, Historical purchases	Market Basket Analysis	Link analysis technique is applied to find connection between products so that they can be bundled appropriately. For example: a customer who has recently opened a student account may also need a small student credit card for daily purchases and a student loan to fund their education.
			Linear Regression	Linear regression and decision trees can be used to understand a customer's propensity to a certain product by studying different attributes like income, demographics etc.

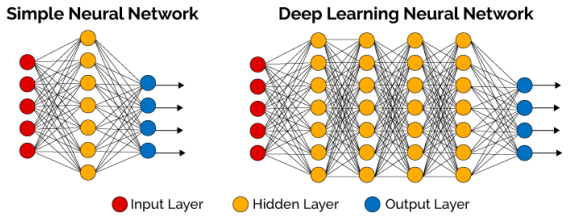
Figure Source: Business and Economics Journal

TECHNOLOGIES USED BY SCOTIABANK

The new system from Scotiabank integrates four technologies: deep neural networks (DNN), GPUs, adjunct algorithmic differentiation, and cloud, a subset of artificial intelligence (AI). Today, Scotiabank has the most computational power in its sector, enabling traders to better understand the risk in the derivatives market and, as a result, give consumers more rapid, accurate pricing.

1. Deep Neural Networks(DNN):

A deep neural network (DNN), or deep net for short, is a neural network that has some degree of complexity, often at least two layers. Deep neural networks use advanced math modelling to interpret input in complicated ways.



2. Adjoint algorithmic differentiation (AAD):

A mathematical method known as adjoint algorithmic differentiation is used to considerably speed up the computation of the Greeks, or the sensitivity of derivatives prices to underlying variables. It is frequently employed in valuation adjustments and the risk management of intricate derivatives.

3. Cloud Computing:

The on-demand availability of computer system resources, in particular data storage and processing power, without direct active supervision by the user is known as cloud computing.

CONCLUSION

The Global AI Platform, C.MEE, and SOFIA are exclusive advancements in AI and big data in banking from Scotiabank. One of Canada's Big Five banks, Scotiabank, has caught up to rivals in certain critical areas. It has achieved this by concentrating on reusable data sets, resulting in both speed and return on investment, taking a pragmatic approach to AI, and more closely integrating its data and analytics activities. In fact, The Banker's Global Innovation in Digital Banking Awards 2021 named Scotiabank the Most Innovative in Data in the year 2021.

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