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Intelligent Student Progress Monitoring application (Ispma)

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Abstract: *In the world of digitization where every student is holding a smartphone, the scope of distraction is endless. The interest of students is fading in studies and schools and colleges are burdened with students performance. If the student's progress is monitored carefully the student gets an overall learning experience and teachers get feedback to help students with progress. The Education system faces certain human limitation as a barrier to progress monitoring. With a vigilant progress monitoring system the teachers can impart knowledge better. India is moving fast paced towards digitization. The education system also has been digitized greatly with innovative Teaching Aids, smart classes, learning content in AV form, number of Apps, and most importantly free internet. The smartphones and the internet are something that every student has access to. Separating a phone and a kid or teenager is next to impossible. The smart phones and free internet certainly make the student vulnerable to various distractions that may hamper students progress and overall growth. If the phone becomes the progress monitoring device?, then the things would be a lot easy. Here comes our proposed technology Intelligent Student Progress monitoring Application (ISMA). This is a fully automated system that works on the data that is received through a number of sources and process the data. Each student is then evaluated and the machine starts progress monitoring the student according to the behavior pattern, interests, and evaluating other traits. The feedback of which is sent to the institution and Parents.*

Keywords: *Education Technology, Hadoop, monitoring progress, personalized learning, machine learning*

I. Introduction

Education is vital to the human resources development and empowerment in the stages of growth of a nation. Education has become increasingly important in providing a competitive edge for individuals, regions, society and the nation as a whole in the global market. India has a number of universities that give out best IT, science and scholars of many other fields. However the literacy ratio of India is 65.38% with male literacy at 75.85% and female literacy at 54.16%[1]. Rural India does not have a good institution for education after school or maybe junior college. The role of institutions becomes more challenging in the modern world with innovations and technological developments. The biggest challenge in India remains the student and teacher ratio, that is as high as 22.0. India has always seen a traditional teaching method, or the Chalk and Blackboard teaching but now with digitization the classrooms are equipped with Projectors and web-based learning aids. However digitized the infrastructure be students need a continuous progress monitoring and assessment, for a enhanced progress and personalized learning. A mechanism or a system is needed that would monitor the student, and provide feedback to both parents and teachers. This would prove to be essential in developing the students skill development and overall personality enhancement.

II. Reviewing The Current Education And Progress Monitoring System

Learning in India is based on an assessment framework; it is highly ‘exam-oriented’ rather than ‘outcome-focused’ as believed by 92% teachers. Although teachers consider skill development as a critical factor the system focuses more on examinations. The teachers also face a certain resistance from parents and policymakers. But with digitization the overall learning experience has increased in the past 5 years[2]. In today's digitized age there are few personalized progress monitoring system avaliable, the students today can access any type of content on internet, which results in affecting the students progress as well as personality. The student also becomes vulnerable to many non-sensical games such as blue wale and many more. This needs to be addressed as parents and teachers cannot be with the student throughout also they do not have access to the students social media, they tend to be left unmonitored or monitored with limitations. If there is a continuous independent automated progress monitoring system at a lower cost and low limitations then the students would

[1] http://www.tarang.org/facts/facts-statistics-about-education-in-india-2.html
[2] Pearson Voice of Teacher Survey, 2016

be benefited with a complete learning experience, this experience would lead to overall personality and progress enhancement of the students.

III. The Need For Progress Monitoring And Personalized Training

The students in the urban areas undergo a lot of stress, when it comes to education. The family and even institutions can be exam-centric and seek the student to score out well in the exams. Just for the numbers the student toggles between college, tuitions, assignments and homework. In 2015, the number of student suicides stood at 8,934. In the five years leading to 2015, 39,775 students killed themselves. The number of attempted suicides, many unreported, is likely to be much higher. India has one of the world's highest suicide rates for youth aged 15 to 29, according to a 2012 Lancet report, which illustrated the need for urgent interventions for this demographic[3]. Conversations with counselors revealed that young people find it difficult to cope with failure in examinations and careers and neither families nor other social institutions offer adequate support or solace. The major problem is that they are been left unmonitored. The students are deprived of teacher's attention as it is not humanly possible for teachers to individually monitor each student in schools and colleges. For an overall development of student a personal attention and continuous progress monitoring is essential which does not happen, as it's humanly impossible for the teacher or parent to do so. Once the student leaves the premises of the institution he is left again unmonitored. The proposed mechanism has the ability to monitor and train the student with received plan of action. This gives ample attention as well as necessary feedback of students to teachers and parents. The student receives a completely personalized experience from the institution.

IV. Scope Of The Technology.

The proposed technology has a really wide area of development in the field of intelligent education systems. Through this technology the reach of the teachers and institution is extended and personalized. The continuous progress monitoring also helps in planning teaching methods and counseling the student, protecting students from various dangers of digital age. The technology does not require any new data to be collected or created it works on data that is collected during admission procedure, curriculum and teaching aids. This widens the scope of personalized learning and teaching with available resources.

V. Proposed Technology's Functionalities.

In today's time the admission procedure has become online and this is stored in the institute's database. The admission form requires the student to fill personal, pre-educational and family details. Also the student requires documents such as previous qualification mark sheets to be uploaded. This new system uses this data as primary source and social media profile of student as secondary source to evaluate and analyze the student. The system needs this basic data to start the monitoring. All the data that is collected is stored in a cloud undergoing a continuous evaluation process. It keeps on working according to its feedback collected through the various data inputs. The system also keeps the parents updated as their child progresses. Using predictive modeling technique we are also able to predict the problems associated with the student and provide precautionary solutions and plan of action for the teacher or institution. The system keeps on updating itself and makes sure that it is focusing on each student differently as required.

VI. Architecture Of Proposed Technology

Stage 1- Data Input and storage

The Proposed system will accept the data from various sources. The data such as personal and family details, previous educational qualification, and social media handles, phone and email act as primary data source and social media handles act as secondary data source. It is through the secondary data source a mood and behavior analysis can be made. All of the primary and secondary data sources, the analyzed data, the output, is stored in a single cloud. This cloud also has third-party bundles to provide feedback to concerned teachers and authorities.

[3] Every hour, one student commits suicide in India, Hindustan Times, May 08, 2017

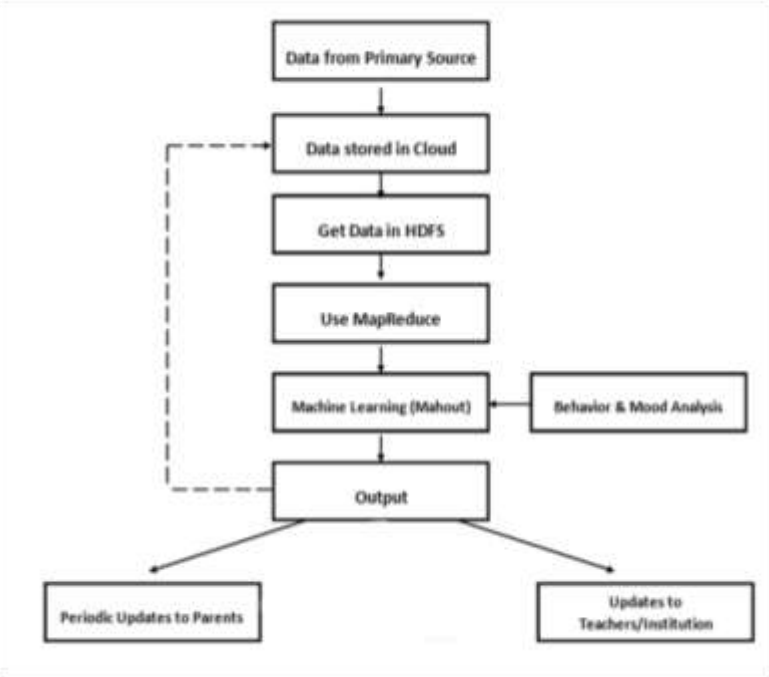

Fig 6.1: Architecture of proposed technology.

***Stage 2*- Data Processing**

The Primary Student data from the HDFS is passed on to Apache Mahout, a Machine Learning Algorithm within HADOOP. Mahout uses the MapReduce Paradigm to sort and cluster data within Hadoop. Once big data is stored on the Hadoop Distributed File System (HDFS), Mahout provides the data science tools to find meaningful patterns in those big data sets and function as the Machine is programmed. Here the Machine would be programmed to intelligently process the data and give out necessary suggestions as planned. Using the Distributed Item-based Collaborative Filtering or Using a Parallel Matrix Factorization the Machine can suggest or predict a user's choice by looking at user preferences for similar items. And using Minhash Clustering for quickly predicting similarity between two data sets, while Parallel FP Growth Algorithm Analyzes data in a group and then identifies pairs, the machine would then suggest the best possible solution and send the output to the user. Also, the Machine would be trained in doing a collective analysis whilst using the data being recorded and send a periodic reports and updates. The algorithms such as Dirichlet Process Clustering would perform Naive Bayesian

Mixture Modeling that would generate multiple data processes into a single model. The model would then be evaluated in Hierarchical Clustering using either an agglomerative "bottom up" or divisive "top-down" approach. After which a K-Means Clustering would be performed that would now sort out the partition n observations into k clusters in which each observation belongs to the cluster with the nearest mean.
This data pattern now identifies the student's interests, performance in tests, previous student history and gives a feedback in form of output.

***Stage 2.1* - Behavior and Mood Analysis**

The social media Data is collected for behavior and mood analysis. As we are asking the students to furnish their social media handles, we can extract tweets, posts etc real-time using flume. Flume has a simple and flexible architecture based on streaming data flows. The data would then be sent to HDFS using the Flume HDFS Sink. The unstructured Data is preprocessed using the MapReduce Algorithm, The Textual data such as posts, tweets etc are pre-processed and OpenNLP, LMClassifier, Naive Bayesian, Algorithms are applied and a sentiment Analysis takes place. The output of the behavior and mood analysis is now collectively sent to the machine learning model to give a collective output. The machine now has enough training on each student to keep on executing its progress monitoring and keep on self-learning.

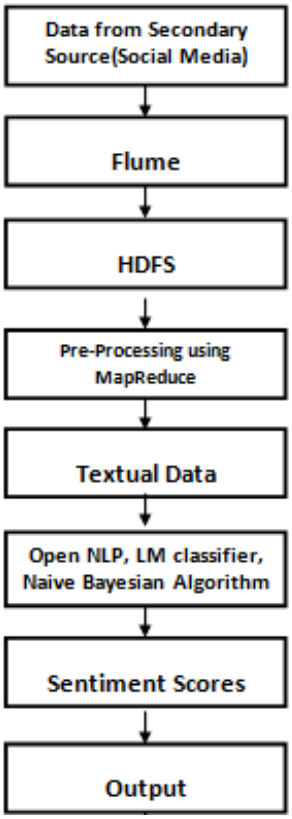

Fig 6.2: Behavior and Mood Analysis

Stage 3- Automated feedback

The analysis through mahout gives output to various sources. In the output, it generates feedback to the institution. Suggesting plan of action.

VII. Limitation

- The proposed system has to be kept in check for any system or human errors.
- The proposed system depends on execution of feedback by human
- The proposed system also depends on reaction of the student to the feedback.
- The secondary stored data has to be kept updated.

VIII. Conclusion

In this Technological work we propose a technological framework that would revolutionized student progress monitoring experience. The technological framework can be brought into application and tested to derive a detailed knowledge of the proposed idea. This technology works on Intellectual and emotional capabilities of each Students. The Technology monitors each student individually and gives feedback according to individual needs. The needs and behavior of student was analyzed and taken into consideration to provide a personalized feedback to the teacher or institution. The proposed technology is an independent entity that is based on self-learning model. The technology keeps on updating itself on basis of continuous data analysis. The technology works on minimum data input, the data that this technology uses is completely based on regular admission procedures. The technology become economical, since the technology uses majority of the existing infrastructure such as data, storage, etc. with many benefits the proposed technology as a whole has the ability to monitor the student progress and keeping parents assured of their child's progress.

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