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Big Data and Information Analytic Support for Indonesian Higher Education: During and After Covid-19 Pandemic

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Abstract

More than 20 years since the Directorate General of Higher Education of the Ministry of National Education of Indonesia has encouraged the use of technology for education, very few universities have made use of online learning. With the influx of the COVID-19 pandemic, suddenly all lecturers across universities are transforming and even the digital revolution. After the issuance of the Minister of Education and Culture Circular on March 9, 2020 to university leaders to conduct learning from home, in a short time many universities switched to online learning modes. The use of online learning platform is increasingly becoming a trend in the world of education. This trend gave birth to a data explosion in Higher Education which became a new innovation for the world of education, namely Big Data. These large amounts of digital data will provide information on what students and academics see and read, student behavior and involvement, their assessment, motivation and preferences, thus providing a large amount of data that can be extracted for the learning experience. Big Data provides an opportunity to educational Institutions to use their Information Technology resources strategically to improve educational quality and guide students to higher rates of completion, and to improve student persistence and outcomes. This proposes work paper aimed at explores the attributes of big data that are relevant to educational institutions, investigates the factors influencing adoption of big data and analytics in learning institutions and seeks to establish the limiting factors hindering use of big data in Institutions of higher learning.

Introduction

With current developments, this big data can be processed and used again, even giving better results because it includes data processing in social media. The use of information technology in Indonesia has touched all areas of life, namely economy, politics, culture, law, education and healthcare. The development of information technology systems makes human activities easier and faster every day. For example, the entire transaction process is carried out with an electronic process, starting from paying for electricity, water, plane tickets, trains, online shops, student tuition fees, mobile collaborative healthcare (Syafar and Husain, 2017) and many more. Information technology has been used to carry out various main activities in higher education, starting from the payment of tuition fees, registration of lectures every semester, registration of final and comprehensive sessions, attendance and lecture minutes, even the learning process to assessment. Data on education and teaching, research, community service, and other supporting activities has also been reported using information technology. All of these activities from time to time lead to digitization of data which in turn causes a data explosion in Higher Education, thus opening up opportunities for big data analytics in universities. Drigas and Leliopoulos (2014) stated, "... Big Data can really improve the education. Can afford to shape a modern and dynamic education system, which every individual student can have the maximum benefit from that .... ". This means that the use of big data in the world of education will be able to form a modern and dynamic education system that is beneficial for lecturers and students. Large amounts of digital data leave behind what students and academics see, what they read, their engagement and behavior, judgments, as well as their interests and preferences, thus providing a large amount of data that can be mined for the learning experience.

Research Problem

Based on the background of this problem, several problems that arise in this study can be formulated, namely: 1. How does big data technology involve the world of education? 2. How is the use of big data analytics in higher education, which includes academic analytics, learning analytics and process analytics?

Research Objectives

This study aims to provide proposals for the use of big data analytics in higher education, which include, academic analytics, learning analytics and academic analytics. In addition, with the use of big data, universities are expected to be able to map their strengths and weaknesses for policy making.

Theoretical Foundations

Big data can also be defined as a problem domain where traditional technologies such as relational databases are no longer able to serve. Big data is more than just a matter of size, it is an opportunity to find insights in new and emerging types of data and content, to make your business more agile. , and answer questions that were previously considered beyond your reach. Big data can be interpreted into 9 characters (IBM) according to respondents, so it can be concluded by IBM, Big data is data that has a very large scope of information, a real-time information model, has a large volume, and is based on social media data so it can be concluded that Big data is a dataset that has a large volume and one of its contents is based on social media data, and the information from Big data is always the latest (latest data) so that the information model is real-time, and the scope of information is not focused on small industries only or large industries only but all small and large industries.

Data digitization has opened up opportunities to use big data in universities. The value of big data lies in the results of analysis and predictions or the actions taken from the results of these analyzes and predictions.

Data digitization enables effective practice to utilize big data analytics in the form of learning analytic, academic analytic and process analytic. By using big data analytics in Higher Education which is supported by the cooperation of all educational enterprise contributors, be it students, staff, lecturers, administrators, and the community, it is possible to make accountable decisions based on information and data mined carefully, so that in the end it supports increasing decision making based on data in tertiary institutions in an effort to improve the success performance of students and institutions.

Görnerup et al., imply that Big Data presents a good framework for efficiently utilizing the vast array of data in shaping the future in higher education sectors. In addition, Wagner and Ice (2012) states that the implementation of Big Data in higher education is attributed to technological innovations and developments that trigger the growth of analytics in higher education. Moreover, Drigas and Leliopoulos, (2014), found that Data Warehouses and Cloud Computing coupled with greater ownership of digital devices Higher Education stakeholders are allowing to obtain, manage and maintain big data. These Information Technologies are important resources that are useful in driving HE business strategy and decision making. According to Educase (2019), Information Technology makes available sophisticated platforms that provide computing power necessary for ploughing through big data analytic, and turning these masses into meaningful information

With the use of big data analytics in higher education, it can be obtained more insight into students, academics, and the process in higher education so that it supports predictive analysis and increases decision making based on data which in turn can help improve the success performance of students and institutions.

The use of big data analytic in higher education which includes learning analytic, academic analytic, and process analytic.

1. Learning Analytic

Big Data Analytic can be used to analyze in real time student experiences that can be generated from student activities, such as: lecture registration, payments, class participation, online learning, and assessments.

Learning Analytic is analyzing learning data in real time so that it can be used to predict successful students and students who are at academic risk. With big data analytics in higher education can provide insight into students who are at risk of dropping out so that preventive action can be taken (Syafar et al., 2019b; Syafar et al., 2017) or provide additional support to increase their success, and confidence, in the learning process before they really fail.

Learning Analytic has the potential to help students and lecturers together recognize signs of danger before threats to learning success materialize. Learning Analytics provides tools, technology, and a platform to empower educators and open doors to meaningful learning experiences that can engage, inspire, and prepare current and future students for success.

For learning analytics, you can use data sources from Student Information System data, Course Magement, Online Education, Student Assessment, and finance data.

2. Academic Analytic

The object that can be analyzed in Academic Analytic is the performance of academic staff. With academic analytic, real time analysis can be carried out on data which is a variable measurement of academic performance so that it can be seen that outstanding academic staff and academic staff are underperforming compared to other academic staff. For the academic analytic process, you can use data sources from the Outcomes Assessment data, Lecture Assessment, Staff Assessment, Faculty Assessment, and Finance Assessment data. Data captured and processed by these systems is not comprehensive and is process dependent, making it difficult to be reused for any other sources or process innovation (Syafar et al., 2015).

3. Process Analytic

Big Data Analytic can also be used to analyze real time business processes in Higher Education. The data used can be obtained from log data or activity data from students, lecturers, and units related to the processes and activities that occur in tertiary institutions to then carry out process analytics using process mining to find new business process models. However, process analytic is not limited to the process discovery of business processes but also allows for compliance checking, detecting deviations, predicting delays, supporting decision making, and recommending process redesign.

Meanwhile, process analytics can use data sources from log activity data from the Student Information System process or mobile learning system (Syafar et al., 2019a), Course Management, Online Education, Student Assessment, and log activity data from the finance process. Student Assessment, and data finance.

Data from several sources is then collected in a data warehouse to be analyzed using real time analysis and predictive technology, such as: OLAP, Analytical Reporting Tools (Business Intelligence), and Data Mining / Predictive Modeling.

The results of the analysis and predictions will be displayed in the form of a Dashboard Analytic Presentation which is expected to support the improvement of decision making in higher education in an effort to improve educational, academic performance as well as the success of students and institutions.

Research Method

This research intends to use a qualitative research design. Semi-structured interview approach will be used as the research methodology, which will provide an opportunity to triangulate as the primary source and materials from the literature review and result of Delphi study as the secondary source. The methodology intends to employ for respondents open-ended deliberations, fixing future analysis by questioning significant explanations made by the respondents. This method of qualitative research attests, and most appropriate particularly when the phenomena to be researched are not accurately understood or known, and researcher desires to get an in-debt understanding perspective from respondents experienced in the aspect. The target respondent will be the IT person of Indonesian universities.

Result Expectation

Now after one semester online learning are running on during the Covid-19 pandemic, we saw a lot of learning can be picked. The case of the spread of Covid-19 in Indonesia still not showing a significant decrease. Data on September 10, 2020, it still shows its height new cases in several provinces in Indonesia, with the number of new cases was 3861, which is much higher of the number of patients who recovered, which was only 2310 people. Thus, it seems that the situation is not quite yet under control and many regions still apply status Large-Scale Social Restrictions (PSBB).

Hence, process of online learning in higher education in the semester to become still not yet fully likely to come back "Normal" as before. Distance learning and especially learning online seems to still be coloring if it isn't dominate the lecture process at various Universities. This matter also indicated by the results of various surveys conducted, both in Indonesia and abroad. Experience one semester this should be that learning valuable so that the next online learning process can be organized in a more planned, structured, In the midst of the uncertain situation, the lecturers has demonstrated a tremendous capacity to remain running the learning wheel in various ways, make use of various learning resources exist, and with a capable spirit of serving. Plague Corona virus that came suddenly was able to revolutionize perspective, mindset, and behavior patterns of the academic community

our higher education. Uncertainty has turned into opportunities to innovate. systematic, and quality.

Conclusion

This paper will be explored Big Data Analytics and its relevance in Higher Educational systems during and after pandemic Covid-19 with a view of helping Indonesia universities adopt Big Data Analytics. The research will also explore the attributes of quality of big data and information analytic that are relevant to Indonesian HE sectors, and looked at the factors hindering the use of big data analytic.

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