Data Science in Education

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Abstract

Data Science has also changed the way in which students interact with teachers and evaluate their performance. Instructors can use data science to analyze the feedback received from the students and use it to improve their teaching.[1] Data Science can be used to create predictive modeling that can predict the drop-out rate of students based on their performance and inform the instructors to take necessary precautions.

IBM analytics has created a project for schools to evaluate student's performance based on their performance. Universities are using data to avoid retention supplement the performance of their students. **For example**, the University of Florida makes use of IBM Cognos Analytics to keep track of student performance and make necessary predictions. Also, MOOCs and online education platforms are using data science to keep track of the students, to automate the assignment evaluation and to better the course based on student feedback.

1.Introduction

Education is the key to shaping the lives of people. It holds the power to transform and enrich the lives of people. Since the dawn of civilization, humans have evolved through education and have developed mechanisms to improve education. In the 21st century, where data is omnipresent in every walk of life, education is no exception. With advancements in computing techniques, it is possible to imbibe all the information through powerful big-data platforms. In this we will discuss how data science is playing a key role in making education better for society.

2. Applications of Data Science in Education

2.1. Social-Emotional Skills

Social-Emotional Skill is an important area that needs to be developed through education. Through this, a child learns to acquire a capacity to understand, analyze, express and manage emotions. He also learns how to develop a relationship with others. Facilitating growth in social-emotional skills is an important task of educational institutes. This is an example of a non-academic skill that plays a major role in defining the learning capabilities of the students.

Previously, there were various statistical surveys that would assess these social-emotional skills. However, with the advancements in computational methodologies, it is possible to gather a large amount of data. With the formalized knowledge discovery models in Data Science and Data Mining techniques, it is possible to gather such large information and incorporate it with the existing tools to produce better results. Furthermore, with the

data that is extracted, data scientists can apply various predictive analytical techniques to help the teachers in understanding the motivation of the students for studying the course.

2.2 Monitoring Student Requirements

There are several evaluation and assessment techniques that are utilized by educational institutes. However, such traditional methodologies were often unable to capture and encapsulate all the important trends and patterns of student services. Furthermore, most of the assessment techniques were not in real time. With the advancements in **Big Data analytics**, it is now possible for the teachers to scrutinize their student requirements based on their performance and reviews.

As a result of monitoring student requirements, teachers are able to provide appropriate responses and even change their teaching methodologies to meet student expectations. Many times, teachers have an unconscious bias towards certain students. A data platform will treat its users with a zero bias, meaning that there will not be any bias in the evaluation of student performance. This will provide an equal platform for all the students to engage and develop their skills.

2.3. Innovating the Curriculum

Various Universities have to keep themselves updated with the demands of the industry so as to provide appropriate courses to their students. Furthermore, it is a challenge for the universities to keep up with the growth of industries. In order to accommodate this, Universities are using Data Science systems to analyze growing trends in the market.

Using various statistical measures and monitoring techniques, data science can be useful for analyzing the industrial patterns and help the course creators to imbibe useful topics. Furthermore, using **predictive analytics**, universities can analyze demands for new skill sets and curate courses that address them.

2.4. Measuring Instructor Performance

The performance of students depends on the teachers. While there are many assessment techniques that have been used to assess the performance of teachers, it has been mostly manual in nature. **For example**, student reviews about the performance of teachers make, have been the standard tool for quantifying teaching methodologies.[2] However, all these techniques are not an efficient method and usually take time to assess. Furthermore, reading student reviews and creating an analogy is a tiresome task.

With the breakthrough in data science, it is possible to keep track of the teacher performance. This is not only valid for recorded data but also real-time data. As a result, with real-time monitoring of teachers, rigorous data collection is possible, along with its analysis. Furthermore, we can store and manage unstructured data like student reviews on a big data platform. And, with **Natural Language Processing**, it is possible to analyze the sentiments of the reviews and provide a comprehensive analysis of teacher performance.

3. Data Science Case Study

3.1 The University of Florida – Using Big Data Analytics to Mitigate Student Dropout

A college education is considered to be a gateway to a successful life. Many students enroll in colleges in the hope of making a career. However, many students drop out due to academic or financial challenges. According to a recent survey conducted in the United States, at least 54.8% of incoming students will be unable to finish their degrees within 6 years. This staggering percentage means that industries will have limited access to qualified individuals. This will also impede national growth.

In order to solve this menacing issue, education institutes are looking towards Data Science. One such Institute is the University of Florida. The University utilizes IBM InfoSphere to Extract, Load and Transfer data from multiple resources. It also makes use of the IBM SPSS Modeler for **predictive analytics** and **data modeling**.[3] It aligns these two platforms with the powerful IBM Cognos Analytics.

IBM Cognos is a powerful, web-based business intelligence tool that provides various toolsets for reporting, analyzing and monitoring events through interactive visualizations. Using IBM Cognos Analytics, the university is able to analyze and predict student performances. It uses various variables like student background, demographics, high school grades, the economic background to assess the dropout probability for the students. Therefore, it will help the university in devising its policies and providing early intervention for students who are on the verge of dropping out.

Summary

In the end, we understand the **diverse role of data science** in the field of education. Data Science has revolutionized every sector and has brought a positive change to scenarios. We overviewed how data science is becoming an effective tool for shaping not only academic skills but also non-academic skills like social-emotional skills. Furthermore, it is used for evaluating the performance of students and teachers. Universities are using Data Science to curate curriculum, keeping in mind the growing trends in industries. Furthermore, we took a look at the use case of how the University of Florida is relying on the IBM Cognos Analytics to reduce the student drop out rate.

References

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