

COURSE EVALUATION SYSTEM USING SENTIMENT ANALYSIS

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ABSTRACT

The popularity of Massive Open Online Courses (MOOCs) has encouraged students to investigate online learning, highlighting the need to improve the efficacy and engagement of traditional education. This study examines how machine learning can be used to enhance educational feedback systems, with an emphasis on examining feedback and student engagement. Through the application of data-driven insights, we aim to pinpoint areas in which formal education needs to improve and to recognize achievements. This study emphasises how crucial it is to use machine learning to adjust traditional education to the rapidly changing nature of education while providing students a say in the curriculum.

Keywords: Massive Open Online Courses (Moocs), Online Learning, Traditional Education, Machine Learning, Educational Feedback Systems, Student Engagement, Data-Driven Insights, Formal Education, Curriculum, Adjustments.

I. INTRODUCTION

In the dynamic realm of postsecondary education, improving the caliber of lectures and seminars at universities has emerged as a top priority. When management and students communicate openly, regular feedback evaluation takes place. In the past, this evaluation procedure has frequently depended on structured questions and numerical evaluations in an effort to evaluate the caliber of instruction and learning. But it's becoming more and more clear how limited this strategy is. Individuals have a natural tendency to communicate more subtly and expressively, whether they are teachers or students. Online feedback forms have become increasingly prevalent as we go farther into the digital age, replacing the previous period of paper assessments. However, this shift alone is not enough to meet the needs of the entire education ecosystem. Sentiment Analysis allows universities to uncover the hidden information behind students' words, allowing them to gain a deeper understanding of their experiences, worries, and ideas. This allows institutions to make better decisions, adjust curriculum and teaching methods, and ultimately improve the quality of their education. Therefore, the use of sentiment analysis on student feedback and engagement not only improves course evaluation but also makes it meaningful, creating a culture of continual improvement within higher education. That's why we plan to create a secure web app for review gathering of students to make the transition from traditional numerical feedback systems a smooth and intuitive process where students can express their thoughts, experience, and ideas in natural language.

The following are the project's main goals:

- To assess the efficacy of the course by examining student reviews written in natural language.
- To develop a powerful online application for handling student feedback on courses and determining what worked and what didn't.
- To anonymously gather ratings and comments from confirmed course participants.
- To assess the course material and its delivery and to use natural language processing to analyse feedback.
- To improve the effectiveness of university courses for students by making them more participatory, welcoming, and interesting.
- To reduce the communication gap that exists between educators, students, and management.
- To assess each student's performance individually during the course and the course educator's performance based on their input.

The web application is designed for students and management to use. Students can write anonymous reviews of faculty and courses on the website, allowing them to express their opinions freely. Junior students can use the website to get opinions from different students about various courses and faculties, which will assist them

in making informed decisions about elective subjects, and they will benefit from better faculty. Management can get accurate and unbiased opinions from students about various faculties and courses, which will assist the institute in providing updated or modified courses to students, as well as analyzing the performance of various faculties. It will also make it easier for the institute to collect student reviews from time to time, and update courses and faculties accordingly.

II. COMPARATIVE STUDY OF SIMILAR SYSTEMS

There's no globally accessible platform that meets all of our project's goals in a specially developed manner. To improve the way they deliver their courses, some universities manage their own in-house methods for grading courses. In addition, a number of methods are employed on an as-needed basis to gather student evaluations and comments and provide it to the staff in a categorized way. The platforms listed below are a few of them.

1. University of Texas at Austin - Course Evaluation System:

UT Austin uses a scalable web-based platform designed to promote teaching excellence and ongoing enhancements to the university's educational program. This program has enhanced student response rate as it can be used to produce QR code which will take them directly to your survey rather than forcing them to travel via their dashboard.^[6]

Features:

- clear mobile UI
- an easy to use
- integrated with Canvas for enhanced accessibility

Limitations:

- internet access needed
- used only at UT Austin

URL: <https://provost.utexas.edu/the-office/academic-affairs/course-evals/>

2. Paper-based Text Feedback:

Staff members print out forms on paper in hard copy and provide them to particular students so they can write reviews. After reading each response separately, suggestions for improvements are made in light of the response. This is how a course is traditionally evaluated using feedback.

Features:

- students can submit reviews in normal language
- paper copies are kept for future reference

Limitations:

- Secure physical space needed for feedback storage
- is time-consuming
- Biased student selection may produce inaccurate results.

3. Online Feedback:

A questionnaire is prepared in an online form through services such as Google Forms, Microsoft Forms, Monday Work Forms, etc. Usually, the responses to these questions fall into one of five categories: "strongly disagree," "strongly agree," "agree," "neutral," or "disagree." Alternatively, the responses might be rated on a scale of 1 to 5, with 5 representing the highest rating. The survey is intended to be completed by students. The evaluation of these responses is not assured.

Features:

- Simple to access and save
- Simple and quick to make
- Simple formatting for educators and administrators

Limitations:

- readily manipulable
- no further student communication

III. COURSE EVALUATION SYSTEM

a) Planning

The project aims to accommodate a number of users from different groups, including administrators, management personnel, and students. The systematic method for evaluating the course is as follows.

- Create the web application's user interface. We developed an intuitive and user-friendly portal for students and management using the React.js framework based on javascript technology. The purpose of implementing authentication systems is to provide data security and user identity verification.
- Through the web application, students may anonymously post reviews regarding instructors and courses. They can even edit or remove their ratings, giving them complete control over the criticism they receive.
- Gather evaluations and ratings for various classes and departments. Then, train a sentiment analysis model to identify the sentiment indicated in a text, such as a review or comment. The model then analyses the content and categorises it as neutral, positive, or negative.
- Incorporate the model into the online application. Additionally, include a function that allows prospective students to view opinions about faculty and courses, which will assist them in selecting courses with superior faculty.
- The backend functionality for handling database transactions, user authentication, and data processing is implemented using Flask, a micro-framework written in Python.
- Tableau is a potent data visualisation application that is used to assess instructor and student performance, analyse feedback, and spot trends. These visual aids will facilitate speedy comprehension of intricate patterns and data.
- Install the online application on a secure server so that management and students may access it.

b) Methodology

Course evaluation is a continuous loop in which the educators deliver the course content as per the university guidelines and syllabi. Once delivered, examinations are conducted to test the students on their understanding of the subject whilst collecting feedback on the performance of the respective faculty in that semester. The collected reviews are then cleaned, processed, and analysed to gain meaningful insights on course-content delivery and the faculty expertise. The analytics are published for open access to the students, staff and management alike while maintaining the anonymity of the reviewers. The management takes action on the basis of these analytics to improve the quality of education in their college and the university at large. The cycle continues into the next semester.

The RoBERTa model was incorporated into the project to analyse the reviews using sentiment analysis. After the application of RoBERTa, we further classify the data frame of positivity, negativity, and neutrality in the comments and reviews. This helped us to convert the numerical variables into a categorical variable.

RoBERTa, short for "Robustly optimised BERT approach," is a cutting-edge natural language processing (NLP) model that builds upon the success of BERT (Bidirectional Encoder Representations from Transformers). In the context of educational feedback systems and student engagement, RoBERTa can play a pivotal role in several ways:

- Understanding Student Feedback: RoBERTa's advanced language processing helps educators better understand student feedback, enhancing insights into student perceptions and needs.
- Personalised Feedback: RoBERTa enables educational systems to generate personalized feedback, addressing individual learning needs and boosting student engagement.
- Automated Assessment: With the sentiment analysis capabilities, RoBERTa can automate assessment and grading tasks, providing timely feedback and streamlining the grading process.

- Curriculum Optimization: By analysing data, RoBERTa can identify areas for curriculum improvement, helping educators optimize teaching strategies for enhanced student engagement and learning outcomes.

A flowchart outlining the project's implementation at the university level is provided below.

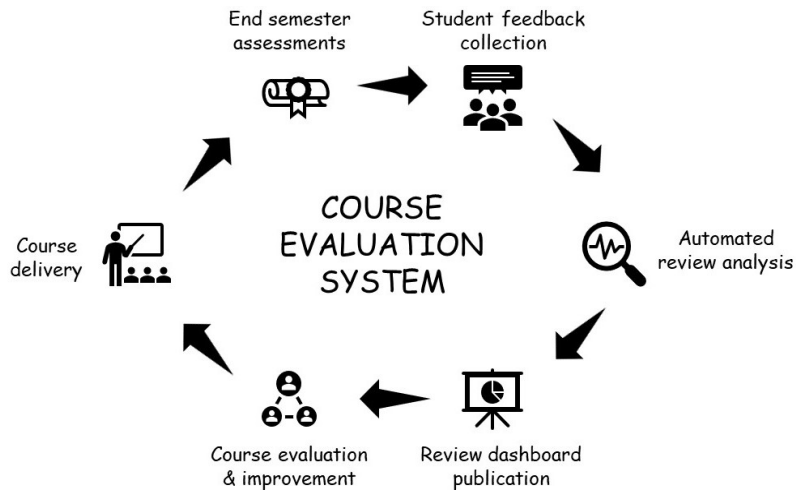


Figure 1: Flowchart of the Course Evaluation System [7]

The following diagram depicts the flow of data through different components or modules within a course evaluation system.

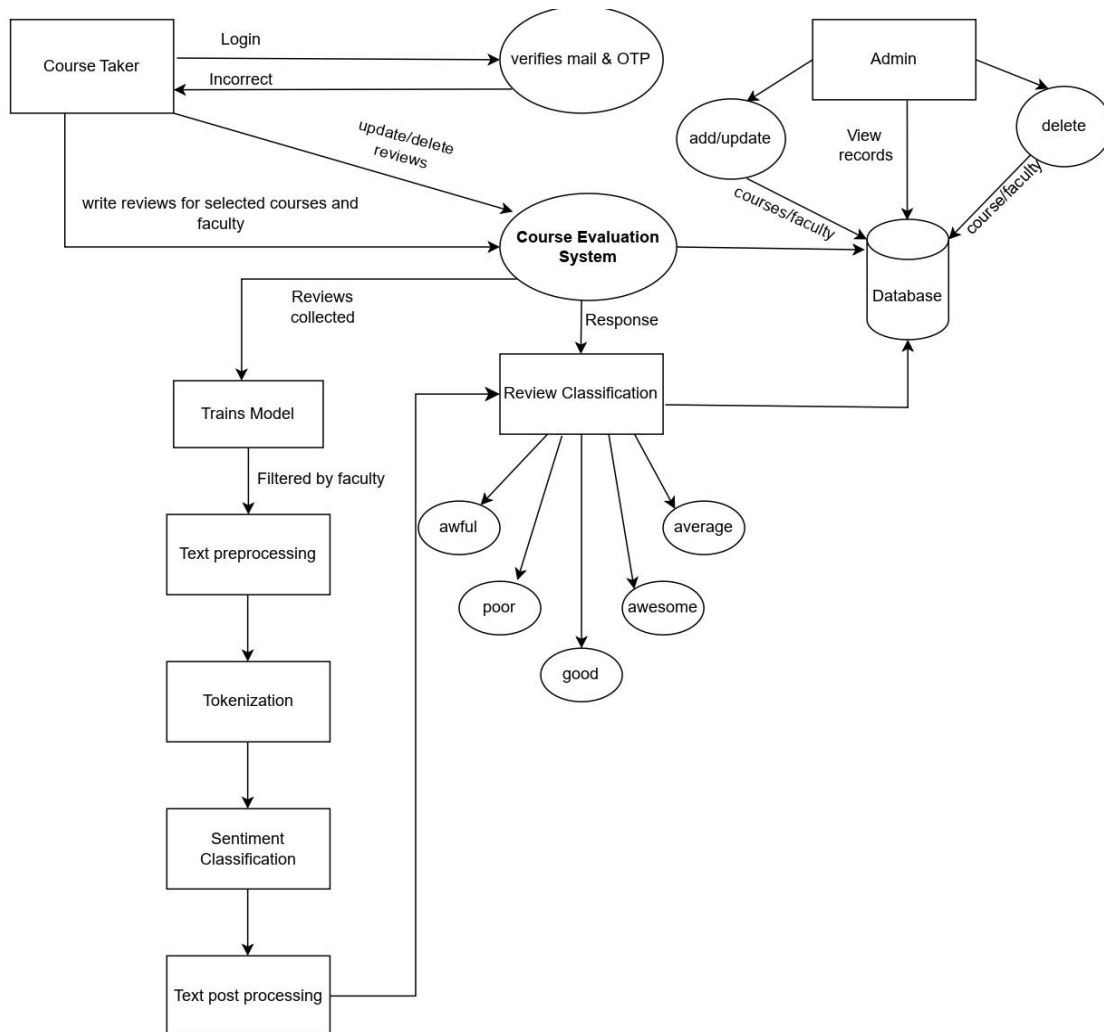


Figure 2: Data Flow Diagram of Course Evaluation System [7]

c) Dependencies

The dependencies of this project are enlisted below.

- RoBERTa (pre-trained model)
- PostgreSQL (database)
- HTML (frontend)
- CSS (frontend and UI/UX design)
- React.js & Javascript (frontend with dependency on NodeJS)
- Flask & Python (backend)

d) Results & Discussion

The comparison model is the RoBERTa pretrained model. Consequently, 82% accuracy was attained. Therefore, RoBERTa categorized data was finally used. Also linked below are a few word clouds from the dataset under examination. Every word cloud comprises the terms that were used in the evaluations, with the size of each word signifying its importance or frequency.

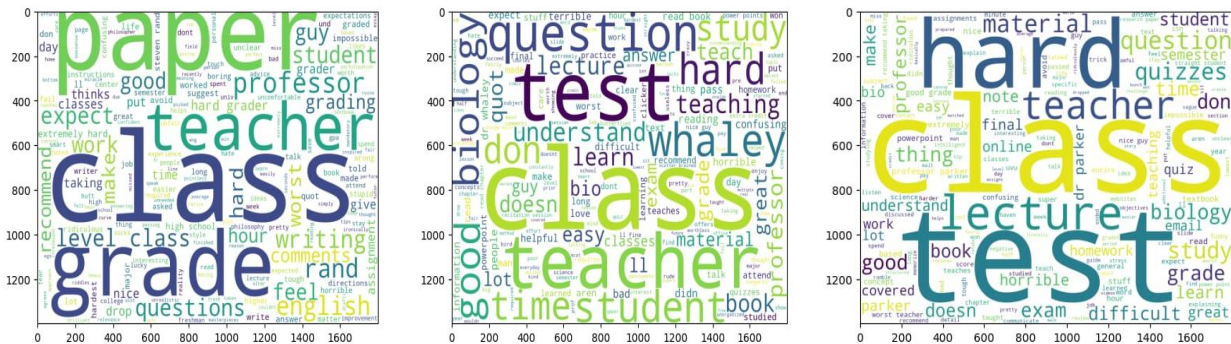


Figure 3: Generated Word Cloud of the Feedback Dataset

This methodology concentrates on the creation and implementation of the web application, stressing the advantages it offers to management and students alike, as well as the security and privacy of student data, and the possibility of ongoing and future improvements. A website devoted to course review can help boost student response rates, giving objective feedback on the courses that are currently being offered.

IV. CONCLUSION

In the field of education, feedback serves as an essential compass that points learners and institutions in the direction of excellence and progress. In light of this, the creation of our web application represents a substantial advancement since it provides students with a dependable platform to obtain important insights that will help them navigate their academic paths. Our online application stands out as a reliable ally for students who must make the crucial decision of selecting their courses for the forthcoming semester since it rates courses according to the frank evaluations of those who have taken them. With the use of this resource, students can better make decisions and match their academic goals with their tastes and desires.

Furthermore, our program gives light on teachers' performance that goes beyond course assessments. It gives educational institutions a useful tool for spotting and developing extraordinary teaching skill by taking into account both the caliber of feedback and the academic accomplishments of their students. This advances the institute's pursuit of excellence while also improving the educational experience.

In summary, our online application closes the gap between student experiences and institutional development, paving the way for a time when education will be more than just the transfer of knowledge—rather, it will involve fostering a cooperative ecosystem of growth and feedback. This tool acts as a beacon, pointing the way towards a time of wiser decisions, more challenging coursework, and outstanding educational opportunities as we traverse the future of education.

Our project faces challenges due to a limited dataset size, compounded by the narrow pool of available feedback from students, restricted by the capacity of institutes to accommodate course participants. Additionally, managing traffic spikes poses a significant concern. As a typical institute website, our platform may struggle to

handle sudden surges in user traffic. Without dedicated servers for managing heavy loads, the website risks crashing or becoming inaccessible during peak usage times, resulting in poor user experience and data collection disruptions.

V. REFERENCES

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