Big Data and Financial Sector: A Review

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Abstract: Big data technologies are utilized in different industries of across the world markets like health-care, finance, consumer retail and manufacturing. The finance industry produces enormous data such as information of its customers, logs from its finance services, transaction data that utilized to help take decision, along with external data, such as social media and websites' data. Big data technology has become an integral part of the financial services industry, supporting in:

- Taking benefits from reserved information available at varied sources of semi-structured and unstructured data.

- Generating new revenue streams through data-driven offers, like personalized recommendations.

- Providing better services to customers, such as security.

1. INTRODUCTION

More than 90% companies think that Big Data is going to cast a great impact to revolutionize their business till 2020. As per study, unstructured data is generated at a great pace compared to structured data during the decade.
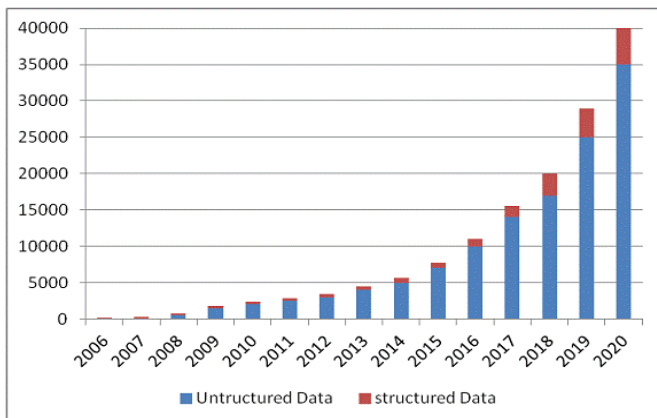
Each industry contains ample data and is required for analyse of these data for some fruitful results. Data warehouses are modifying themselves in Big Data Hadoop system via Sqoop and further be analysed.

Big data in the financial services industries have been responsible for helping to create better customer experiences and to protect businesses. Big data in the financial sector offers various benefits, from better security to better risk management to better customer experiences leading to profitable transactions for the organizations. The big data is an essential element that can help move banking and financial organizations into more secure and successful positions.
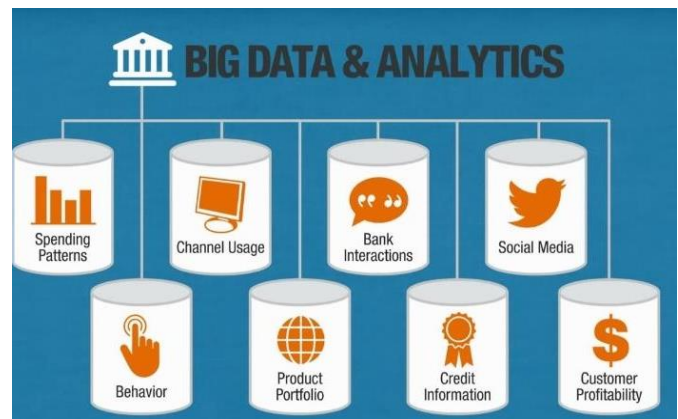
The Big Data analysis technologies, data mining and text mining play a major role in decision making process and enable the financial and non-financial information to get utilized. Multiple techniques were used for various types of financial analysis, like decision tree classification algorithm for data mining shows significant performance for huge data sets, specifically cost data, and justifies its accuracy rate while maintaining a relatively high range.

2. BIG DATA OBJECTIVES OF FINANCIAL SECTOR COMPANIES
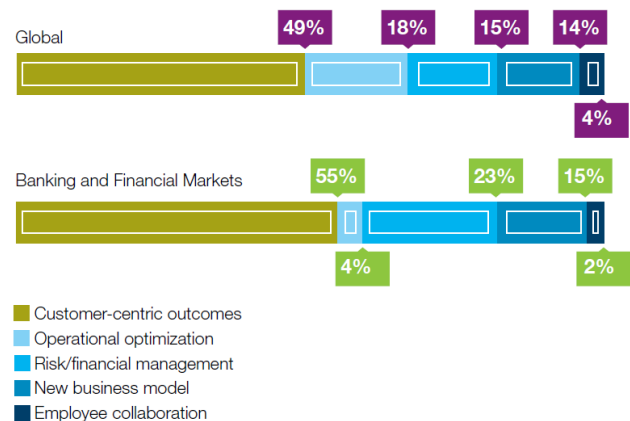
3. MAJOR BENEFITS

- Big data provides an insight about the business, including clients' behaviour, internal process efficiency and wider industry tendencies, supporting the business to make well versed, data-driven decision, and consequently, attain significant outcomes.

- Machine learning (ML) and AI optimize and streamline internal processes. As a result, it offers a performance improvement, as well as decreased operating costs.

- Big data analytics in the finance industry is utilized to improve cyber security and decrease risks. The companies can easily find fraud and prevent potentially malicious actions through intelligent algorithms.

4. MAJOR CHALLENGES

Infrastructure Challenges: Collecting, storing, and analysing the data utilizing an out-dated infrastructure causing the risk of

permanence of whole organization. Firms are facing the challenge of increasing processing capacities or re-building systems to eliminate the risk factors.

Higher Risk with Bigger Data: According to ISACA International, at present, worldwide 38% of companies are accepting to tackle the threat; causing cyber security is a major issue in the sector. However, GDPR has imposed a few restrictions on companies globally those need for collecting and applying users' information.

A Huge Amount of Data: The global population gives rise as much as of 2.5 quintillion bytes of data on a daily basis via card transactions, messages and web pages. It would become a problem to fintech companies to struggle to cope with it.

5. APPLICATIONS

Digital Marketing: The digital approach is an ML process for analysis of big data in social sciences utilizing a Python algorithm. This method shows the consistency in the results gained by applying the traditional procedure, however, the older approach analyses the data quickly.

According to McKinsey, data can be used to secure as much as 15-20% of promotional cost. Finance companies spend ~ 8% of their all-inclusive cost on marketing; big data market strategy helps save the cost, as well as trigger extra sale via extremely targeted marketing processes.

Personalized Products: The financial sector and banking institutions can be benefited from big data by using the given information to customize audience sets on the basis of demography, behaviour, etc., and offer them personalized products. Not every product, such as mortgage, savings

account, IRA, stocks, and bonds, investments or loans, will be a good fit for every customer though. Big data helps banks and financial institutions more specific about product offerings, likely to increase the chance of the right product being offered to the right person.

FinTech Startups: Start-ups of online lending, alternative insurance and money transfer industries, are utilizing big data techniques primarily for their success.

Systemic Risk Analysis: Systemic risk is a crisis that leads to the collapse of an entire financial system or entire market of an area or country, as well as global markets. Various machine learning methods have been developed to detect and identify the systemic risk in financial markets and sectors. Many financial organizations make it their whole job to understand risk, insurance agencies need to know how much risk they're

taking on when insuring a customer, whereas investment firms need to understand the risks of the market and how much risk their customers are comfortable with. Big data analysis allows for this process to be faster and more accurate for a better customer experience, as well as a less adverse experience for the banking industry.

The approaches of back testing against older data manage algorithmic trading threads. If a risk threshold is surpassed then analysis of big data also supports real-time alerting.

The present risk assessment view of various major banks:
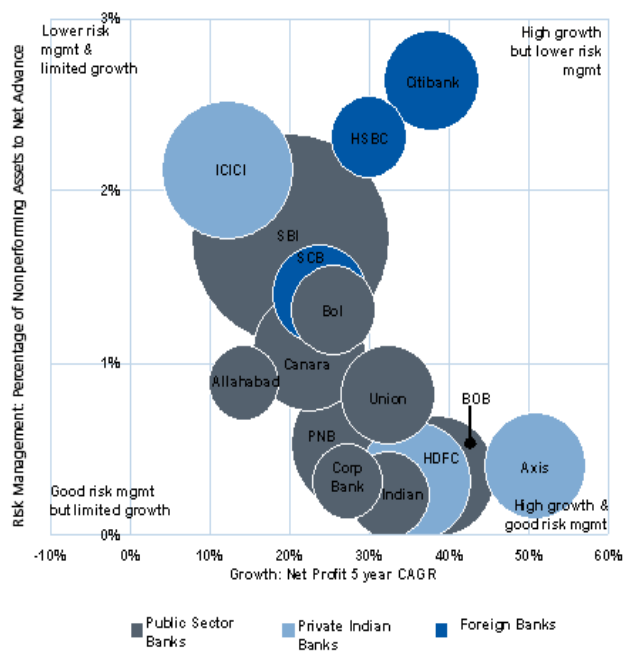
Citi Bank has done the investments in start-ups, as well as established several partnerships with technology firms for its *Citi Ventures*. It made an investment in Feedzai, a data science company which utilizes predictive modelling and real-time ML to identify fake behaviour and reduce risk for online finance companies.

Fraud Detection: Attempted fraud is common in banking and finance sectors. Big data offers a better analysis of data sets that can lead to enhanced fraud detection and prevention. Advancement in analytics and machine learning helps fraud detection teams find out about fraud risks faster and more accurately.

In the below figure, IBM shows how predictive analysis would be helpful to uncover fraud:

Business Process Optimization and Automation: According to McKinsey, banks can automate ~30% of their business via big data and can save a substantial cost, as well as can decrease the failure risk by removing manual errors from some critical procedures.

JP Morgan is employing various AI, as well as ML platforms to improve a few processes, such as algorithmic trading and commercial-loan agreements interpretation.

JP Morgan also gets started data-based automation, *COIN*. The ML algorithm, driven by its private cloud network, is utilized to slow down the required proves time to review documents: this task needed c.360k hours previously, whereas currently it completes in a few seconds.

Improved management & employee performance: Big data resolutions enable fintech firms to fetch and share branch (along with each employee) performance metrics across departments in real-time for better understanding the daily operations, as well as pro-active enable to solve any problems.

For identifying and fixing existing real-time issues, BNP Paribas is engaged in collecting and analysing data on its branch productivity. Also, to get real-time insight about their branch's performance based on several parameters, including acquisition & retention of customers, efficiency & turnover of its employee, amongst others, the bank uses its data analytics software, branch managers, other senior managements.

6. ANALYTICAL TOOLS REQUIRED IN FINANCIAL SECTORS

- **Modelling:** There are primarily 3 major analytics tools (R, SAS, & Python) utilized in financial industry for modelling. Earlier, the industry used only SAS for this. At the beginning, companies were not interested to accept the open-source R code as the companies couldn't claim IP on it. Currently, the firms are utilizing R and Python at their extremes.

- **Optimization:** Optimization can be done in Excel; however R and Python are better optimization tools. It is expected that optimization will get moves towards R and Python from Excel in future.

- **Segmentation:** For segmentation, SAS E Miner is a prominently used tool, though it is expensive. On the other hand Knowledge Seeker and Studio are relatively inexpensive, and allow analysts to form decision trees in a GUI-based in handy mode.

- **Visualization and Dashboarding:** Spotfire, QlikView, Tableau, and SAS visual analytics have changed this domain. CXO dashboards have turned outstandingly insightful. In the future, CXOs will provide a high-level view while offering the flexibility to examine the complicated detail.

7. BIG DATA ADOPTION

Educate	Explore	Engage	Execute
Focused on knowledge gathering and market observations	Developing strategy and roadmap based on business needs and challenges	Piloting big data initiatives to validate value and requirements	Deployed two or more big data initiatives, and continuing to apply advanced analytics
Global 24%	Global 47%	Global 22%	Global 6%
Banking and Finance Management 26%	Banking and Finance Management 47%	Banking and Finance Management 23%	Banking and Finance Management 3%

8. CONCLUSION

In nutshell we can understand Big Data technology helps financial industries to maximize the value of data, as well as supports them to gain competitive advantages, minimize costs, changes challenges to opportunities. Investments in big data in the finance sector estimated c.$9 billion in 2018 and these investments are positively expected to increase at a compound annual growth rate of around 17%, accounting for more than $14 billion by 2021, led by abundance of business prospects for various companies of financial industry.

More than 60% of banks approve that big data is censorious to their success, according to Global Transaction Banking. Over 25% of them report positively getting enough business value from their data. Banks need to re-establish their business policies and accept methodology driven by data, to stay up to the mark and competitive.

Although financial industry has already commenced utilizing big data for examining the market and clients' behaviour, it is still deficient. Big data solutions supplier firms are blessed with an unlimited opportunity to grow in the market. A big development can be required in Merchant Account Solutions,

credit card segment like wireless credit card reader, best credit card swiper, amongst others to make it more secure and user-friendly.

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