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Big Data Analytics in the Education Sector: Requirements, Openings and Challenges

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ABSTRACT

Big data delivers an opportunity to educational Institutions to use their technological aspects to progress their learning quality and assist the students for their career and their higher education. This paper gives insight about the how big data analytics plays vital role in education institutions and explores the aspects inducing the adoption of big data. Big data afford the educational institutions to create the openings for new technological and vibrant education system for which student fraternity can have maximum profit from the big data and can significantly contribute for the quality of education.

Keywords: analytics driven concepts, big data, big data Analytics, Hadoop, hhigher Education.

INTRODUCTION OBJECTIVES

In this digital era, several technological inventions that have headed to enhance the profit to the society in many domains like Business, Education, E-commerce, Marketing, Security and healthcare.

Industrial developments in this digital era, led to growth in the huge set of people accessing and using digital devices all over the world. Big data and analytics assist the higher educational institutions to make use of this data. Big data refers to huge data sets that are large enough data sets that are collected through mobiles, facebook and all other social media networks will contribute towards big data. In Big Data large datasets pose noteworthy tasks when using commonly used tools and organizations to collect, manage, process and analyze the data within stipulated time. Big data will ensemble with technology that can practices huge amount of various datatypes at faster speed, so the characteristics of big data will high in demand naturally cost-effective, innovative that can process the data and enhance the insights and leads to better decision making.

Fundamental characteristics of big data as follows:

1) **Volume:** It refers to massive amount of datasets collected and that is huge challenge to predictable data structures to store, process and analyses the data.

2) **Velocity:** It refers that capability of accessing and analyzing the big data sets. Example for this predicting the earthquake. The two important factors for velocity is data access time and data mining algorithms.

3) **Variety:** In this massive data sets will be in both structured and in unstructured formats. This data formats usually come from sensors, social media, web applications, etc.

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4) **Veracity:** The quality and authenticity of data and aspects how the data is being stored and how it is mined to the specific problem and being analyzed.

5) **Value:** The significant of the datasets to big data analytics to which the data is utilized and to produce the insights and benefits process within an institution.

The paper was guided by the following specific objectives

1. To highlight the attributes of big data that are relevant to educational institutions
2. Investigate the factors influencing adoption of big data and analytics in learning institutions
3. Establish the factors limiting adoption and use of big data by Institutions of higher learning.

PREREQUISITE FOR BIG DATA IN ACADEMIA

Technology inventions, are enlarged the affordability and usage of digital campaigns have to put a path where enormously large amounts of data are created through the usage of these devices worldwide. Big data Analytics can assist the educational institutions to make use of data generated by these digital ecosystems (Anirban 2014).

Information, states that usages of mobile phones ownership rates are increasing day by day in developing and developed countries in an extraordinary way. If this trend is continue, with data being swiftly produced and composed at a incredible rate and will therefore give to towards big data.

Big Data denotes to data sets that are big sufficient to pose noteworthy challenges when using commonly accessible or traditional tools and arrangements to collect, manage, process and analyze the data within a tolerable amount of time.

Big Data is concerned with developing suit of skills that can process huge volumes of data of numerous types at faster speeds than ever before. Observe that the characteristics of big data are best described as high-volume, high-velocity and high variety information assets which by their nature demand profitable, state-of-the-art methods of information processing that can enable enhanced insight and decision making.

Big Data therefore modifications the way we methodology data analysis, stimulating entirely new families of information services and requiring new processing models and knowledge representations. Big Data consists of extensive datasets, primarily in the characteristics of volume, variety, velocity, and/or variability that require a scalable architecture for efficient storage, manipulation, and analysis.

Spreading of big data systems across horizontally-coupled autonomous resources to attain the scalability required for the efficient processing of extensive datasets.

Big Data as data that is too big in terms of volume, and moves too fast in terms of its acquirement and scrutiny the speed that normally beats the processing capacity of conventional database management systems.

Many educational institutions are moving to cloud design and with the increase use of digital devices by users in this digital system is prominent situation and more data is collected in educational institutions creating significant openings for using big data to analyze and associate information that boost decision making.

Big data will give a futuristic path to the educational bodies for analyzing and utilizing the numerous amount of student data, to determine the future of higher education. It states that Big data application for education sector is accredited to technological inventions and developments, which have categorized the growth of analytics in higher education.

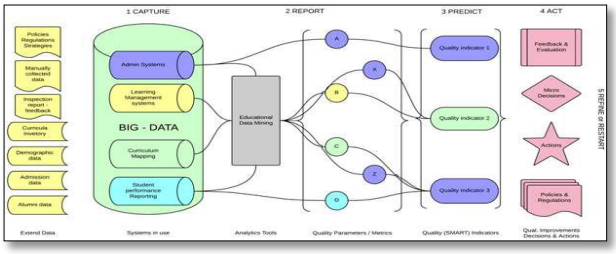


Figure 1: Analytics Driven Conceptual Framework

The Information technology are predominant incomes for institutional strategy and policy making for the future. An illustration of Big Data Environment is presented by figure 1 above.

Big Data Analytics is related in addressing a noteworthy number of pressing issues for education systems.

1) increasing educator effectiveness;
2) harnessing insights from learning experiences;
3) delivering education for all that may also be tailored for individual learners needs; and
4) equipping students with relevant skills for their future careers.

Higher education institutions are confronted with pressure to improve with the quality of learning outcomes though cutting costs to create a noteworthy relationship with the learners. This is attainable when the higher educational institutions have the competence to grasp the data collected during the admission of the student, financial sourcing and instructional procedures to maintain, support and reach the greater and better learning outcomes.

Big data technologies have been transforming by new revolutions in database technologies, hardware, specifically in memory and storage capacities and better availability of internet bandwidth connections. The Hadoop ecosystem which includes Pig, Hive, Mahout, and RHadoop is a good example of the Big Data technologies that can be deployed in educational systems. Hadoop and NoSQL are skilled of analyzing the large heterogeneous datasets at unparalleled speeds.

The Apache Hadoop is for instance develops open-source software for consistent, accessible and distributed computing. In fact, organizations such as Yahoo, Google, and Face book have invested in the Apache Hadoop Project with a view of addressing their Big Data needs.

The Apache Hadoop software library framework permits distributed dealing out of huge data sets across clusters of computers through simple software design models, and is considered to measure up from single machines to multiple machines.

Nowadays, the educational sector is becoming more digitalized and technology oriented in developing countries and are ready to accept the new technologies such as ubiquitous computing devices and the Massive Open Online Courses(MOOC) in all domains and departments which are absolutely converting the mode and accessibility to teaching and learning.

In this digital ear of cloud and mobile computing, there are numerous openings for regenerating and transforming the education. Massive open online courses (MOOC) are new phenomenon in higher education sector. MOOC defines courses offered completely through online where learners can get their certificates when completing the courses and offers a new pattern of shift in the delivery of learning. The virtual classroom is another important tool for learning programs are based upon, and on which instructors can share learning material through the webinar, google classroom, etc. These tools, composed with other learning management systems create a lot of data which can be stored and analyzed for use in predicting the students' academics.

Big Data Analytics is beneficial in permitting educational institutions using such technologies to develop value from these bases of data. Enhancements in Internet accessibility mean that big data analytics can be useful to help decrease the costs of education and progress student performances by examining and contribute modified and self-paced learning solutions for learners.

Higher education institutions emphasis on better quality of education and the accession and maintenance of students and faculty historical data and using business intelligence tools to report and analyze the data.

Big Data analytics has the strength for the positive effect for all the major areas that are of significance for an institution of learning. In areas such as student enrollment and retaining, integrated information management and reporting, operational cost management, regulatory compliance and research.

By using analytical thinking and learning institutions can achieve thorough examines of student and learning data to make informed decisions on upcoming course offerings in order to cater for the needs of potential and existing students.

FACTORS INFLUENCING BIG DATA ANALYTICS IN EDUCATION

The declining costs of big data storage, open source software such as Apache Hadoop, NoSQL databases, network bandwidth and on-demand access to incomes through cloud computing are bringing these complex technologies close to nearly everyone.

Prospectus of good practices of responsibility by stakeholders and expand the requirements based on guidelines to recommend decision-making are some of the representatives that are contributing to the significance of big data in higher education. To follow the suitable technology stands that will lead big data analytics and the relative technical skills like data analysts to provide a meaning for this. The reason behind is henceforth data can no longer consider as office tool but it can have viewed as real time decision making tool which is used by data scientists to conclude a useful information.

Information Technology is reforming and intensifying the education ecosystem beyond old-speeches and teaching space to provide learners' who require flexibility in time and distance through online classes.

This digital educational system has more pressure and response to economic, political and social modifications which is in turn to inculcate the students disciplines, giving training to the young graduates with skill, attributes and good futuristic attitude required by the industry and the community.

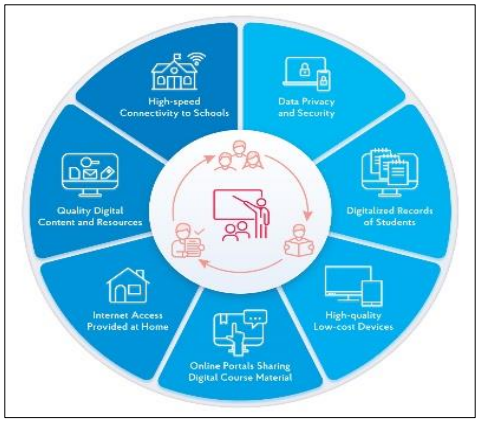
Big Data and analytics in higher education can be transforms, shifting the prevailing processes of administration, teaching and learning and contribute to policy outcomes by helping address present challenges facing educational systems.

Effective Institutions have used big Data in the following ways

- Creating a culture of completion and outplacement.
- Reducing nonproductive credits.
- Redesigning delivery of instruction.
- Redesigning core support services such as human resources, academic services and finance to produce strategically useful data.
- Optimizing non-core services and operations.

NEEDS, OPPORTUNITIES AND CHALLENGES

- Helping Learners
- Helping Mentors
- Developing Curriculum and Learning Process
- Helping Administrators



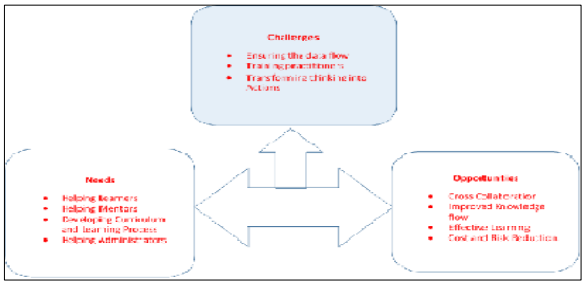
Helping learners

Using Big data we can discover the skill and knowledge of the students and guide them for their potential short and long term goals.

Developing Curriculum and Learning Process

It helps to design unique and customized curriculum according to current industry needs. At the same time we have to take in account that students learning capacity and capability for creating customized syllabus. so educators have to build curriculum that facilitate the learners in a better way.

Helping Administrators



CONCLUSION

The exponential growth in terms of capacity and complexity of data in last decade has led to substantial research in the field of big data technology.

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