A Prediction Model for Improving Accuracy of Students Performance Using Big IoT Data Analytics

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ABSTRACT
Today the big data analytics are playing a very important role in various field like business, organizations, health care, weather forecast because the huge amount of big datasets have been produced since the past some years via educational apps, organization's websites, and social media. There are a lot of educational big datasets are available which have generated through the online courses, Institution's report like student academic result, student placement activity performance records. Those types of datasets have stored in form of unstructured data. Thus big IoT data analytics has the capability to process unstructured data and predict the valuable information insight into large datasets and this information we can use for the next coming student in the campus for improving their performance. In this paper, we have given a prediction model to improve the accuracy of student's performance such as job placement by using big IoT data analytics. The Internet of Things (IoT) devices has enabled to connect all digital devices to each other and share the information among them. The proposed prediction model can be improved existing learning process and will find out which students are not performing well then further the management can provide extra facility to that type of poor students.

Keywords: Big Educational Data, Big IoT Data Analytics, Clustering, Sampling Technique.

I INTRODUCTION

Due to rapid growth of technologies in education sectors for learning online by using various tools and framework. Almost every institutions and organizations are moving towards online administration process such as admission process, online result display, placement activities etc. in the online process the educational data has been stored in digital form within databases. Once the student has completed their course then his academic data has stored only for records but here we can previous students' performance data for improvement of future student's performance. The Internet of Things is the interlinking of heterogeneous devices with each other together via internet. By the using IoT technologies we can improve the existing learning systems and to make smart education system. The smart education system, the student continuously monitored by using the sensors devices which will measure the student's activity in daily life and to be stored information on the servers. If the student is not able to come and attend the lecture in classroom then he can join from his home also because IoT technologies have ability to connect each and every device with each other and share the information to all over the devices [1]. After the came information and communication technologies especially the internet becoming over more ubiquitous within the education system and its play key role in Improving education quality. At present there are different seven types of technologies which are bring numerous innovation and benefits in the education sectors like consumer technology, visualization technology, learning technology, enabling technology, social media technology, digital strategies, and internet technologies. In which IoT technology to supports education in various ways. The following figure1 has explored how IoT technologies transforms knowledge delivering and obtaining creating an intelligent experimental teaching and learning environment. The IoT can help solve diverse challenges across an educational sectors, it is used to reduce cost and resource usages. These technologies allow enabling to remote access to equipment, virtual meetings and learning sessions, use cloud computing and big data analytics for shared services and solutions. Furthermore improve design of organizations and universities buildings, designing ICT- intense smart building which has smart doors, locks, radio frequency-Identification, Cameras and connected devices with the help of smart devices monitoring and surveillance of entire buildings for secure and safe learning environment [2].

Fig.1 The smart IoT educational environment

II INTERNET OF THINGS IN EDUCATION SECTORS

The Indian education system is mostly moving around the reading books, attending class, exam and grades, where the creating learning lies far away. Even teachers also teaches within the syllabus and the students focused on that only part but today an existing technology development in education that is known as cloud computing. The students and administration have opportunities to quickly access different types of application platform and resources by the web pages on their need without leaving the classroom they can take notes, textbooks could be scanned to be received instant additional resources. The IoT and cloud computing technologies enable users to access and control data on internet. Teachers can identify problem area in which students tend to make mistakes by analyzing student records which are storing every day and will allow teachers to improve teaching material and methods [3]. Big data analytics is rapidly emerging as a key IoT initiative to continuously improve the education system. The IoT data analytics will perform lightning-fast analytics with large queries to allow colleges and universities to gain rapid insights and make quick decision in the case of subject or stream selection. The following figure 2 shows the relationship between IoT and big data analytics.

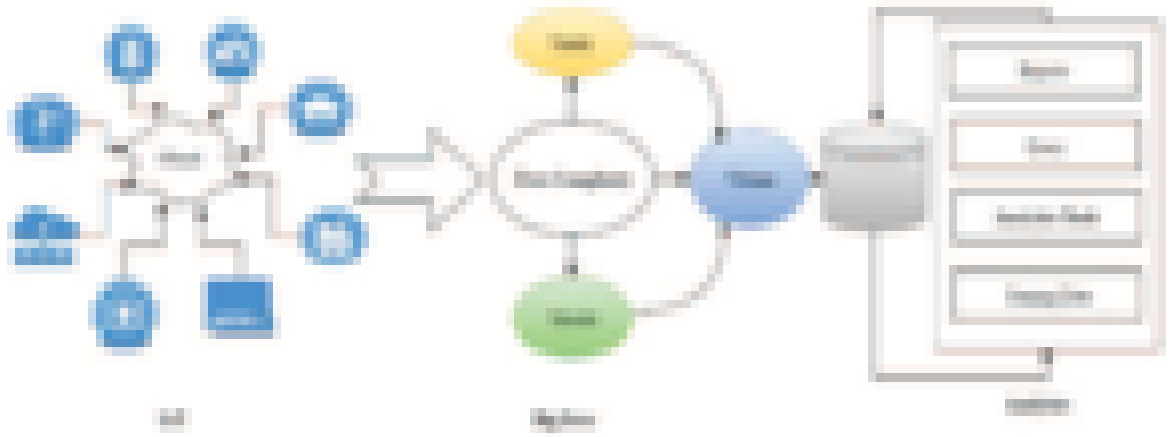

Fig. 2 The Relationship Between IoT and Big Data Analytics

The IoT technology can be divided into three parts and to enable the management of IoT data. The first part managing IoT data sources which are connected through sensor devices such as CCTV cameras by using web applications. The second part, the data generated from different sensor devices are called big data because which are based on 3Vs- Volume (collection of heterogeneous data sets), variety (data in various format structure, unstructured or semi-structured) and velocity (the speed of data generation). These large amounts of data are stored in big data files in shared types of databases. For processing these huge amount of data, we need a powerful analytics tools such as Hadoop MapReduce, spark etc. which is the last part. The figure3 is the complete architecture of Internet of Things (IoT).

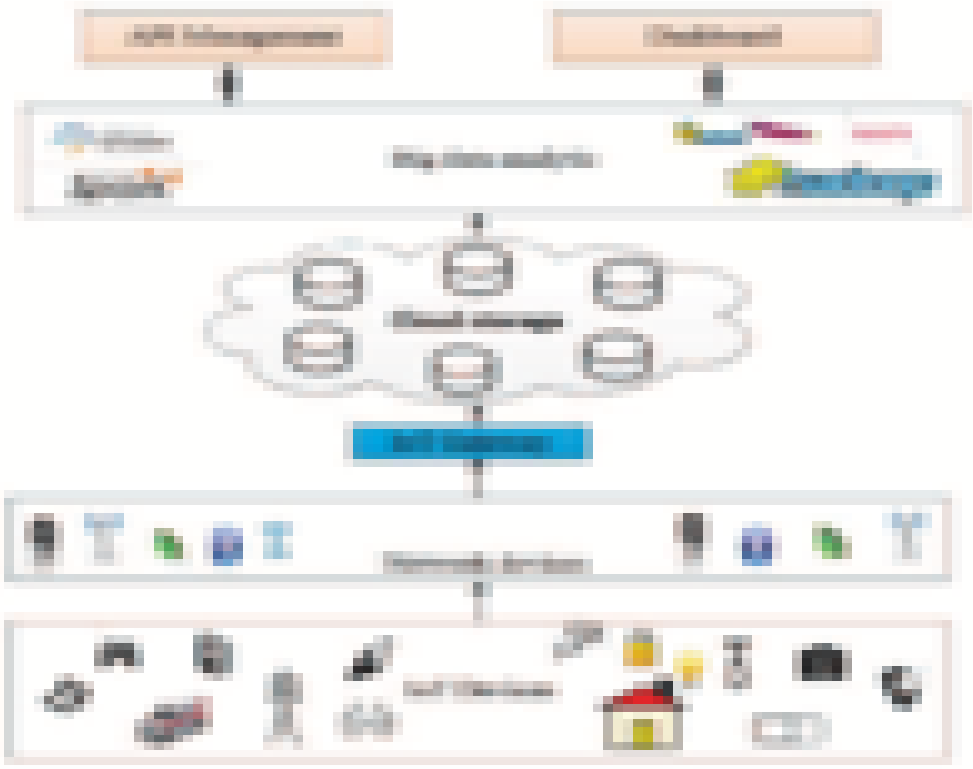

Fig. 3 The architecture of Internet of Things

In the figure3 IoT device layer, connected to all object to each other's via network devices and store the all datasets on cloud through the IoT gateway. The multiple queries will process through the big data analytics layer which will provide information to the users [4]. The IoT inclusions in education provide facility for the student to become active participants accessing to their courses, laboratories and exercises at any time from many places. The following table1 has explained the major concept of IoT in education [5].

Table 1
The collaboration Learning Benefits

Social Benefits	➢ A social support system for learners. ➢ Diversity understanding among students and staff. ➢ A positive atmosphere for modeling and practicing cooperation. ➢ Learning communities.
Psychological Benefits	➢ Increased students' self-esteem. ➢ Reduced anxiety. ➢ Positive attitudes towards teachers.
Academic Benefits	➢ Critical thinking skill. ➢ Active participation in the learning process. ➢ Improved classroom results. ➢ Appropriate problem-solving techniques. ➢ Personalization of learning lectures. ➢ Increase students' motivation.
Assessment Advantages	➢ Utilization of variety of assessment like observation of the group, self-assessment of the group and individual assessment of the members in a group.

Technologies have played a significant role in the field of education for connecting and the students. It will also improve the education infrastructure and administration management with the IoT applications. The following figure has shown the IoT based smart environment.

Fig.4 The architecture of Smart Campus based on IoT

There are also some key points like automatic attendance tracking system, wireless door lock and real-time feedback on lecture quality [6]. After the migration of IoT in education sector then IoT brings tremendous challenges and opportunities also. Some of the IoT challenges in education when IoT will implement, the challenges includes: cloud computing, instructional technologies, security and privacy, research computing, quality and ethics and finance [7].

III ADVANTAGES AND FUTURE SCOPE OF INTERNET OF THINGS

The IoT technology will open door for new and innovative smart education system. School and colleges can improve their campuses and enhance access to information. It creates smart lesion plan for all student where they can access anytime and anywhere. It is also optimizes cost of lighting on the room occupancy, cost of heating, ventilation and air condition system and automatically opening and closing the windows. Furthermore the IoT based technology will helps to enhance and improve the performance of each student. In which the student has facility to customize their courses according to needs because some students does not want to all things. Thus they can customize and adopt the education for the improvement in accountability and performance. One of the most important advantages of IoT based education system is to enhance collaboration among educators and learners [8].

IV PROPOSED PREDICTION MODEL

Data mining is a process to discover and extract novel and useful patterns from the huge amount of datasets through the mining algorithms. The data mining algorithms are enable to extract the hidden pattern from large datasets, through the classification process we can predict the class of object whose class label is unknown. The association analysis is able to frequent items occur together in a given datasets. Data mining enables in various sectors like in industry, healthcare, city governance, education etc. the following figure 5 shows the overview of data mining process [9].

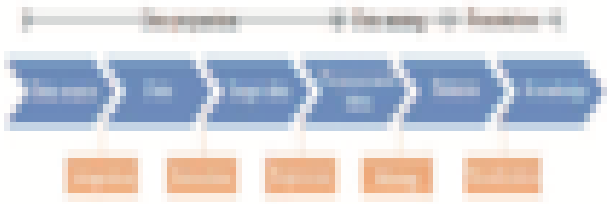

Fig. 5 the Overview of Data Mining Process

The k-nearest neighbor algorithm has been frequently used in pattern recognition because of it enables composed image features in three types: color feature, shape feature, and texture feature. The single types of feature cannot explain the feature of any object with complex background [10]. The application of Internet of Things in education, we can get lots of monitor image data from the student which they have done in their daily academic activity. Through the image data we can identify the satisfactory of student in classroom and also in other academic activity like stress. This image data analysis will help to improve student performance.

Fig. 6 Graphical Representation of Proposed Model

The proposed model will provide scale teachers and best quality of instruction, convert ad-hoc decision making into data-driven decision. Smart classroom with scale content recordable and replication instruction at any time from anywhere. The student can access to crowd-sourced content and they can also customize curriculum. This model has five layers, the data input layers will collect student activities and teachers also from various IoT devices like sensor, cameras, RFID and so on. After the collection of datasets the devices will send to the cloud via network layer for storage these datasets. The IoT data analytics layer will process those datasets and the result sends to the monitoring layer. The institution management will monitor from anywhere at any time. Furthermore the management can decide which type of facility is needed to improve the student's performance.

V CONCLUSION

This paper demonstrates the potential value of Internet of Things in education sectors for improving the student's performance through the monitoring daily activities. The IoT can change education policies and give potential impact on making secure campus with IoT devices. In this paper, we have discussed about the potential value of IoT in education and have given a prediction model for improved the student's academic performance. This paper also has explained the advantages and challenges of Internet of Things in education and realizes the benefits from the connected people or collaboration learning.

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