Challenges and Opportunities for Big Data in Financial systems

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Abstract: Big Data is one of the key technological developments that is revolutionising the way high volumes of data are processed to identify meaningful patterns and derive useful information for efficient decision making. One of the segments that has witnessed an exponential growth of data generation and consequently applications of Big Data consists of the financial systems. There is a vast growth in the amount of data generation which has necessitated the use of Big Data. A majority of the companies in the financial sector have already begun using this technological tool for efficient management of large volumes of data generated through their operations and processes. This paper evaluates the applications of Big Data in the financial systems and analyses the challenges and opportunities. Several factors such as security and data management in terms of challenges, and real time information generation and decision making support as opportunities are discussed. Based on the discussion it is determined that despite the challenges, the opportunities offered by Big Data are much more and financial systems, especially those deployed by the companies in the financial sector can benefit immensely. However, for the financial systems to become more robust, it is critical that the challenges are addressed efficiently while capitalising on the opportunities.

Keywords: Several factors, financial systems, Big Data.

1. INTRODUCTION

Big data has emerged as a key analytical component for decision making across sectors and industries. It offers an analytical insight by collecting large data sets and synthesising them to identify trends and patterns that contribute to efficient strategic planning and gauging market needs. It further helps with innovations and developing new solutions (Manyika, et al., 2011). The scope of Big Data application can be gauged from the fact that by 2020, it is expected that every second 1.7 MB of data will be generated for every two persons on earth (Marr, 2015). However, a mere accumulation of data does not offer any value unless there is process to derive meaningful knowledge from it, which is where Big Data applications come into the picture. Among other applications, Big Data also has tremendous scope in financial systems. However, along with the opportunities, there are also several challenges for Big Data. This paper evaluates applications, challenges, and opportunities for Big Data for financial systems by focusing on each of these parameters.

2. BIG DATA APPLICATIONS IN FINANCIAL SYSTEMS

Big Data has extensive applications in the financial systems, and these are more prominent in the financial service industry where financial systems encompass almost every business process and functions. According to a report by Accenture, companies in the financial service sector have adopted Big Data as one of the tools to mitigate risks that are inherent to the financial systems. The need for risk management was felt more after the financial crisis, and Big Data emerged as a potent tool in this regard. Accordingly, around 71 percent enterprises in the financial sector have implemented Big Data and Predictive Analysis measures. 70 percent of them have acknowledged the importance of Big

Data for them, and 54 percent of them have a Chief Data Officer. In terms of financial commitment to adopt Big Data, enterprises in this industry invested $6.4 billion in data management processes in 2015. This spending is expected to increase by 26 percent by 2019. Additionally, the financial sector companies have also begun investing in financial technology firms so that they can have more efficient financial systems that utilise Big Data generated by the processes of the financial sector enterprises. Between 2013 and 2014, the investment of financial sector enterprises in financial technology companies that develop technology solutions based on Big Data for the financial industry increased by 215 percent. The investments made in 2015 were to the tune of $12 billion (Sarrocco, Morabito and Meyer, 2016). It shows that Big Data is now one of the core business process components. In their pursuit to mitigate risks and improve efficiency, financial sector companies are investing billions of dollars both internally into their operations and externally into Fintech start-ups, with the objective of developing more efficient Big Data based technology which can then be integrated with their existing financial systems.

Challenges:

The use and adoption of Big Data are increasing significantly, which is evident from the discussions in the previous section. However, there are several challenges posed by Big Data to the financial systems. One of the biggest challenges is regarding technological limitations. As seen in the introduction section, the amount of data that is generated through business processes and user activities is increasing exponentially. There are zettabytes or a billion terabytes of data which is generated globally (Sarrocco, Morabito and Meyer, 2016). Currently, 4.4 billion zettabytes of data are created every second which is expected to reach 44 billion zettabytes (Marr, 2015). A significant portion of this data is generated in the financial systems of corporations, especially in the financial sector companies. This exponential growth presents a severe challenge for firms in this industry as their data storage and analytical capacities might not increase in the same proportion. It can result in a situation where a large part of useful but unstructured data might not get processed whereas some other data sets which lack any useful information might get processed (Jagadish et al., 2014). Hence, there are numerous technical challenges when it comes to data storage and processing.

There is also a significant challenge in the form of inappropriate use of analytical information generated through Big Data. Financial systems consist of financial information of the customers such as account, loan, and card details of clients in case of a bank as well as their personal information. In the absence of Big Data analytics, such information is largely incomprehensible and consequently inaccessible. However, Big Data has made it easy for firms and their employees to generate and access information related to their customers which can then be misused to sell unsuitable products to clients or for financial frauds (Bollier and Firestone, 2010). This easy accessibility of information, which counters the risk management and confidentiality measures of the enterprises, presents a major challenge to the use of Big Data in financial systems.

Opportunities:

Although there are several challenges, Big Data also offers numerous opportunities which are discussed in this section. Financial systems span across the financial industry and provide businesses in this sector a scope to consolidate vast volumes of data generated through numerous internal and external processes and customer touch points, which are further useful for business analytics and intelligence (Chen, Chiang and Storey, 2012). Hence, the integration of data from several sources in financial systems and generation of insightful information paves the way for efficient and real time management decision making. Managers no longer have to depend on outdated data or their personal experiences, judgements, or heuristics while making decisions. Big Data provides them access to the most updated and current information generated through its analytical and intelligence processes (Hu et al., 2014). By identifying the right trends through the application of Big Data to the financial systems, organisations gain the capabilities of assessing the current trends from not just the local factors and industry but across the macroeconomic, political, and environment. This can be better understood from the example of a bank.

The financial system of a bank gathers information from various sources through which the customers interact with the bank and conduct their transactions. These could be bank branches where they deal with employees of the bank or the completely automated processes such as the ATMs. Through every interaction, there is some form of data which is generated which might not be useful individually. But when big volumes of such data elements are integrated through Big Data analytics, it offers extensive and accurate insights into trends and patterns. Not only does it enable a bank to understand the current market trends and behaviours of the customers but also makes it possible to make reliable forecasts

(Oracle, 2015). Therefore, through Big Data, managers are better equipped to plan future strategies as well as develop a roadmap for their implementation. The ability to generate reliable forecasts in financial systems makes it possible to optimise costs, identify new sources of revenue, and plug income leakages, all of which add up to the profitability. Additionally, identification of trends makes it possible for businesses to determine what their customers want and accordingly offer solutions (Kambatla et al., 2014). In case of banks or financial institutions, Big Data can be used to design and provide financial and investment products which are developed on the basis of macroeconomic data, which makes them more efficient. Big Data also helps with the development of solutions that align suitably with the goals of the customers. All these factors culminate into more effective customer service, efficient planning, reliable forecasting, and better decision making, which further enable businesses to gain a competitive edge over their competitors. Thus, the effective use of Big Data in financial systems offer tremendous opportunities which are not just limited to the operational processes but also forecasting, marketing, and market analysis and intelligence.

There is also one significant opportunity offered by Big Data in the form of innovation. Within the context of financial systems, Big Data can be a source of innovation where firms can generate new knowledge which did not exist earlier (Lee, Kao and Yang, 2014). An example of Big Data based innovation in the banking industry is in the form of using unstructured data to develop marketing solutions and financial products. Secondly, there have been significant innovations in the form of predictive analysis which has helped banks or financial institutions to identify new sources of revenue generation. Another crucial innovation that has taken place due to the optimum application of Big Data is information concurrency where across the vast financial systems and processes, there is a high level of integration which removes inconsistences of the information. In other words, it means that everyone accesses similar and updated information and any changes are also effected immediately (Yurcan, 2013). Therefore, Big Data also offers immense innovative opportunities.

3. CONCLUSION

The analysis of Big Data applications and its challenges and opportunities yields few key findings. The first important finding is that Big Data already has a large scale presence in the financial system and its presence is only increasing. The second vital finding is that there are significant challenges posed by Big Data in the form of technical capacities and information security challenges. The third finding highlights the vast opportunities of Big Data in the shape of predictive analysis, real time and accurate information access, business analytics and intelligence for more efficient decision making, and improving customer service which gives a competitive advantage to the companies. From this evaluation, it is concluded that the opportunities presented by Big Data are immense and outweigh challenges. Also, since the use of Big Data is only on the rise, companies need to adopt it for their financial systems, failing which they will lose out to their competitors. However, the challenges cannot be ignored and require extensive planning and execution of measures which help eradicate them.

REFERENCES

[1] Bollier, D., & Firestone, C. M. (2010). The promise and peril of big data. Washington, DC: Aspen Institute, Communications and Society Program.

[2] Chen, H., Chiang, R. H., & Storey, V. C. (2012). Business intelligence and analytics: From big data to big impact. MIS quarterly, 36(4).

[3] Hu, H., Wen, Y., Chua, T. S., & Li, X. (2014). Toward scalable systems for big data analytics: A technology tutorial. IEEE access, 2, 652-687.

[4] Jagadish, H. V., Gehrke, J., Labrinidis, A., Papakonstantinou, Y., Patel, J. M., Ramakrishnan, R., & Shahabi, C. (2014). Big data and its technical challenges. Communications of the ACM, 57(7), 86-94.

[5] Kambatla, K., Kollias, G., Kumar, V., & Grama, A. (2014). Trends in big data analytics. Journal of Parallel and Distributed Computing, 74(7), 2561-2573.

[6] Lee, J., Kao, H. A., & Yang, S. (2014). Service innovation and smart analytics for industry 4.0 and big data environment. Procedia Cirp, 16, 3-8.

[7] Manyika, J., Chui, M., Brown, B., Bughin, J., Dobbs, R., Roxburgh, C., & Byers, A. H. (2011). Big data: The next frontier for innovation, competition, and productivity.

[8] Marr, B. (2015). Big Data: 20 Mind-Boggling Facts Everyone Must Read. [Online] Available at: https://www.forbes.com/sites/bernardmarr/2015/09/30/big-data-20-mind-boggling-facts-everyone-must-read/#39f40ac917b1. [Accessed: 22nd September 2017].

[9] Oracle. (2015). Big Data in Financial Services and Banking: Architect's Guide and Reference Architecture Introduction. Oracle Enterprise Architecture Whitepaper.

[10] Sarrocco, F. Morabito, V. and Meyer, G. (2016). Exploring Next Generation Financial Services: The Big Data Revolution. Accenture.

[11] Yurcan, B. (2013). Big Data Innovation in Banking. [Online] Available at: http://www.banktech.com/infrastructure/big-data-innovation-in-banking/d/d-id/1296465? [Accessed: 22nd September 2017].