

ROLE OF SENTIMENT ANALYSIS IN EDUCATION SECTOR IN THE ERA OF BIG DATA: A SURVEY

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Abstract- “Don’t let technology steal the art of storytelling from you; use technology to tell story better”, says Prahlad Kakar, a leading Indian ad director. Although Big Data has unfolded its wings in an unprecedented manner in every sector, the education sector is still at a slower pace in capitalizing on Big Data which is attributed primarily by Volume, Velocity and Variety. Sentiments being a valuable part of human nature have profound relevance in every domain and education sector is no exception. Sentiment Analysis also called Opinion Mining plays a promising role in education policy making. The paper aims to shed light on the diverse application areas of the education sector where Sentiment Analysis plays a defining role.
Keywords – Big Data, Education Sector, Feedback, Sentiment Analysis, Student, Teacher

1. INTRODUCTION

Medium of communication have drastically changed over the years from traditional media to social media. The amount of exploding data created in the past two years is greater than the amount of data ever created in the history of mankind. The internet community has grown over 7.5 per cent by 2016 and is expected to grow in leaps and bounds. The massive amount of data generated comes in all formats namely structured, semi structured and unstructured. With the generation of large volumes of data, businesses must be quick enough to take competitive edge over the competitors by mining value from the available data. Even though the education sector generates large volumes of data, the adoption of Big Data analytics is slow in comparison to sectors like Banking and Securities, Media and Communication and so on. Inadequate computational tools and policies and lack of human assets, privacy and security concerns can be attributed to it [1].

The data generated in the educational sector is varied. The structured data includes enrolment data, attendance, grades, progression data and others to unstructured data like the students opinion expressed on social media through web blogs, discussion forums and social networking sites. Efficient Sentiment Analysis of all the education data across different sources can help in making better informed policies thereby contributing holistically for the betterment of the education sector. Sentiment Analysis can be applied to the exponential volume of data for the target users such as student, teachers and the organization as a whole. Application of Sentiment Analysis techniques at the document, sentence or phrase level enables efficient business applications, helps to make better decisions and facilitates early prediction of trends. Education Data Mining (EDM) is a booming field that tries to answer the persisting problems of education. Big Data analytics can resolve all the issues of the education sector. Georgia State University for example adopted new data analytic tools to deliver solutions to the long pending problem of student retention [2].

Sentiment Analysis is a buzz word and an intuitive method to understand the subjectivity of reviewers. The growing popularity of social media among people to express their views and opinion has paved the way to find subjective reviews. Work on Sentiment Analysis done currently can be classified from different point of views: technique used, text view, rating level and so on.

Machine learning, lexicon based, rule-based are some of the different classifications from the technical point of view. Considerable amount of learning algorithms are used to resolve the sentiment by training on a known dataset in the Machine learning approach. The lexicon based approach determines the polarity of the sentiment using the semantic orientation of words or sentences in the review. Semantic orientation is the valuation of subjectivity and opinion in the text. The rule-based approach organizes the number of positive and negative words by looking at the opinion words in the text. The classification from the text view is document, sentence and word/feature level classification. Rating level classification can be further classified as aspect rating and global rating [3]. Programming languages like Python and R have made Sentiment Analysis comparatively easier with lots of built in libraries and packages. Student enrolment, expansion, student course selection optimization, student conduct and retention, teaching effectiveness are some of the major business challenges where the application of Sentiment Analysis plays an outstanding role. Massive Open Online Course’s (MOOC’s) have become a crucial component in the education sector. The biggest challenge that appears in MOOCs is the student retention rate. The huge dropout rate attracted a greater need to introspect the fallouts. The application of Sentiment Analysis technique enhances the instruction design. Multimodal Sentiment Analysis can be applied to extract deeper emotions which sometimes may not be possible from textual analysis. Incorporation of audio-visual equipments helps to detect emotions of different target users.

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Multimodal Sentiment Analysis describes how audio and video is taken in parallel from an audio-visual input to determine emotions from facial expressions [4].

The paper is organized as follows: Section II focus on the Role of Sentiment Analysis in the context of Teaching Effectiveness. Section III features the Role of Sentiment Analysis from a Student's Perspective. Section IV highlights the role of Sentiment Analysis in the context of the organization as a whole. Section V gives the concluding remarks.

2. ROLE OF SENTIMENT ANALYSIS IN THE CONTEXT OF TEACHING EFFECTIVENESS

Role of teachers have surprisingly changed over the years with the advent of Big Data. Teachers are now required not just to get accustomed to the usage of new tools but also keep pace with cutting edge technologies. Teachers are the skeleton of any educational system. Effectiveness of a teacher is not just measured by his/her academic qualification but also by dedication, skill and commitment. The most effective way for a teacher to improve teaching methodologies is by taking timely feedback from students. Feedbacks can be open ended and/or close ended. Open ended textual feedbacks are difficult to observe manually to draw conclusions as they are filled with observations and insights. Sentiment Analysis can be used to extract useful information about the teaching methodology of a teacher and also towards the course curriculum. Sentiment Analysis identifies students learning curve, understand students need, foresee their performances and make effective changes in the teaching style [5]. The explosive data set of students must be mined efficiently with respect to only the required dataset. Results of Sentiment Analysis help the teachers and the organization to take corrective actions. Rewards and appreciation can be presented to those teachers about whom student exhibit positive sentiments [6]. Employee satisfaction plays a very vital role in the growth of an educational institution. Mining sentiments from the faculty end in terms of encouragement, good teaching tools and equipments, recognition, appreciation at the organizational level can be done at regular intervals to get answers to the long pending problem of faculty volatility. [7] Highlights the importance of Twitter as a prominent social media platform to derive and mine public interests and opinions. The role of Twitter to education policy making is also highlighted. The proposed model would be implemented using Python and Natural Language Toolkit. [8] proposes a Sentiment Analysis System that aims to improve teaching and learning by performing temporal sentiment and emotion analysis of multilingual student feedback in terms of teaching methodology and course satisfaction. Open source language R is used by the system to perform pre-processing and sentiment analysis of data as shown in Figure I.

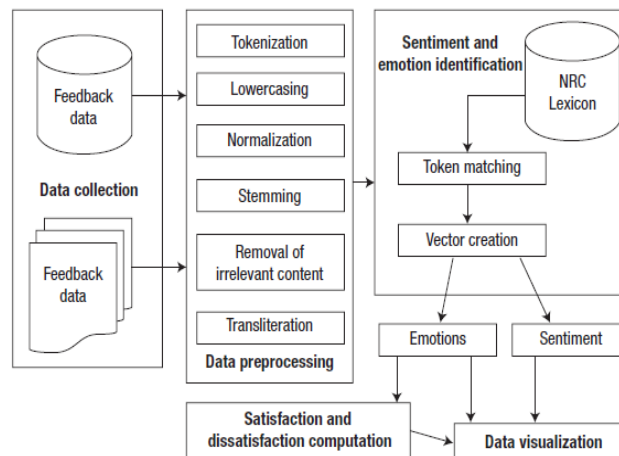


Figure 1. Proposed Sentiment Analysis System Architecture

3. ROLE OF SENTIMENT ANALYSIS FROM A STUDENT'S PERSPECTIVE

Acquiring the most talented students has nowadays become a no easy task. Universities and colleges have begun to make use of social media extensively for marketing and advertisement. Students and their families do extensive on line research by mining data to gain better understanding of the prospective institution. They connect with students of similar interest through blogs and other discussion forums and gauge the quality of interested colleges and universities [9]. Personal factors, academic quality, campus facility, socialization, financial aid and policies are some of the key factors that students primarily focus on before the enrolment process. Research conducted at the university of New Hampshire reveals that 96% students use Facebook, 84% use YouTube, 20% use blogs and 14% use Twitter. Application of Sentiment Analysis techniques would work wonders if applied to the student enrolment process.

The success of any educational institution depends on the good academic performance and retention rate of students. A student's conduct is a measure of how well the student performance academically. A student's overall campus life plays a prominent role in academics. Installation of sensors in the college premises gives an understanding of a student's behavioral activity inside classrooms, library, cafeteria, dormitory and so on. The analysis of student datasets pertaining to profile,

archival conduct and demography provide intuitive diagnosis. Sentiment Analysis of social media data can efficiently help institutions to frame curriculum and increase student retention rate. Big Data technologies provide the required and efficient methodology for the collection, storage and processing of large datasets belonging to different variety of data types and samples [10]. Feedback analysis of student's parents also plays a prominent role for the institutions to provide a homely atmosphere where the students can be shaped better by making them feel at home.

[5] Course recommendations systems like the Degree Compass matches students with courses that best suits their ability. Recommendation systems developed by Netflix, Amazon and Pandora encouraged the development of the project. The system mines student data such as grade and enrolment data and ranks to help students opt for suitable course in their academic life. Tableau, Quibble, Qlike is examples of some tools that analyses educational data.

4. ROLE OF SENTIMENT ANALYSIS IN THE CONTEXT OF RESEARCH OPTIMIZATION

The credibility of any institution is noticeably reflected by the research practices being carried out in the institution. Good quality research brings grants not just from the government sector but also from other respective bodies thereby bringing the institution to limelight. Good quality research work is possible with bringing in interested faculties, students and resources under a single umbrella. Sentiment Analysis of the faculties and students involved in the research work gives an estimation of team work, sentiments about each other and help understand pace of research work. Big Data tools and applications make use of scholarly data that helps in research and management on both personal and collective fields [11]. Academic social networks such as Academia and Research Gate provide a platform for the inference of research work. Cloud based Big Data analytics allows researchers across the globe to find likeminded people who could contribute to the projects. Sentiment Analysis can help to determine the research environment and if initial phase looks unsatisfactory, then further research proceedings can be thought about, otherwise the required resources both human and non-human along time frame required can be determined. Big Data solutions incur much lower cost for the storage and processing of magnitudes of research data thereby serving as a storage and analytical platform.

Decision time is the most critical aspect of education data which is real time in nature such as daily course attendance, online learning activity, campus behavior and so on. Organizations are keener on obtaining real time data in order to make a more enhanced analysis and derive value from it.

5. CONCLUSION

The education sector is undergoing tremendous transformation to live up to standards in today's competitive world. Every aspect of the education is incorporating positive changes. The paper highlights the importance of Sentiment Analysis in the era of Big Data in the education domain. With the generation of voluminous data in the recent years, technologies have been developed that makes storing and processing of data much easier. Large amount of data sets can be obtained, mined and realized to analyze sentiments. Different target users namely teacher, student and the educational institution has been touched upon. With the embodiment of human resources, tools and techniques, the education sector can incorporate Sentiment Analysis extensively to harness every aspect of education.

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