IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 11, November 2017

Big Data Analytics in Higher Education

Preet Navdeep[1], Dr. Neeraj Sharma[2], Dr.Manish Arora[3]

Research Scholar, IKGPTU, Jalandhar, India[1]

Professor & Dean, GJIET, Banur, India[2]

Additional Director, NIELIT, Chandigarh, India[3]

Abstract: With the increase in structured and unstructured data, the use of Big Data platforms to analyze such large data is common. Even the Higher Education sector is not free from its impact .The strategic use and applications of Big Data in higher education would lead to higher educational quality and better student retention. Big Data Analytics play a critical role in performing a thorough analysis of student and learning data to make an informed decision on future course offerings and their mix to cater to the potential and existing students. This paper focuses on the role of Big Data Analytics in higher education

Keywords: Big Data, Big Data Analytics, Higher Education.

I. INTRODUCTION

With the increasing massive amounts of structured and unstructured data in a distributed environment; different government, Non-government and business organizations are forced to seek new technical solutions and managerial approaches in dealing with data. As a result, the concepts and applications of Big Data have taken the world by storm. Big Data is broadly defined as "An accumulation of data that is too large and complex for processing by traditional database management tools" [1].This Big Data are analyzed using different Analytical Techniques referred to as Big Data Analytics. Big Data analytics is used to examine huge amounts of data and can be used to decrypt cipher texts, correlating previously not known variables, finding the trends in the market, checking preferences of customers and finding out data about various businesses and institutions. Data professionals perform analytic operations on the large amount of data which is unconquerable by conventional operations and methodology. Using conventional methodology here is a futile effort and thus Big-Data Analytics proves essential as well as effective solution. Big-Data Analytics can reduce the wait-time of results. Modern techniques such as mining, prediction, text-analytics and relevant data analysis can give in conclusive results and valid and informative decision making process. Nowadays, use of technology in higher education is very prominent. Technology has been introduced into higher education to improve different practices like teaching, learning. When it is associated with educational objectives and standards the impact is reflective. Higher education now not only focuses on providing education but also to explore new means for improving and monitoring student success and other institutional policies. This paper tries to identify how Big Data analytics can meet the expectations of educational Institutes .In this paper; various phases of Big Data analytics in Higher Education sector are discussed. Also, uses and challenges of using Big Data analytics in education are stated.

A. Big Data Analytics in Higher education

Big Data is the next frontier which will revolutionize higher education [2]. Higher education is transforming to meet the changing learning needs and diversity of students. Global changes like advancement, availability and ease in use of technology has steered the change in higher education. Though there have been developments in the educational field, the role of data has been overlooked[3].e-Learning technologies have provided a new platform to enhance the teaching learning .The data trails left by them provide higher education institutions actionable data to adapt to the required changes. The data being stored by the higher education institutions along with the digital data being created by the use of technology has resulted in huge chunks of data which can be termed as "Big Data". Big Data is associated with five V's Velocity, Volume, Variety, Value and Veracity as depicted in the figure 1. The exploration of Big Data in association with higher education would be beneficial in understanding the social, cognitive and emotional aspects of students and teachers.

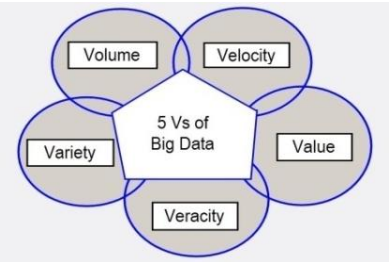

Figure 1 5 V's of Big Data

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 11, November 2017

II. PHASES IN BIG DATA ANALYTICS IN EDUCATION

Major phases involved in analyzing Big Data can be given as Data Acquisition, Integration and Analysis, Interpretation and Implementation.

1. Data Acquisition

Data may be collected from various social networking sites like Twitter, facebook, various Course management systems(CMS) or Learning Management Systems(LMS).Data thus generated is of large volume ,sometimes of petabytes order. To identify the right data and discarding unwanted data is very important.

2. Data Integration and Analysis

Data integration plays an important role as the data stored may be different in data structure and semantics. To process Big Data is a difficult task as data may be noisy and dynamic. Even though the data is noisy, important information can be derived from it. Proper data integration may help in finding missing data, checking conflicting cases and identifying hidden relationships.

3. Interpretation

If the results are not properly interpreted by the decision maker or user, Analyzing Big Data would have less value. The interpretation involves examining all assumptions made and retracing of the analysis. Due to Big Data complexity, this process may be tedious. Hence the necessity to provide supplementary information along with the results is quite essential.

4. Planning and Implementation

The use of Big Data and Analytics in higher education is relatively new trend. Analytics projects to be successful in an institution would require data, technology, statistical requirements and above all skill and leadership. Any effort for planning and implementation of an analytics project in an institution would require leaders committed to decision making based on the institutional data. The role to be played by analytics relies on the institutions vision of the next generation learning system. An institution should identify who can use data to solve complex issues, Identify the key values on which data can be measured, identify tools and models suitable to their requirements in order to use analytics.

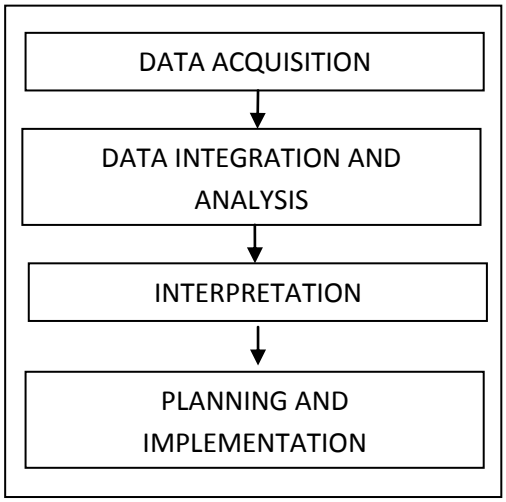

Figure2. Phases of Big Data Analytics in Education

III. Uses of Big Data Analytics in Education

Big Data Analytics will be an important component in education in future. It helps to analyze all the activities in higher education affecting administration, research, resource allocation and management.

1. They can improve decision making and resource management.
2. Success rate of students can be increased by identifying the risk at earlier stage.
3. Institutional growth can be enhanced and challenges tackled effectively by the transparent data available.
4. Innovative models can be developed for transforming the university or college system.
5. Decision making would be facilitated by “what if” experiments.
6. Usage of social networking and technical and information network could provide assistance in handling complex issues.
7. Hard values like patents and soft values like brand building generated by faculty activity can be determined.
8. Productivity of the institution can be enhanced through effective responses generated due to real time data availability.

IJARCCE
ISSN (Online) 2278-1021
ISSN (Print) 2319 5940
International Journal of Advanced Research in Computer and Communication Engineering
ISO 3297:2007 Certified
Vol. 6, Issue 11, November 2017

IV. CHALLENGES OF USING BIG DATA ANALYTICS IN EDUCATION

Even though Big Data Analytics proves to revolutionize the education sector but still there are some challenges faced by education sector in using it. Some of them are-

1. Acquiring Data- Acquiring data for analysis is a great challenge in Higher Education sector. No database system is maintained from where data can be easily fetched for analysis as a result it is hard to develop integrated warehouse for all institutions. Besides, poor quality and incorrectly formatted data from less accessible database system can cause significant problems.

2. Lack of expertise in Big Data Analytics- Due to lack of expertise in Big Data Analytics, it is difficult to analyze Big Data and derive essential results. Since it is new in the field of education, not enough analysts are there who can efficiently analyze the data .Moreover; collecting data from different sources require a good level of expertise.

3. Security and Privacy-Big Data utilization also raises issues around ethics of data collection in regard to quality of data, privacy, security and ownership. It also raises the question of an institutions responsibility for taking action based on the information available. Security and privacy issues pretense additional challenge to implementation of Big Data in higher education

V. CONCLUSION

Big Data Analytics in higher education can lead to a transformation in administration, teaching and learning process. With the use of various Big Data Analytics tools, problems of students can be understood and analyzed to make better decisions. If the challenges are overcome, Big Data Analytics would lead to innovation in education to adapt to the growing needs in higher education.

REFERENCES

[1] A.G. Picciano(2012),"The Evolution of Big Data and Learning Analytics in American Higher Education", Journal of Asynchronous Learning Networks, pp 9-20.
[2] Big Data:The next frontier for innovation, competition and productivity. James Maniyka, Executive summary, McKinsey Global Institute, May 2011,<http://www.mckinsey.com/mgi/publication/big.data/MGI_big_data_exec_summary.pdf>
[3] Wullianallur Raghupathi & VijuRaghupathi,"Big Data Analytics Architectures, frameworks, and Tools"
[4] Pang, B., & Lee, L. (2008),"Opinion mining and sentiment analysis. Foundations and Trends® in Information Retrieval", 2(1–2), 1-135.
[5] Baker, R. S., &Yacef, K. (2009)," The state of educational data mining in 2009: A review and future visions", JEDM-Journal of Educational Data Mining, 1(1), 3-17.
[6] Gobert, J. D., Sao Pedro, M. A., Baker, R. S., Toto, E., & Montalvo, O. (2012).,"Leveraging educational data mining for real-time performance assessment of scientific inquiry skills within micro worlds", JEDM-Journal of Educational Data Mining, 4(1), 111-143.
[7] Bifet, A.,& Frank, E. (2010, October)"Sentiment knowledge discovery in twitter streaming data" In International Conference on Discovery Science (pp. 1-15). Springer Berlin Heidelberg.
[8] Barbosa, L., & Feng, J. (2010, August)" Robust sentiment detection on twitter from biased and noisy data" In Proceedings of the 23rd International Conference on Computational Linguistics: Posters (pp. 36-44). Association for Computational Linguistics.
[9] Chen, X., Vorvoreanu, M., & Madhavan, K. (2014)" Mining social media data for understanding students' learning experiences" IEEE Transactions on Learning Technologies, 7(3), 246-259.